



*Northeast Decision Sciences Institute Conference*

*March 26 – 29, 2014*

*Philadelphia, PA*

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**PART 1: NEDSI 2014 Proceedings**



**Northeast Decision Sciences Institute Conference**

**March 26<sup>th</sup> -29<sup>th</sup>, 2014**

**Philadelphia, Pennsylvania**

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DECISION SCIENCES INSTITUTE

*Northeast Decision Sciences Institute  
Conference Proceedings*

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*Proceedings Editor*

*Minoo Tehrani, Roger Williams University*

**Northeast Decision Sciences Institute Conference Proceedings  
Philadelphia, 2014**

**Best Paper Presentation Winners by Undergraduate, Master's and  
Ph.D. Students**

**Marketing Strategies and Sustainability: The Case of Coca Cola and Proctor  
& Gamble**

**Eda Surucu, Amanda Losapio, Russell Greenstein**

*Roger Williams University*

*Best Research Presentation*

*Undergraduate Student Category*

*Faculty Supervisor: Minoo Tehrani, Roger Williams University*

**Healthcare Information Technology Workforce Changes and Its Implications**

**Vishnoo Charan Reddy Kothapeta**

*Hofstra University*

*Best Research Presentation*

*Master's Student Category*

*Faculty Supervisor: Alexander Pelaez, Hofstra University*

**Humanitarian Logistics: Lessons from Operations and Supply Chain  
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**Mehmet Yalcin, Degan Yu**

*University of Rhode Island*

*Best Research Presentation*

*Ph.D. Student Category*

*Faculty Supervisors: Douglas Hales, Henry S. Schwarzbach, Satya Chakravort,  
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# **Does experiential learning improve learning outcomes in an undergraduate course in game theory – a preliminary analysis**

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## **Abstract**

In today's learning environment students are faced with countless distractions. In order to engage a generation of technologically savvy students, new avenues of learning and teaching need to be explored. This study examines how experiential learning in the form of different types of learning mechanisms can be applied to an undergraduate business decision making course in game theory in order to increase student engagement and improve course learning outcomes. The learning mechanisms range from hands-on game playing exercises to a digital learning portal in which students play games in a simulated game playing environment. In this paper, we report on the feedback obtained from the students regarding the different learning mechanisms. While the evidence is somewhat anecdotal, it highlights some important factors about the benefits of experiential learning.

## **Introduction**

Children from the late 1990s and early 2000s along with every subsequent generation have grown up on the internet and are now entering the undergraduate population en masse. Academics, particularly those who specialize in teaching these students, owe it to themselves to recognize this and do what they can to actively engage and teach this continuous wave of technologically savvy specialists, who are easily distracted in the classroom environment. Rather than focus on traditional teaching methods, it is important to explore new innovative teaching methods which add value to the learning experience. This paper considers a number of experiential learning techniques applied to an undergraduate course in game theory. Our goal for each of these techniques was to turn the students from passive observers into active participants. We wanted to see if experiential learning would improve the students' understanding of game theoretic concepts and their engagement in the classroom.

The study describes how experiential learning can be applied to an undergraduate course in game theory. The course focused on different types of games and how these can be applied to business decision making. The course used game theory to find (where possible) optimal solutions to situations of conflict and cooperation under the assumption that players behave rationally and act in their own best interests. The audience for the class was undergraduate students mainly from business related fields.

We have developed a number of game-playing scenarios which were explored. One game-scenario involved a hands-on exercise in which students were split into teams of four and played a competitive board game (Tetris-Link). Another game-scenario required the use of a computer: students played two

different games within a digital portal environment which simulated other players' rational behavior. The portal was developed specifically for the class. For each of these game-playing scenarios, we describe the game being played and tie this to a specific course learning outcome. We then discuss the benefits and drawbacks of the approach as well as some in-class observations. This is followed by some qualitative feedback from the students.

## Literature Review

For a number of years, educators have recognized that experiential techniques and alternative learning environments are useful in helping students better understand and retain information. For example, according to the proponents of Activity Theory [1–3], learning is conceptualized not just as a function of a game itself, but rather as a transformation that occurs due to the dynamic relations between and among player(s), the game and any intervening social structure. Other studies have also concluded that games are very effective alternative activities that provide students with a learning environment that is fun and educational. Game-based learning takes many forms, including virtual reality, role playing, and performing simple tasks. See for example, Chow et al. [4] who propose a classroom activity based on the game of pitching pennies in order to introduce students to the concept of variation. Similarly, the concept of expected value is introduced via the online television game 'Deal or No Deal'. In both [4-5], learning and retention are measured to evaluate the success of the students' performance. Although not a business learning environment, the research by [6] describes the implementation of a game to teach chemistry concepts. The authors indicate that the use of the game reinforced student knowledge of chemistry concepts, was evaluated positively by students, and allowed the chemistry teacher to develop competencies in areas such as student cooperation, student assessment, and student engagement.

Another form of game learning is the use of simulation environments, in which simulation and game-based techniques are used to explore a particular service-science-related problem, see for example, [7-8]. An important aspect of simulation games is to (a) clearly identifying learning goals and (b) debriefing is a critical component of using games or simulations for learning, [9].

Although educational games have become quite popular in recent research, only a limited number of studies have focused on the effectiveness of these games, [10]. The authors in [10] demonstrate that competition is not significantly related to students' learning gains and only partly related to students' motivation. Similarly, [11] describes a framework for using game theory tournaments to implement competition based learning. Students surveys suggest that the use of friendly competitions provides a strong motivation for students; helping to increase their performance. The authors in [12] describe an online game which was developed to enable students to learn cooperatively. They demonstrate that students' desire to win the game motivates them to learn from online course materials before they play, which in turn can enable them to achieve better learning outcomes.

While game-based learning may take many forms, this research focuses mainly on the use of games to illustrate a learning goal or concept. We do not discuss simulation and virtual environments based learning. Consequently, we describe three different gaming activities designed to teach concepts of business decision making in a game theoretic context. For all the activities, the learning goal is clearly described and the game is used to reinforce that particular concept. All the games included some measure of competition. This paper describes the basic features of each game and discusses the relative benefit of using competition to motivate students to learn. In addition, we use anecdotal evidence and

survey results to discuss the implications of the learning technique to student knowledge, student cooperation, and student engagement.

## **Experiential Learning in the Classroom**

The concepts of strategic behavior, decision making and dominance play an important role in a course on game theory applied to business decision making. This course discusses the idea of strategy and how it evolves from a theoretical standpoint. Among other constructs, the course considered strategic behavior via a selection of two-person games which were then evaluated for pure and mixed strategies using classical game theoretic concepts (decision trees, payoff tables, and matrix forms). The purpose of the experiential game playing was to help students better understand and apply these theoretic constructs to a practical real-life decision making situation.

### ***The Game of NIM***

Students were exposed to different simple gaming scenarios and used constructs such as decision trees and payoff tables to determine winning strategies. In practice, decision making in a real business environment, does not easily lend itself to decision trees or payoff tables since the number of variations can often be too large. The idea of finding an emerging winning strategy by observing different behaviors was the motivating factor behind the game of NIM. A digital learning portal was developed in which students were able to play a version of the ancient game of NIM against the computer for an endless number of runs.

#### **Game Rules:**

In the portal game, each game begins with thirty counters distributed randomly into five of piles. The student plays against the computer taking turns removing any number of counters from a single pile. The player to move first is chosen at random. The winner is the player who takes the last counter. The portal keeps track of the number of wins and losses and students could observe their relative position in the class, thus stimulating an air of competition in playing the game.

**Learning Outcome:** Students learned how to formulate a general winning strategy by observing patterns. Students also observed that it is not always possible to construct a game tree since the number of possibilities is too large.

#### **Results:**

The homework activity was to get students to formulate a winning strategy based on their observations. Some of the responses are provided below and while some of the comments alluded to the winning strategy, only one student was able to determine this. However, the game was important because it motivated students to learn more about game theory early on in the course. In addition, the discussion session following the game playing class forced students to talk and learn about how strategies develop and how these can be formulated.

- “The strategy I implemented was to get the game down to an even number of chips with an even number of cups having it be the computers turn. Once I did that then I could copy the

computers moves and back him down until I won. Getting to this point however was hard and I did not figure out a sure way of doing it”.

- “I am not totally sure what the winning strategy would be although I have begun to win a couple games trying. If you are able to get two sets of pairs, you take all the remaining points from the fifth pot and you will be able to win. This however is not very helpful when you are dealt 5 different numbers in the pots. If you are able to force the opponent into moving while the set is in balance, he will remove 1 and all you have to do is remove one to force the set back into balance and eventually lead you into winning”.
- **“The strategy to win this game is to balance the piles before your opponent balances them. You want to place your opponent in a position where his or her move allows you to balance the piles. One winning strategy is to make your opponent move with two pairs remaining. For example 1, 1, 2, 2, 0. Another balanced position is to make your opponent move when the piles resemble an equal pair, a 1 and a two-number sequence piles. For example, 5, 5, 1, 2, 3 and your opponent's move results in your opponent's loss. The same can be said for 7, 7, 1, 4, 5 which leads to 7, 7, 1, 2, 3 or 7, 7, 1, 4, 4.”**
- The winning strategy is to have a odd number of chips left in the piles. Ideally, having one chip in each of the five piles. However player 2 is at a disadvantage. If player 2 plays too aggressively, removing entire piles at a time, player 1 will take notice and respond accordingly. Because of this, in order for player 2 to win he/she must play conservatively and strategically remove small amounts of chips from each pile. Until there is only one chip in each of the five piles.

From the anecdotal comments that were received it appears that students found the exercise challenging yet motivating. Only the very determined were able to arrive at the correct strategy which is highlighted in bold. Some of the students were able to touch on the idea of the strategy without actually being able to formulate it. The instructor also received informal feedback on the game – most of the students found the exercise beneficial because it motivated them in the course but also frustrating because of the level of difficulty. This could be due to the fact that this was the first game played in the course and it would be interesting to see if students did better at this game if exposed to it at the end of the course. At the end of the course, students were asked to comment on the different games they had played and to evaluate their benefit. Quite a few students discussed the benefits of learning concepts from the game of NIM (See Table 5).

## ***Prisoner's Dilemma***

### **Game Background**

The **prisoner's dilemma** is a canonical example of a game analyzed in game theory. An example of the prisoner's dilemma (*PD*) is presented below:

Two dominant firms in an industry is fairly common: Pepsi vs. Coke, Nike vs. Reebok, P&G vs. Kimberley-Clark, and when the goods are close substitutes (Coke vs. Pepsi) price is: a) the key competitive weapon, and b) the most important factor for market share and profits. In this business version of the prisoner's dilemma, your choice is either to select the high price or the low price, and your competitor has the same choices.

Each student played against an opponent who was chosen at random from one of six personalities with the following traits:

- **Collaborators** are supportive, want to work together and avoid conflict. Will always tend to cooperate, it will be difficult to persuade them to give up. They're happy when everyone is thriving.
- **Salesmen** can be competitive, but also want to make a deal. Want you to be happy, but if you betray them you had better watch out.
- **Dabblers** are just in it for the fun, their decisions tend to seem random.
- **Pursuers/drivers** for them, the ends justify the means, and business is war. They'll go for the jugular and try for the quick score.
- **Profit-seeking investors** are always looking for the maximum return, and for them, that can go either way.
- **Analytical** studies your moves, and tries a strategy based on your behavior.

The portal keeps track of the students' moves and tallies their respective scores so that students can observe their rank in the class. A small incentive was offered to the student who obtained the highest score at the end of the session.

	<b>High Price (\$8)</b>	<b>Low Price (\$6)</b>
<b>High Price (\$8)</b>	You each make \$10m	You'll make \$5m, your opponent \$12m
<b>Low Price (\$6)</b>	You'll make \$12m, your opponent \$5m	You each make \$7m

Table 1: Table showing the resulting profits based on the competitors respective decisions.

We can refer to the Table 1 for a payoff diagram of each firm's profits under each of the four different scenarios. For firm 1 its two options are listed as High Price (Row 1) and Low Price (Row 2). For firm 2 its two options are listed as High Price (Column 1) and Low Price (Column 2).

The portal game was set up so that the student had to play ten rounds of the game against different personalities. The winner at the end of the ten rounds was the one who had accumulated the most wealth.

**Learning Outcomes:** Students understood the concept of the prisoner's dilemma and learned about how different variants of the game might impact strategy (collaboration/cooperation) and the Nash equilibrium.

## Results

At the end of the session, students completed a short survey in which they were asked the following questions:

1. How do the scores vary when you play against different personalities?
2. Does the predicted personality of the opposing player affect your strategy?
3. To what extent do you veer away from the Nash Equilibrium suggested by the prisoner's dilemma and what is the motivating factor?
4. How did your strategy change if the number of rounds was no longer fixed at 10 but was determined by the flip of a coin (i.e. a random number of rounds)?

From the set of responses (13 out of 23 students), 66% of students felt that the scores varied when playing against the different personalities, whereas 44% stated that the predicted personality of the opposing player affected the strategy. All the respondents mentioned that they veered away from the Nash equilibrium in order to accumulate more profit and beat the opponent. In the comments section, students provided their strategies which were rich in terms of the methods that they developed. It is clear from these strategies that students were motivated in this game and all the students reporting their strategies learned how to "beat" their opponent regardless of personality. This game was played in the latter part of the semester, after students had already been exposed to various games and strategies. The informal comments on the game suggested that this game was less challenging and it was easier to win against the computer regardless of personality being played.

A selection of the reported strategies is provided in Table 2 below. Note that unlike the game of NIM, most of the students were able to determine a winning strategy which essentially is similar across the reports. Consequently, only a selection of these comments is provided.

Student 1	My strategy was to always choose the high price first. Generally the opponent matched this high price for a few rounds, which is when I would switch to the low price and catch them off guard. I tried not to do the low price more than two times in a row without doing the high price once to confuse them, before they could catch on and start matching my low price.
Student 2	My strategy for this game was to alternate back and forth from \$6 to \$8 each round. When I did this it seemed that I would win most of the time no matter the type of player. Each time I won I started with a \$6 and then alternated for the remaining rounds. This worked because by the time computer realized what was going on it was too late. The few times I lost I started with \$8 instead of \$6. When this happened if the opponent was aggressive. I would already be down and would not be able to come back. So for me the best strategy was to alternate between \$6 and \$8 each round.
Student 3	For the most part if you chose \$6 with your first move the opponent would respond with \$8 with its first move. Thusly you would go up 12-5 right away and then easily cruise to a victory. I saw this happen with the salesman, collaborator, analyst, and prisoner. I noticed that as I kept playing the analyst began to respond with \$6 and the only thing I was left to do was to play for a tie. The one time I tried to play an \$8 the opponent continually used the \$6 option and would win.
Student 4	I always start the game with my dominant strategy of charging a low price (\$6).



	Generally, the game evolves into a pattern of myself and my opponent playing (low, low). If my opponent seems collaborative, I might veer from the Nash Equilibrium and charge a high price, because I believe that my opponent will join me in charging a high price in the next round, resulting in consistently high payoffs for the rest of the game. If my opponent seems especially collaborative, I might undercut them by charging a low price after a series of (high, high) strategies toward the end of the game.
Student 5	Typically I would start out charging \$6 in an attempt to get out to an early lead. Usually at some point the computer would choose \$8 which would allow me to get a 7 point lead. At that point I would continue to charge \$6 the rest of the game so there would be no possibility to surrender the lead. In some rounds where I identified that I was playing a cooperative opponent I would charge \$8 for a few rounds in a row in order to bait the opponent into thinking I would cooperate throughout all 10 rounds as well as try and drive up my total score. Once I had charged \$8 for a few rounds, I would go back to charging \$6 in order to catch the computer off guard and further drive up my total score. However, usually the opposing player's strategy did not affect my playing strategy.

Table 2: Winning strategy in fixed round prisoner's dilemma game

Our discussion also considered how the strategy described in Table 2 might change if the number of rounds in the prisoner's dilemma game changed from a fixed number (10) to a random number of rounds. Table 3 provides a summary of some of the responses that were received. From the anecdotal evidence it is clear that students had to think about collaboration and cooperation in determining their overall strategy.

Student 1	When playing the random game my strategy shifted to trying to get the highest payoff in the short term. However it probably would be a good idea to achieve Pareto optimum as soon as possible to ensure some level of consistency thus guaranteeing a higher payoff than 7 Million dollars
Student 2	When playing a game with the full 10 rounds, I knew that I could charge \$8 for a few rounds because I would have time to make up ground or put more distance between me and my opponent. However, when playing a game of uncertain length, I did not have that same liberty because I did not know how many rounds the game would go. This changed my playing strategy dramatically. When flipping a coin, you could either play for one or two rounds or play for 20 rounds. Since it was not known how many rounds I would be playing, I decided to take a conservative approach to try and capture a lead early and hold it because of the uncertainty. I chose to charge \$6 each round so the game would either end in a tie or I would end up the winner. <b>Due to the uncertainty, instead of playing to win, I began to play not to lose.</b>
Student 3	The big difference I noticed between the random games and the repeated games is that in the repeated games it is rare that a collaborative strategy will be established. You can rarely determine whether establishing such a strategy will pay off, because there may be a limited number of rounds.
Student 4	I was unsure how long the game would go on so I wanted to be sure to gain a lead early. I realized after round two of playing the game without knowing how long it

	was going to run, that the game could potentially stop after one round. Due to this I decided to play the \$6 early and gain a quick 7 point lead.
Student 5	It seems like my strategy should change because I don't know how long the game will be. I like to take risks, so I chose low to get the most profit. What I probably should do was pick high so that both players can be profitable. Since we don't know when the game is going to end, we both want to work together. I chose low because since the computer doesn't know when the game is going to end, I can get away with picking low and getting a bigger profit.

Table 3: Comparing winning strategies for fixed round prisoner's dilemma game vs. random number of rounds

Based on the evidence provided in Table 2 and Table 3, the prisoner's dilemma exercise demonstrates that students absorb the learning outcomes for this part of the course via active participation. Students learn via doing and the results indicate that the learning outcomes are enforced in a positive manner. From the selection of comments one can observe how the individual experience forces a student to absorb the intended concepts rather than be lectured about the same concepts.

### ***Tetris Link***

The appeal of the well-known game of Tetris (in which users pile up blocks of varying shapes) is universal. The version of Tetris played in the classroom (Tetris Link) was unknown to the students, yet it invoked among others, rational and sometimes irrational behavior, competitive behavior as well as cooperation between team members. The goal was to use experiential play to convey the learning goals of dominance and strategy in a more real sense.

**Tetris Link - Game Rules:** Tetris Link is a game of strategy and blocking your opponent. Each player has five of each of the five Tetris tetrominoes, for a total of twenty five pieces. In addition, there is a die that has five faces each depicting one of the five shapes, and one "Tetris LINK" face, that is used as a wild. To play, a student rolls the die, selects the depicted shape, and drops it into the vertical grid, just like in the original game of Tetris. Once a student has three pieces of his/her color linked (orthogonally - diagonally doesn't count), each piece scores 1 point. So when a group of three tetrominoes is formed, a score of 3 points is obtained. If an additional piece is added to the three-piece construct, an additional point is scored. If another team member blocks you off, you can start a new group, but it doesn't count, until you have a group of at least three. Also, if a student drops a piece and there is a single completely open square under it, you lose a point. If there are two or more squares under it, you lose 2 points, no matter how many open squares are left. If a student rolls the die and the piece showing is one he/she no longer has in stock the student must miss his/her turn. Play continues until nobody can play any more pieces. No pieces are allowed to be sticking out the top of the grid. The person with the highest score wins. If there is a tie, the person amongst the tied players with the largest connected group wins.

**Classroom Activity Description:** The aim of the exercise was to familiarize the students with the two concepts of dominance and strategic behavior and be able to detect winning strategies. Since the course was taught on a Monday and Wednesday the game activity was straddled over two class sessions, each one lasting one hour and fifteen minutes. At the start of the Monday session, students were divided into groups of four students and familiarized themselves with the game rules by playing

one test-run of the game. At the end of each round, scores for the players were recorded. Following the trial run, all teams began a second game. Competition in this game was invoked among team members. A homework sheet was issued to each team for completion by the Wednesday session. A classroom de-briefing took place on the Wednesday session.

**Learning Outcomes:** Both **dominance** and **strategy** play an integral role in business decision making, particularly when considering the strategic behavior underlying oligopolies. The goal of this game was to convey both these concepts in a business learning context.

**Results:**

For the homework, students were asked to describe any practical implications of the game to business decision making. In a follow-up question in the mid-term exam, students were asked to discuss how the game can be applied to analyze market share and market strategy. In order to analyze the results, we performed a keyword search based on the responses of the students. The results are presented in Table 4 below:

	# of responses	Dominance	Blocking	Strategy	Market Share	Competition	Diversification
Homework 2013	11	17	26	83	10	19	4
Mid Term 2013	23	4	23	51	24	13	0
Homework 2014							
Mid Term 2014							

Table 4: Keyword search on game theory concepts

One can observe that the key words of “blocking” and “strategy” appeared most frequently in the summaries and that the information was retained between the two tests. In addition, students were able to connect concepts (such as dominance or competition) to the game they were playing. The preference in this method of learning is also expressed in the qualitative comments received at the end of the class. These comments are provided in Table 5.

**Discussion on the benefit of experiential learning**

We wanted to examine how students felt about the use of experiential learning as a central theme for the class and understand whether they found it effective. Students were asked to assess the effectiveness of the teaching methodology in the midterm of 2012 and a similar question was posed in the final of 2013. The outline of the question that was posed is provided below, and a summary of the responses is provided in Table 5. For each response, we have highlighted the positive benefit gained from experiential learning. In almost every response, the student points to such a tangible benefit.

“What parts of the class did you enjoy most? Describe the benefit (if you derived some) from playing games in class to underline the theory (e.g. NIM, Prisoner’s Dilemma and Tetris Link). Did you find the experiential playing enhanced your understanding and increased the value of the learning experiences?”

2012 (17 responses)	2013 (18 responses)
<p>The part of the class that I enjoyed most was when we got to <b>practice playing the games</b>. I found that to be enjoyable. The NIM game was enjoyable because it was very challenging, and once I found a dominant strategy, it became more fun because I was winning. What I disliked about these two games is that they started off very challenging, and it wasn't until I found a dominant strategy that I had the ability to win.</p>	<p>The parts of the class I enjoyed the most were all the <b>interactive games</b>. I always was very motivated to figure out how the games worked, and after figuring it out, it was easier to relate it to the class. The game of NIM was my favorite because the type of thinking that I went into it made me more excited about the class. Tetris Link was also one of my favorites. This definitely enhanced my understanding. Every game, I would leave class excited to tell people what I learned.</p>
<p><b>Playing games</b> in class helped me to visualize some of the concepts. <b>I enjoyed them the most</b>. I also liked the articles that showed how game theory came into play in real world scenarios.</p>	<p><b>I enjoy playing the games in class</b> and being able to apply what I learned in the form of a competition. The Tetris Link game was definitely the most fun for me because I was able to see how my strategy would function against others in person with other players. Obviously the class is based on the strategy, but being able to see the game unfold in front of your opponent allows you to analyze the other variables that aren’t considered in the game. This could be eye movement or different ways to see if the opponents blocking or planning another strategy. The experimental playing definitely helped me in understanding more than anything else.</p>
<p><b>The best part of class was playing the physical games in class</b> because it allowed you to use the applications of strategies in games, which was very beneficial.</p>	<p>I enjoyed Tetris the most. <b>The interactive game made the concepts easier to understand and fun</b> because we got to compete with our classmates. This experimental playing definitely enhanced my learning experience through tangible examples we could achieve multiple ways.</p>
<p><b>I really enjoyed playing all the in class games</b> because it made us think critically and helped apply concepts we learned in class. The benefit was more tangible as a result of the games, although real life application is still a stretch.</p>	<p>My favorite portion of this course was studying Nash Equilibrium. I felt that I was easiest to understand because it’s very applicable to different real world scenarios, especially ones where at first there isn’t a clear strategy. I personally am awful at games and get confused easily, but the strategies lesson using Tetris was the most helpful throughout the course.</p>
<p><b>Best thing I liked about class was seeing how we could use types of games like this in the real world</b>. Once we see them being used in real life, it becomes easier and I am more willing to learn some of the math and theory</p>	<p><b>I really benefitted from the ability to participate in examples to better understand game theory concepts</b>. I also enjoyed the project, because it allowed me to test how well I understand. I think the Tetris Game class was</p>

<p>behind it. Some of the math did get a little harder towards the end. I thought the class ran smoothly and was also entertaining.</p>	<p>my favorite. It was fun and thus engaged me to really think about dominant strategies. I definitely find that experiential learning in this class helped make some complex concepts clear and applicable. Thanks for an informative and engaging semester.</p>
<p>What I really enjoyed about this class was the opportunity to play games and give presentations about interesting topics such as the penny auction, and backward induction and moral hazard. Doing this allowed me to better grasp the material and use theories for games in real life, such as penny auction websites. What I liked about the NIM game is that there is a clear strategy to implement in order to win, but in class it was hard to implement because the computer had a slight advantage a majority of the time. What I liked about the Prisoner's Dilemma is that there are two strategies that allow you to get an equal payoff to your opponent. Also, you can force your opponent to think that you pick a high price, then you effectively choose the option. This will allow you to have the upper hand.</p>	<p>I enjoyed working in groups and presenting to the class on the different topics the most. <b>Playing these games in class</b> helped me to take a step back and try to weigh all the strategies instead of executing the first strategy that came to me. This definitely increased my learning experience because now I will be better at weighing options and not be a rash decision maker with my career/life.</p>
<p>I enjoyed the auction presentation, moral hazard, and the explanation about extensive form. This class taught me that you should never be surprised by an outcome because you should already know the options and their payoffs. Prisoner's Dilemma was a great game because it gave us first-hand experience about the concept.</p>	<p>The topic that interested me the most this semester was the Prisoner's Dilemma. I believe that playing the various games helped to clarify the strategies we had discussed. Except for NIM, that game is purely impossible. I believe it was easier for me to grasp the concept of the theories when <b>I was actually playing the game</b> rather than discussing the theories alone.</p>
<p><b>I most enjoyed learning various games and strategies.</b> I often find myself applying the skills I have learned in class to my everyday life. This class has truly shown me how to weigh the costs and benefits of any given situation, and how to best respond</p>	<p>I think Tetris and its business application helped me most. It showed me the ups and downs of market expansion and that various markets (blocks of Tetris links) can brought together. <b>This experimental playing did increase the value of my learning experience.</b> Almost all visuals helped tremendously.</p>
<p><b>I really enjoyed the game in class</b> because now if I have an issue that is difficult to solve, I can use game theory to help solve my dilemma. I liked how we were able to play the games on the computer and learn from experience about the mechanics of the game, also the added competition in class made the games more fun.</p>	<p><b>I enjoyed playing the game of Tetris. I did find that the experiential playing enhanced my understanding and increased the value of the learning experience</b> because I applied it to analyzing market share and market strategy, by blocking off my opponents. I learned that you have to broaden your options all over the board in order to succeed, which is the same strategy used for market strategy share.</p>
<p><b>I enjoyed playing the NIM and the Prisoners Dilemma</b></p>	<p>I really enjoyed this class. I liked looking at practical</p>

<p><b>games</b> because I was able to analyze the situation (i.e. the game) and understood how each player played in NIM (choosing the number of tiles) and how they award the strictly dominated strategies because my opponents were thinking of the outcome of the game and how achieve it while anticipating my movements. What I liked about the NIM was that you had to anticipate the opponent's move and assume that they're rational enough to choose the strictly dominated game and outsmart them. What I liked about the Prisoner's Dilemma was that it showed how one prisoner's actions can negatively or positively affect another. This dilemma teaches you when to cooperate with your opponent and the reasons for doing so. For example, if both entrepreneurs decide to price the goods high (at the same price) then both will receive more benefit than competing with each other (in terms of pricing).</p>	<p>business models and seeing the math &amp; strategy behind each choice and learning how to find the greatest payoff. <b>The games in class really reinforced my understanding of the material</b>, and competing against classmates motivated me to solve each game.</p>
<p><b>I enjoyed the hands-on examples;</b> they made the class more fun. The games helped me apply the theory to real life examples and helped me understand the material better. I liked both of the games and found them very helpful.</p>	<p><b>I really benefitted from the ability to participate in examples to better understand game theory concepts.</b> I also enjoyed the project, because it allowed me to test how well I understand. I think the Tetris Game class was my favorite. It was fun and thus engaged me to really think about dominant strategies. I definitely find that experiential learning in this class helped make some complex concepts clear and applicable. Thanks for an informative and engaging semester.</p>
<p><b>I really enjoyed the in-class games.</b> These games helped me apply the theoretical concepts of game theory. While both games were challenging, I really liked playing against the computer. In particular, with both games, the structure of the game allowed me to develop a strategy to ensure my wins. Also, one of the things i like about both games is the ability to see how my classmates' were done. In contrast to NIM, i enjoyed the Prisoner's Dilemma game, as i was able to figure out a strategy faster. I enjoyed exploring the different personalities of the computer.</p>	<p><b>The part of this class that stood out the most was we actually played games</b> such as NIM and Prisoner's Dilemma which in turn got me a better understanding of the material. The presentations got me an opportunity to understand dominated strategies and equilibriums better as I had to do research on those topics. The saddle points were a very interesting topic for me and the clarifying of the power point presentations allowed me to understand the concept with ease. This class has given me a new view on how to make decisions. It allowed me to better assess situations and how to handle them with a more strategic outlook.</p>
<p><b>I liked playing the games.</b> It helped me understand the concepts better by using them physically rather than theoretically.</p>	<p><b>I enjoyed the hands on activities that we did in class.</b> They allowed me to really understand the topic at hand which really helped. I also liked the group presentations we did in class. They gave real world examples to the topics we discussed.</p>
<p>The parts of the class that I liked the most <b>was playing</b></p>	<p><b>I liked the games we played because it gave a real life</b></p>

<p><b>the games</b> with the other classmates during class because it gave us real life examples of how game theory could be used in day-to-day life. The benefit that I derived from playing the games was that I can better learn how to react better when my opponent makes certain types of moves and to better make new strategies to better trap and defeat them.</p>	<p><b>perspective to the class.</b> The games showed how it can be applied in real life. Also my term project helped me see even further how important numbers are in baseball with all the research. It did really help me understand better.</p>
<p><b>I enjoyed playing the Tetris link the most in this class. I really think this and the other games we played, including the NIM, helped me to learn game theory.</b> I liked trying to figure the NIM game out because it was very complicated.</p>	<p><b>I enjoyed playing the game of Tetris. I did find that the experiential playing enhanced my understanding</b> and increased the value of the learning experience because I applied it to analyzing market share and market strategy, by blocking off my opponents. I learned that you have to broaden your options all over the board in order to succeed, which is the same strategy used for market strategy share.</p>
<p><b>I enjoyed actually putting the concepts into practice by actually playing the games.</b> They allowed us to take what we were learning and actually see it in action. This makes the concepts much more powerful.</p>	<p><b>Playing the various games allowed me to better understand the different concepts introduced in the class and how they can be applied.</b></p>
<p><b>I liked playing the games the most.</b> You are really able to see the strategies at work when you play the games. I like that for some games, we had to figure out and interpret the strategies. I found this to be beneficial in understanding the concepts. I enjoyed both games, especially NIM. i think the computer portal worked well. I wouldn't change anything. it is much better to play against the computer than a person for these games.</p>	<p><b>I found the game Tetris to be very useful and added greatly to my learning experience.</b> I am very competitive with my brothers when we play games, and this game afforded me the opportunity to try out new strategies as I wasn't in fear of losing. Additionally, I really enjoyed learning about backward induction as it showed me not only the outcomes of others' and my decisions, but also which were most likely to happen.</p>
	<p><b>Playing the games, such as Tetris and NIM helped me better understand some of the theories in class.</b> NIM helped me in my backward induction presentation especially.</p>

Table 5: Comments from students (midterm and final) on the benefit of experiential learning via practical game playing in the classroom to understand and master game theory concepts.

One can observe from the comments that regardless of when the games took place, all the students found that the games were enjoyable, fun, interactive and enhanced their understanding of game theoretic concepts. Some of the students differentiated between the games and highlighted which games they found were of increased value and why. The games which featured most in their comments were NIM, TETRIS LINK and the Prisoner's Dilemma. It is clear from this initial analysis that this mode of learning benefits the students and that the students find the learning method useful, interesting and applied.

## Conclusions

This paper deals with the implementation of experiential learning for an undergraduate course in game theory whose focus is applied business decision making. We describe three different game playing scenarios along with the intended learning outcome as well as the results that were obtained. The first game (NIM) was played on a computerized portal developed specifically for the course. Students found this game challenging because they had to formulate a winning strategy by observing different behavior. Some of the students enjoyed the challenge, others felt frustrated but overall the experience appeared to whet their appetite for games of a similar nature and stimulated them in the subject. In a number of cases, students reported that this game helped them understand concepts better.

The second portal game was a modified prisoner's dilemma. Overall, students were able to conceptualize the ideas and could formulate a winning strategy. It is not clear yet whether this is a function of the fact that the game is played much later in the course, when students have already mastered some key concepts. It would be interesting to see if the results would change if the order of playing was reversed, (i.e. prisoner's dilemma followed by NIM).

The game of TETRIS link stimulated a lot of interest, in fact the atmosphere in the classroom when this game was played was not replicated in the two other games. This might be due to the fact that unlike the other games which were played against the computer (something this generation of students is already so familiar with), TETRIS was played against fellow students. From my observation, it would appear that students enjoy both forms of experiential learning and that a balanced class should include different forms of game playing scenarios. TETRIS was also very successful in getting the message about dominance and strategy across to the students. Students reported that this game in particular helped them understand the theories being presented and enabled them to see how applied game theory actually is.

While this paper provided mainly a qualitative assessment of the benefit of experiential learning, it highlights that an effective mechanism to get students to absorb key concepts is to turn them from passive observers into active participants. This can be achieved by forcing them to play games in which those concepts or learning outcomes will be tested. This will enable them to absorb the material in a fun, interactive and beneficial manner and will yield good results in the long term. It would be interesting to poll these students a few years on to examine the extent to which they have retained the concepts taught in the class. It would not come as a surprise if students were able to recall the games they had played and what they had learned from the process. With this in mind, it is important to think



about new avenues of teaching which will guide and shape the way our students think and learn in the years to come.

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## **Perceptions of Corporate Social Responsibility Between the United States and South Korea**

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### **Abstract**

In today's business world, there is much discussion on the importance of Corporate Social Responsibility, also known as CSR. This study explores the difference of CSR perceptions between university students in the United States and students in South Korea to establish how subjects of each country view importance of CSR in various settings and experiences. To develop hypotheses, research analyzing the background of CSR, the perceptions of CSR in the United States and South Korea, as well as the importance of CSR for specific industries and in relation to employment was utilized. A questionnaire was comprised of questions to rate the subjects' perceived level of importance of CSR in various settings, as well as likert scales to gauge agreement levels. The perceptions of corporations' reasons for acting responsibly, purchase intent in relation to CSR, consideration of CSR in employment options, and importance of CSR in specific industries is examined. Results show the subjects responded favorably to CSR, and felt that CSR performance was necessary, considered it when purchasing and searching for employment, as well as found it important for industries to comply with CSR standards.

**Key Words: corporate social responsibility, United States, South Korea, Hofstede**

### **Introduction**

For decades, businesses have struggled with understanding the benefits, both perceived and realized, of corporate social responsibility, and if these benefits differed based on variables such as the culture and the industry the business operates in. The concept of corporate social responsibility began in the early 1930's and to date has become known as *the responsibility that companies have to society through economic, legal, ethical, and discretionary actions* (Carroll, 1979). The basis of research conducted on CSR focuses on the discretionary responsibilities of the firm, which are the voluntary contributions the firm makes to their stakeholders.

Aguinas and Ante (2012) found that stakeholders perceived corporate social responsibility better when the company's main business offerings were aligned with the form of corporate social responsibility they engaged in. Choe, Choi, and Kwak (2010) found that a firm's financial profitability would improve if the CSR activities were directed towards activities related to their industry. Yet, there has been little research focusing on which industries consumers expect to have higher CSR.

On a cultural basis, Ho, Wang, and Vitell (2011) found that differences in CSR were linked to national culture, geographic region, and level of economic development. They

found that European firms had the most CSR practices, followed by North America then Asia. The previous study done by Ho, Wang, and Vitell also looked at Hofstede's Cultural Dimensions as predictors or determinants of the level of CSR within a culture. These studies found that if a country had a culture that scored higher on power distance, individualism, and masculinity, that country would have lower corporate social responsibility performance. Ho, Wang, and Vitell also found that cultures with high uncertainty avoidance and higher levels of economic development had higher levels of CSR performance.

This paper seeks to expand on these previous studies and explore how the cultural differences between the United States and South Korea will affect student's perspectives on why corporations should engage in CSR, how CSR and cultural differences will impact purchase intent and employment perceptions, as well as, which industries subjects feel it is most important for corporations to act in a responsible manner.

### **Background of Corporate Social Responsibility:**

The definition of corporate social responsibility has been theorized countless times since its conception in the 1930's. Milton Friedman (1962) was one of the first economists who said that businesses only had one responsibility: to generate wealth for the stakeholders. Social performance was seen as something unrelated to a firm's economic performance, and therefore was unnecessary and voluntary. The views of the responsibilities shifted over time, and the chart below summarizes the main theories on CSR by major economists.

*[Insert Table 1 Here]*

The definition of CSR used in this study is "the social responsibility of business encompasses the economic, legal, ethical, and discretionary expectation that society has of organizations at a given point in time" (Carroll, p.10, 1979). Carroll states that corporate social responsibility consists of four different types of responsibilities: economic, legal, ethical, and discretionary. Carroll defines economic responsibilities as the responsibility of the business to produce goods and services that society wants and to sell them at a profit; legal responsibilities as the responsibility of a business to fulfill its economic mission within legal requirements; ethical responsibilities as the responsibility of a business to go beyond the law in their business transactions and operations by remaining ethical; and discretionary responsibilities as the responsibilities the firm does not have to do and society does not expect them to do, these are voluntary actions. A firm operates with a reason as to *why* they would engage in CSR, and how they respond to CSR. Some of the reasons why corporations engage in CSR are: purchase intent (Ferreira, Avilia, Faria, 2010), employee recruitment (Gowan & Zhang, 2011), and financial returns (Choe, Choi, & Kwak, 2010). Henry Mintzberg (2007) details four response patterns and reasons why companies would engage in corporate social responsibility. The first is social responsiveness, when a firm anticipates and prevents social problems as opposed to keeping up with them or doing the bare minimum. The second is enlightened self-interest, the idea that being socially responsible will pay off, or deliver some business related benefit. The third is the sound investment theory, the idea that the market price of a company's stock is affected by its social behavior. The last form of social responsibility is avoiding interference, the perspective that if a business does not behave in a socially responsible manner the government or some type of

industry governing body will move in and make rules and regulations to monitor their behavior.

### **Hofstede and Corporate Social Responsibility:**

Geert Hofstede was one of the pioneers of cross-cultural research. His cultural dimension study was first published in 1991 and has been since updated in 2001. The Hofstede Cultural Dimensions allow researchers to define specific cultures, as well as, the differences between cultures of different countries (Hofstede, 2001).

Culture is key in analyzing a society, the methods of acceptable business practices, and individuals' thoughts, attitudes and behaviors (Bae & Kim, 2012). Hofstede's dimensions include measuring Power Distance (PDI), Individualism versus Collectivism (IDV), Masculinity versus Femininity (MAS), Uncertainty Avoidance (UAI), and Long-term versus Short-term Orientation (LTO) (Hofstede). Power distance represents the extent that less powerful members of society accept and expect that power is distributed unequally throughout the society. Masculinity represents cultures where achievement, heroism and assertiveness is rewarded whereas femininity represents cooperation, modesty and caring for the quality of life. Uncertainty avoidance represents the extent members of society feel uncomfortable with uncertainty and ambiguity and the unknown future. Long-term orientation is the dimension which interprets whether a country focuses more on long term or short term rewards - such as saving for the future or focusing on the present (Hofstede, 2001).

*[Insert Chart 1 Here]*

Hofstede (2001) found that the United States scores a 29 on long-term orientation, which is relatively low, indicating the country is more concerned with the present. Scoring a 40 and 46 on power distance and uncertainty avoidance respectively shows that the US is about average in comparison to other countries in regards to these two dimensions. The United States scores a bit higher on masculinity than South Korea, earning a 62, and has a 91 on the individuality index, suggesting that the United States is one of the countries that most highly values individuality over collectivism (Hofstede, 2001).

On the other hand, Hofstede (2001) found South Korea scores to differ greatly from the United States. While the United States is highly individualistic, South Korea has a low score of 18 on the individuality index, showing how the country is highly collectivistic. South Korea is also in the middle of the spectrum on the masculinity index, scoring a 39, but is still significantly lower than the United States. South Korea scores very highly on the other three indexes, receiving a 60 on power distance, 75 on long-term orientation and 85 on uncertainty avoidance. These numbers indicate that there is high power distance in the country, as well as the nation being very concerned about the future as well as wanting as a whole to avoid what is uncertain and ambiguous.

These numbers represent how each culture is very different from the other and why the basic cultural differences between the United States and South Korea may have influence on our research results. This study will use Hofstede's cultural dimensions as a way to measure the basic cultural differences between the United States and South Korea.

Hofstede's dimensions have been used in numerous cross-cultural studies regarding business ethics prior to our own study (Kim and Kim, 2010). In a prior study completed in 2000, it was discovered that in high uncertainty avoidance countries such as South Korea, unethical behavior is less tolerated (Kim and Kim, 2010).

While researchers recognize that there is a link between corporate social responsibility and culture, there has not been much empirical testing on the nature of the relationship. Ho, Wang, and Vitell (2011) found that European firms had the highest CSR performance followed by North America and lastly, Asia. They argued that this may be due to the differences in the nation's value systems; the fact that Europe is more regulated than North America, and North America is more regulated than Asia; and that companies in each country may place higher value on different stakeholders. They also found that countries that were more economically developed had higher corporate social responsibility performance; which can be due to the fact that less developed countries are less likely to employ legal safeguards needed for economic growth, such as regulations pertaining to the environment (Harrison and Huntington 2000).

Ho, Wang, and Vitell (2011) also tested the relationship between PDI, IDV, MAS, and UAI with corporate social responsibility. They found that countries with higher PDI, lower IDV, higher MAS, and higher UAI were more likely to have higher corporate social responsibility performance. Previous research suggested that countries that score high on PDI were more likely to accept questionable business practices (Cohen et al, 1996), yet Ho, Wang, and Vitell found that countries with higher PDI tended to place more emphasis on environmental regulations, which may be the reason that higher PDI is correlated with higher corporate social responsibility performance.

A previous study by Akaah (1990) cited by Ho, Wang, and Vitell found that organizations that were individualistic have more unethical behavior by their workers than organizations that were collectivistic; Ho, Wang and Vitell found that higher IDV was correlated with lower corporate social responsibility performance. They hypothesized that higher MAS would lead to lower CSR due to previous research that found higher masculine societies have a lower appreciation for cooperative behavior. Even though their hypothesis was rejected, they did not provide any explanation as to why higher masculinity may be related to higher corporate social responsibility. Higher uncertainty avoidance leading to higher corporate social responsibility performance could be related to the fact that previous research cited by Ho, Wang and Vitell found that people who accept uncertainty are more inclined to take risks, and taking risks is correlated with unethical behavior (Rallapalli et al. 1994).

### **Corporate Social Responsibility in the United States:**

In a study done by Redding and Witt (2012), the CSR perceptions of multiple nations are analyzed, including both the United States and South Korea. In this study, CSR perceptions within the United States were analyzed by interviewing executives. 71% of respondents from the United States said they felt as though society was important and used the term 'community' in their responses. The study found that more manufacturing managers felt strongly about society than financial managers, and the researchers felt that this in part could have been a contributing factor to the 2008 financial crisis. Out the interviews, only 2.74% said that society was one of the main goals; others claimed that being socially responsible was beneficiary but still placed higher importance on the production of products or the primary focus of the industry.

It should be noted that most managers did realize that being socially responsible may be seen as necessary in order for a business to survive in the current societal state of America. The mentality of "if you are not a good citizen you will lose profits" was

imbedded in many managers' minds (Redding and Witt, 2012). Most of the managers felt as though the best thing they could do to contribute to society was in the form of providing employment. They also speculated that products based industries that have less communications with their consumers, will not weigh consumers as important stakeholders. The way companies treat employees also has an effect on how society views a particular company and can affect the prosperity of the corporation (Guchait, 2011).

### **Corporate Social Responsibility in South Korea:**

In the case of South Korea, public relations have much to do with the perceptions of CSR, according to a study done by Kim Yungwook and Soo-Yeon Kim. The public relations in South Korea can be considered to be propagandistic (Kim and Kim, 2010); however the heavy influence of Confucianism, an Asian practice based in hard work and dedication (Domjahn, 2013) and the collective nature of the country, is said to have a positive effect on CSR in South Korea (Kim and Kim, 2010). In South Korea, CSR is perceived by consumers to be a more valued aspect of public relations for businesses than it is in practice, indicating that the idea of CSR to citizens is much more important than CSR actually is in terms of companies having success. (Kim & Kim, 2010)

An issue of *The Economist*, claimed that CSR related activities "should be the job of elected government, not profit-maximizing companies," ("Just good business," 2008) and also claimed CSR to be a waste of shareholders' money. (Kim and Kim, 2010) This idea may be based in the fact that South Korea is a very homogeneous country, and that social trust and capital is very high in the nation. The corporations in South Korea see developing and building relationships with customers as necessary for economic development. (Domjahn, 2013)

It was discovered that there is a correlation between Hofstede's cultural values and the perceptions of CSR in Korea. Collectivism, Confucianism influence, and uncertainty avoidance showed positive relationship with CSR, while individualism and power distance demonstrated negative relationships with CSR perception. (Kim and Kim, 2010) Overall, Koreans are believed to be supportive of CSR activities, and over 60% believe that in even global recessions companies should continue maintaining CSR activities (Bae and Kim, 2012). South Korea's rapid economic development since the 1970s has altered the cultural views of individuals in the nation to realize the importance of CSR. The economic development has also played a part in influencing CSR perceptions (Bae and Kim, 2012).

Results found that the more feminine characteristics that respondents had, the higher importance they placed on economic, legal, and ethical responsibility, and the less likely respondents were to accept unequally distributed power, the greater importance they had on philanthropic responsibility (Kim and Kim, 2010). For-profit companies in Korea have to aim at the consumers' economic, legal and ethical expectations and conduct activities in order to positively affect purchase intent (Bae and Kim, 2012). In the case of executives in Korea, many felt a strong sense of needing to contribute to society and felt as though they should be making society more livable, returning profits to society and setting up foundations. Executives also stressed the importance of innovation and providing employment. (Redding and Witt, 2012)

### Employment Perception and Corporate Social Responsibility:

Chiu, Joe, Lin, and Tasi (2012) measured the relationship of a firm's attractiveness relative to their level of participation in corporate social responsibility. They looked at the four dimensions of corporate social responsibility: economic, legal, ethical, and discretionary. They defined firm's attractiveness as the envisioned benefits that individuals see in working for a specific firm. A firm's attractiveness is positively driven by perceived economic responsibility, perceived legal responsibility, perceived ethical responsibility, and perceived discretionary responsibility.

Hatrup, Lin-Hi, Muerller, and Spiess (2012) measured the effects of corporate social responsibility on employees' affective commitment. Affective commitment, or AC, can be defined as "the employee's emotional attachment to, identification with, and involvement in the organization." (Hatrup et. al, p. 1186, 2012). This study found that overall, there was a positive relationship between CSR and AC. The study also tested how CSR and AC differ across cultures. They found that in cultures with higher humane orientation; involving fairness, altruism, caring, kindness, and institutional collectivism; meeting the needs of the group over meeting the needs of the individual, will have a more positive relationship between CSR and AC. Essentially, lower power distance of a culture indicates a more positive relationship between CSR and AC.

Gowan and Zhang (2011) also measured the impact of corporate social responsibility on applicant's attraction to an organization. Specifically, they focused on how companies' economic, legal, and ethical responsibilities affected applicant attraction. They found that companies with high levels of economic performance, legal performance, and ethical performance were associated with an increase in applicant attraction to organizations.

Bhattacharya, Korschun, and Sen (2006) conducted research on the role of corporate social responsibility in strengthening multiple stakeholder relationships. They found that when the respondent was aware of the company's CSR, it was associated with greater intention to seek employment with the company. Albinger and Freeman (2000) also found that organizations demonstrating higher levels of corporate social responsibility have an ability to attract employees due to increased employer attraction.

### **Price Perception and Corporate Social Responsibility:**

Research for price perception and CSR has not been conclusive. Mohr and Webb (2005) found that high levels of CSR lead to a more positive evaluation of the company and a higher level of purchase intent, yet their findings showed that higher or lower CSR had no impact on price as a determinant of purchase intent; meaning if the CSR was high, respondents did not feel that justified a higher price.

Others have found the opposite data. Creyer and Ross (1997) found that the 'ethicality of a firm's behavior is an important consideration during the purchase decisions, ethical corporate behavior is expected, they (consumers) will reward ethical behavior by a willingness to pay higher prices for that firm's products, and although they may buy from an unethical firm they want to do so at lower prices, which in effect, punishes the unethical act' (Creyer and Ross, p. 429, 1997).

A study done by Penn, Schoen, and Berland (2011), found that most consumers planned to spend about the same on goods from socially responsible corporations within the next year. They also found that a majority of consumers would be willing to spend more on products from socially responsible corporations.

Avila, Faria, and Ferreira (2010) measured the relationship between corporate social responsibility and consumers' perception of price. They found that consumers perceive a higher benefit and value when a company is socially responsible. They also perceive the price differential between the socially responsible company and the competitor (assuming quality is equal) is fair, and they would be willing to pay a premium for the product from the company with the higher CSR. The research also showed that consumers were more motivated to purchase from a company with social responsibility that directly impacted their lives, versus a company that indirectly impacted their lives.

Bhattacharya, Korschun, and Sen (2006) also examined the relationship between purchase intention and CSR, and found those who were aware of firms' CSR initiatives had higher intent to purchase products.

### **Industry and Corporate Social Responsibility:**

Different industries have different regulations, due to this CSR can differ depending on the industry. Businesses in the same industries will have similar social behaviors, as noted by Andersen, Yongtao, and Limin (2011). In 1977, it was proposed that industry should be taken into consideration when evaluating CSR, which was reaffirmed in 2004, as an industry's services and/or products in nature may be more or less socially responsible than other industries'. It has also been proposed that when doing a study on CSR only one industry should be focused on due to the industry differences. (Coughlin and Sweeney, 2011)

Andersen, et al. (2011), found that different industries had different concerns. Industries, such as agriculture, focused more on product output whereas industries such as mining and construction had a stronger focus on environmental concerns. The food, tobacco, apparel, petroleum, and chemical manufacturing industries were found to be concerned with environment, human rights and products they produce. Transportation and public services industries were found to be high in product and environment concerns, and wholesale and retail seemed to focus the most on products, as did the health legal, education, social and engineering services. Finally, hotel, personal, business, auto and amusement services had low concern in any societal areas, though financial services had high levels of community strengths (Andersen, et al. (2011). Choe, Choi, and Kwak conducted research on the relationship between CSR and financial performance in Korea. They found that the profitability depended on an industry-CSR fit. This research implies companies had to match their CSR activities to their industry to realize an effect on their bottom line.

Penn, Schoen, and Berland (2011) also examined industry in their study. They found that over 85% of their subjects felt as though it is important for the healthcare, energy, food, automotive, financial services, and consumer goods industries to employ CSR. However, the healthcare, automotive and financial services industries were not viewed as having a high CSR performance. The study also found that consumers felt as though it is more important for certain industries to perform CSR than others. It was found that the food, energy, healthcare, automotive, financial services consumer goods and media industries were viewed as most in need of CSR.

Aguinas and Glavas (2012) discussed CSR on an organizational level of analysis. They claimed that an alignment of CSR with the firm's mission and values is important to the value or benefits that may be received from the CSR. The study by Coughlin and



Sweeney discovered that much of the CSR reporting done by various industries complies with the expectations of the industry and standards set by other companies in the same industry (Coughlin and Sweeney, 2011).

## Hypotheses

In this study, we aim to examine the differences in perception between subjects from the United States and South Korea. By focusing on corporate reasons, future employment options, purchase intent, and industry, we aim to get a broad idea of how subjects from each nation view the importance of corporate social responsibility. For each hypothesis, the comparison of subjects from both nations is key, and will be the theme of the hypotheses to be examined in this paper. Due to the extensive nature of the study, the hypotheses have been broken into four sections, each testing the difference of perceptions between subjects in the United States and subjects in South Korea.

For all of our hypotheses, we believe that the subjects from the United States will have more positive perceptions of CSR than subjects from South Korea. As Ho, Wang, and Vitell (2011) stated, countries that have high masculinity and have high economic development have higher CSR. They also found that North America had higher CSR than Asia. We expect that both countries will have positive views of CSR as South Korea has high uncertainty avoidance, high power distance, and low individuality.

The first section of hypotheses deals with the reasons subjects believe corporations engage in socially responsible behaviors. By developing four key reasons: regulation, competition, ethics, and innovation, four hypotheses have been created in order to gauge why subjects feel it is important for corporations to remain socially responsible, as well as which group of subjects feels more strongly as to certain incentives.

*H1a: Subjects from the United States will rank regulatory requirement as a more important reason for companies to respond to a societal expectation than subjects from South Korea.*

*H1b: Subjects from the United States will rank competitive advantage as a more important reason for companies to respond to a societal expectation than subjects from South Korea.*

*H1c: Subjects from the United States will rank the fact that it is the right thing to do as a more important reason for companies to respond to societal expectations than subjects from South Korea.*

*H1d: Subjects from the United States will rank ability to innovate and learn as a more important reason for companies to respond to societal expectation than subjects from South Korea.*

The following section of hypotheses deals with willingness to pay for goods and services from socially responsible corporations as well as purchase intent of subjects from socially responsible corporations. Again, in this section the difference of opinions from subjects in the United States and from South Korea will be examined.

*H2a: Subjects from the United States are more willing to pay higher prices on goods from socially responsible firms than subjects from South Korea.*

*H2b: Subjects from the United States will have higher purchase intent on products from socially responsible corporations than subjects from South Korea.*

The next set of hypotheses has to do with future employment options and beliefs of subjects from each country. The willingness of subjects to take a lesser paying job from socially responsible firms, as well as whether subjects regard social responsibility as an important factor when evaluating potential employment will be determined.

*H3a: Subjects from the United States are more willing to take lesser paying jobs from socially responsible firms than subjects from South Korea.*

*H3b: Subjects from the United States will weigh the social responsibility reputation of a company in higher importance than South Korean subjects when choosing a potential employer.*

In the last section of hypotheses, the nature of industries will be examined. Choosing four representative industries: Healthcare, Energy, Financial Services, and Consumer Goods, the perception of CSR importance of each industry as perceived by university subjects will be examined in accordance to the perception of subjects from each country.

*H4a: Subjects from the United States will feel as though it is more important for the Healthcare industry to have higher CSR practices than subjects from South Korea.*

*H4b: Subjects from the United States will feel as though it is more important for the Energy industry to have higher CSR practices than subjects from South Korea.*

*H4c: Subjects from the United States will feel as though it is more important for the Financial Services industry to have higher CSR practices than subjects from South Korea.*

*H4d: Subjects from the United States will feel as though it is more important for the Consumer Goods industry to have higher CSR practices than subjects from South Korea.*

## **Methodology**

In order to complete the study, students from one American and one Korean higher education establishment were chosen. In America, the students surveyed came from a higher education institution located in the Northeast; whereas in South Korea the students surveyed came from a university located in Seoul, South Korea.

In the United States, students who were taking a general seminar class were given the questionnaire to attempt to reach a wide range of majors and ages. Students who are in their sophomore year or higher generally take the seminar classes. The subjects were given a 20-minute time frame to complete their questionnaires

In South Korea, the questionnaires were given to subjects in media and sociology courses, using a convenience sample. Classes at the university are conducted in English so the questionnaire was not translated into Korean. While geared towards Communications and Sociology subjects respectively, students of any major are able to

take the courses as electives. Since the classes are 300 and 400 level, they are geared towards upperclassmen. The questionnaires were distributed at the beginning of class and were to be handed back in the next class period. Many subjects completed them the same day, and others handed the questionnaire back at a later date as requested. It was difficult to find subjects to complete questionnaires, thus out of 96 questionnaires distributed, only 47 were returned completed.

### **Survey Instrument:**

The questionnaire had a total of 94 questions including demographic identifiers. The questionnaire included a total of five parts, each using a likert scale indicator from one “1” to five “5” for each participant to rate their perception on a each question. On each scale, “1” represented the lowest level of agreement, while “5” or “7” indicated the highest level of agreement.

Of the five parts of the questionnaire, this study utilized parts two, three, and four for research purposes. The questionnaire was adapted from the study done by Penn, Schoen, and Berland (2010), where 1000 participants were surveyed. The questionnaire focused on how important it is for certain industries to perform CSR duties, why some industries are perceived as needing higher CSR practices, as well as purchase intent in conjunction with CSR.

In the survey instrument utilized by this study, part two, consisting of twenty questions, dealt with stakeholder perceptions in different corporate industries, as well as asking the level of importance of different reasons for companies identifying and responding to societal expectations. Part two was utilized in determining why subjects feel as though corporations engage in CSR. Part three of the questionnaire, consisting of four questions, prompted subjects to rate their thoughts in regards to their dedication to corporations practicing CSR and how it affects them. Part four, adapted from Penn, Schoen, and Berland (2010) had subjects rating their perceptions on which industries they feel most necessary to utilize CSR, as well as which of those industries they feel do act in a responsible manner. There were fourteen industries represented in part four of the questionnaire. Part five of the questionnaire was used for demographic purposes, asking subjects to indicate basic information such as age, gender, year and major in school.

### **Results**

Analysis of the data was done by running independent *t*-test analysis with a significance level was set at .05. After cleaning the data, our sample size was 148; 102 subjects from the United States and 46 subjects from South Korea. Below is a table detailing the demographics of each of the samples.

*[Insert Table 2 Here]*

*[Insert Table 3 Here]*

Table 1 looks at our descriptive statistics. Observing this table, we can see that H1a, H1b, H1c, H1d, H2b, H3b, H4a, H4b, H4c, and H4d all have means over 3, which is our neutrality point. H2a and H3a have means that are below our neutrality point of 3. In

addition to this, the United States has higher means on H1a, H1b, H1c, H1d, H2a, H3b, H4a, H4b, and H4d while South Korea has higher means on H2a, H3a, and H4c.

*[Insert Table 4 Here]*

Hypotheses H1a-H1d were measured using a likert scale where “1” represented that it was not at all a reason to respond to a societal expectation and “5” represented it was very much a reason to respond to a societal expectation.

H1a states that subjects from the United States will rank regulatory requirement as a more important reason for companies to respond to a societal expectation than subjects from South Korea. H1a is supported with a *t*-score of 6.026,  $p = .000$ , and a mean of 4.10 for the United States and a mean of 3.22 for South Korea.

H1b states that subjects from the United States will rank competitive advantage as a more important reason for companies to respond to societal expectations than subjects from South Korea. H1b is supported with a *t*-score of 2.252,  $p = .026$ , and a mean of 3.97 for the United States and a mean of 3.63 for South Korea.

H1c states that subjects from the United States will rank the fact that it is the right thing to do as a more important reason for companies to respond to societal expectations, than subjects from South Korea. H1c is supported with a *t*-score of 5.384, a  $p = .000$ , a mean for the United States of 4.42, and a mean for South Korea of 3.61.

H1d states the subjects from the United States will rank ability to innovate and learn as a more important reason for companies to respond to societal expectation than subjects from South Korea. H1d is supported with a *t*-score of 4.634,  $p = .000$ , and a mean of 4.42 for the United States and a mean of 3.80 for South Korea.

H2a states that subjects from the United States will be more willing to pay higher prices on goods from socially responsible firms than subjects from South Korea. The question asked subjects how much more they would be willing to spend on a \$100 product if they could purchase the version from a socially responsible company. “1” represented zero, “2” represented 5-10% more, “3” represented 11-20% more, “4” represented 20-30% more, and “5” represented more than 30%. H2a was not supported with a *t*-score of -1.28, a  $p = .218$ , and a United States mean of 2.58 and a mean of 2.80 for South Korea.

H2b states that subjects from the United States will have higher purchase intent on products from socially responsible corporation than subjects from South Korea. This question, which asked to what degree did subjects plan to spend less, more, or the same amount of money on products from socially responsible companies. “1” represented spend much less, “2” represented spent a little less, “3” represented spend the same, “4” represented spend a little more and “5” represented spend much more. H2b was rejected with a *t*-score of -3.209,  $p = .002$ , and a mean of 3.20 for the United States and a mean of 3.63 for South Korea.

H3a states that subjects from the United States are more willing to take lesser paying jobs from socially responsible firms than subjects from South Korea. This question asked subjects what percentage of their salary would they be willing to give up in exchange for working with a company that is socially responsible. “1” represented zero, “2” represented 5-10% more, “3” represented 11-20% more, “4” represented 20-30% more, and “5” represented more than 30%. H3a was unsupported with a *t*-score of -1.758,  $p = .083$ , and a mean of 2.28 for the United States and a mean of 2.59 for South Korea. H3b states that subjects from the United States will weigh the social responsibility reputation of a company in higher important than South Korea subjects when choosing a

potential employer. This question asked if subjects were to receive similar employment offers from two or more companies, to what degree would they consider social responsibility reputation when making their decision. Responses were on a scale from “1” to “5”, where “1” represented little or no consideration and “5” represented a great deal of consideration. H3b was supported with a  $t$ -score of 2.615,  $p = .010$ , and a mean of 4.05 for the United States and a mean of 3.70 for South Korea.

Hypotheses 4a through 4d were measured using a likert scale to assess how important subjects thought it was for certain industries to be socially responsible. “1” represents little or no importance and “5” represents high importance.

H4a examines the importance of the healthcare industry to be socially responsible, H4b examines the energy industry, H4c examines the financial services industry, and H4d examines the consumer goods industry. Results revealed that for H4a-c the means were statistically different and that the subjects from the United States felt stronger than subjects from South Korea that the energy, healthcare, and financial services industries should be more socially responsible. H4d was unsupported as the means were not statistically significant with a  $p = .382$ .

## **Conclusion**

The results of all of our hypotheses revealed that both subjects from the United States and South Korea perceive that it is important for companies to engage in socially responsible behavior. We came to this conclusion by examining the means of each hypothesis from both countries and determining that they were all favorable towards corporations acting in a responsible manner. Some of the reasons subjects thought it was important for businesses to engage in corporate social responsibility include: that it is a regulatory requirement, it provides a competitive advantage, it is the right thing to do, and it provides companies with an ability to innovate and learn (Penn et. al, 2011). Subjects from both countries ranked all of these reasons as being important, yet subjects from the United States had higher means on all reasons, as we hypothesized. This is in accordance to the suggestions from Ho, Wang, and Vitell (2011) who stated that North America has higher CSR performance than Asia; the United States is a masculine society, which correlates to high CSR performance, as well as the United States having high levels of economic development.

Since both countries feel that companies should engage in CSR, companies who operate in both of them should be aware of this fact. The subjects who responded to our questionnaire are current stakeholders of companies who operate in their country, by either currently or potentially being customers, employees, shareholders, government officials, or a part of the community at large. Companies who engage in CSR activities will likely see positive feedback from their stakeholders.

To further look at how CSR activities interact with specific stakeholders, we looked at the relationship between purchase intention and CSR performance. We found that subjects would be willing to spend on average 5-20% more on products from socially responsible firms. This is consistent with previous research by Bhattacharya, Korschun, and Sen (2006); Avila, Faria, and Ferreira (2010); and Creyer and Ross (1997), who found that people have a higher purchase intention and would be willing to spend more

on products from socially responsible companies. Earlier, we indicated that CSR performance was perceived to be important to stakeholders, and that companies should take note of this in order to realize positive feedback from their stakeholders. Customers are one of, if not the most important, stakeholder for companies. If companies engage in CSR and market these actions via public relations measures, their website, and packaging, companies can charge higher prices than the competition, 5-20% more according to our results, and earn higher returns.

There was also a positive relationship between CSR reputation and employee attraction. Subjects from both South Korea and the United States weigh companies' social responsibility when choosing an employer, and said that they would be willing to take a 5-20% pay cut to work for companies who were socially responsible. This is consistent with previous research by Chiu, Joe, Lin, and Tasi (2012), Gowan and Zhang (2011), Bhattacharya, Korschun, and Sen (2006), and Albinger and Freeman (2000) who found that higher levels of CSR performance lead to higher employee attraction. If companies engage in CSR and publicize the measures they have taken, they will be able to attract more talent and possibly increase the quality of their workforce by having a larger selection of talent.

Lastly, subjects from both countries felt that it was important for firms to be socially responsible in the industries of energy, healthcare, financial services, and consumer goods. Subjects from the United States felt that it was more important for the energy, healthcare, and financial services industries to be more socially responsible than did students from South Korea. This is consistent with research by Penn, Schoen, and Berland (2011) who found that 85% of their subjects felt as though healthcare, energy, financial services, and consumer goods industries should engage in CSR activities. Companies in these industries should be aware that their stakeholders expect them to act socially responsible. With being aware of these expectations, they can deliver on these expectations and realize the benefits in employee attraction and willingness to pay higher prices.

Educational implications of our results relate back to educating subjects on CSR in university classes. As subjects from both nations indicated they felt CSR is important, schools can offer opportunities for subjects to learn about various types of CSR activities, how to market CSR activities to stakeholders, and why corporations engage in CSR. Corporations can also offer classes to their current employees on the topic and educate them in the same manner.

### **Limitations**

The major limitation of this study had to do with the sample size, specifically in South Korea. Ideally, there would have been 150 or more participants from each nation, and having subjects at only two schools could have also affected results. Another possible limitation was the dispersion of majors in the sample size; over 50% of respondents were either in the Communications or Healthcare field. Despite the university in South Korea offering English courses policy, having Korean subjects take the questionnaire in English could have also been a deterrent, as it is not their native language and questions could have been misread or not fully understood. Finally, the original questionnaire distributed

to subjects was comprised of 94 questions, which many subjects from both nations felt took too long to complete.

### **Future Research**

Future research should be done to explore the CSR-industry relationship more in depth. While this study went over the basics of which industries subjects felt most important to be socially responsible, research on what is expected from each industry in order to be viewed as responsible would be the next step. Finding out why subjects indicated certain industries as needing to have more socially responsible behavior would also be something to explore in a future study. This would help companies to aim their CSR efforts more accurately.

For a more effective study, multiple universities should be used spanning different geographic areas and demographics. Even though university undergraduate students were the demographic for this study, having graduate students, or even recent graduates participate could also garner interesting results that are still relevant.

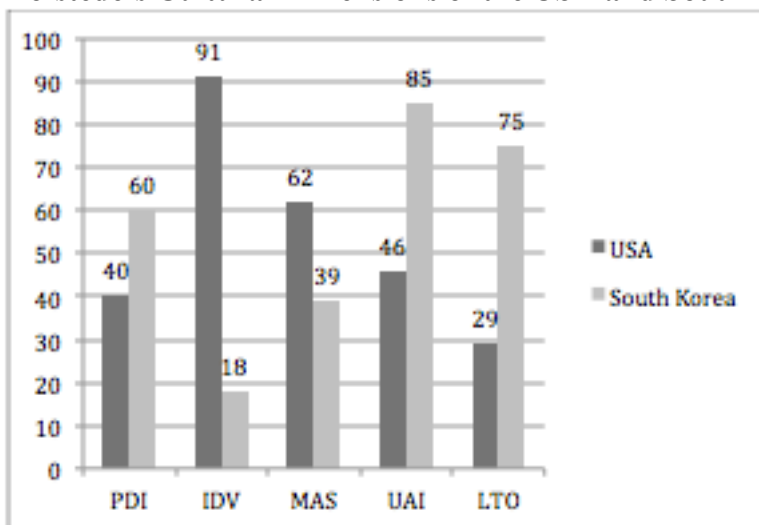
In order for future studies to be more effective, there should also be more research done on cultural differences between South Korea and the United States, as finding studies proved difficult and many found were outdated. Finding more current research about the cultural aspects of each country, particularly South Korea would be beneficial as well.

Appendix

**Table 1: Adapted from Carroll (1979)**

<b>Economist</b>	<b>Theory on CSR</b>
Friedman (1962)	Profit making only.
Davis (1960), Backman (1975)	Going beyond profit making.
McGuire (1963)	Going beyond economic and legal requirements.
Manne & Wallich (1972)	Voluntary activities.
Steiner (1971)	Economic, legal, voluntary activities.
Committee for Economic Development (1971), Davis & Blomstrom (1966)	Concentric circles, ever widening.
Eells & Walton (1961)	Concern for the broader social system.
Hay, Gray, & Gates (1976)	Responsibility in a number of social areas.
Ackerman & Bauer (1976), Sethi(1975)	Giving way to social responsiveness.

**Chart 1:**  
**Hofstede's Cultural Dimensions of the USA and South Korea**





**Table 2: Demographics**

<b>Major</b>	<b>United States Sample</b>	<b>South Korea Sample</b>
Communications	17.8%	47.8%
Business	15.8%	21.7%
Healthcare	33.7%	0%
Computer Systems	5%	2.2%
Law/Government	6.9%	0%
Education	13.9%	6.5%
Liberal Arts	5.9%	21.7%
<b>Education Year</b>		
Freshman	4.9%	2.2%
Sophomore	36.3%	39.1%
Junior	50%	17.4%
Senior	8.8%	41.3%
<b>Gender</b>		
Female	71.6%	34.8%
Male	28.4%	65.2%
<b>Mean Age</b>	20.38	22.52

**Table 3: Descriptive Statistics**

Hypothesis	Country	N	Mean	Std. Deviation
H1a: Subjects from the United States will rank regulatory requirement as a more important reason for companies to respond to a societal expectation than subjects from South Korea.	USA SK	102 46	4.10 3.22	.790 .892
H1b: Subjects from the United States will rank competitive advantage as a more important reason for companies to respond to a societal expectation than subjects from South Korea.	USA SK	102 46	3.97 3.63	.850 .853
H1c: Subjects from the United States will rank the fact that is it the right thing to do as a more important reason for companies to respond to societal expectations than subjects from South Korea.	USA SK	102 46	4.42 3.61	.710 .906
H1d: Subjects from the United States will rank ability to innovate and learn as a more important reason for companies to respond to societal expectation than subjects from South Korea.	USA SK	102 46	4.42 3.80	.724 .806
H2a: Subjects from the United States are more willing to pay higher prices on goods from socially responsible firms than subjects from South Korea.	USA SK	102 46	2.58 2.80	1.019 1.046
H2b: Subjects from the United States will have higher purchase intent on products from socially responsible corporations than subjects from South Korea.	USA SK	102 46	3.20 3.63	.745 .799
H3a: Subjects from the United States are more willing to take lesser paying jobs from socially responsible firms than subjects from South Korea.	USA SK	102 46	2.28 2.59	.776 1.045
H3b: Subjects from the United States will weigh the social responsibility reputation of a company in higher importance than South Korean subjects when choosing a potential employer.	USA SK	102 46	4.05 3.70	.825 .591
H4a: Subjects from the United States will feel as though it is more important for the Healthcare industry to have higher CSR practices than subjects from South Korea.	USA SK	102 46	4.73 4.20	.548 .749
H4b: Subjects from the United States will feel as though it is more important for the Energy industry to have higher CSR practices than subjects from South Korea.	USA SK	102 46	4.388 4.07	.676 .712
H4c: Subjects from the United States will feel as though	USA	102	4.33	.775

it is more important for the Financial Services industry to have higher CSR practices than subjects from South Korea.	SK	46	3.67	.920
H4d: Subjects from the United States will feel as though it is more important for the Consumer Goods industry to have higher CSR practices than subjects from South Korea.	USA SK	102 46	4.19 4.07	.780 .772

**Table 4: t-test results**

Hypothesis	t (2-tailed)	Country	n
1a: Subjects from the United States will rank regulatory requirement as a more important reason for companies to respond to a societal expectation than subjects from South Korea.	6.00	USA	92
1b: Subjects from the United States will rank competitive advantage as a more important reason for companies to respond to a societal expectation than subjects from South Korea.	2.26	USA	78
Subjects from the United States will rank the fact that is it the right thing to do as more important reason for companies to respond to societal expectations than subjects from South Korea.	4.00	USA	92
2: Subjects from the United States will rank ability to innovate and learn as a more important reason for companies to respond to societal expectation than subjects from South Korea.	4.00	USA	92
3a: Subjects from the United States are more willing to pay higher prices on goods from socially responsible firms than subjects from South Korea.	1.88	USA	80
3b: Subjects from the United States will have higher purchase intent on products from socially responsible corporations than subjects from South Korea.	1.92	USA	80
4: Subjects from the United States are more willing to take lesser paying jobs from socially responsible firms than subjects from South Korea.	1.83	USA	80
5: Subjects from the United States will weigh the social responsibility reputation of a company in higher importance than South Korean subjects when choosing a potential employer.	1.510	USA	80
6a: Subjects from the United States will feel as though it is more important for the healthcare industry to have higher CSR practices than subjects from South Korea.	1.700	USA	80
6b: Subjects from the United States will feel as though it is more important for the Energy industry to have higher CSR practices than subjects from South Korea.	1.910	USA	87
6c: Subjects from the United States will feel as though it is more important for the Financial Services industry to have higher CSR practices than subjects from South Korea.	1.400	USA	87
6d: Subjects from the United States will feel as though it is more important for the Consumer Goods industry to have higher CSR practices than subjects from South Korea.	1.782	USA	87

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# **ENVIRONMENTAL INEQUALITY IN THE GLOBAL ERA: THE EXAMPLE OF COUNTRIES IN SUB-SAHARAN AFRICA**

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## **ABSTRACT**

This discussion reflected on the concept of environmental inequality, using the example of countries in Sub-Saharan Africa. In matters concerning the environment, it is cautious to offer that the world is even a smaller village than one may think. Therefore, this discussion is offering a reflection on the unfairness and dangers of environment inequality. The consequences of actions taken in countries located in Sub-Saharan Africa may have repercussions on communities distant from the continent, and located in places as remote as the United States and other distant places in our interconnected world.

Keywords: Environmental inequality, Hazardous wastes, Sub-Saharan Africa.

## INTRODUCTION

In a global era, many occurrences happening in one part of the world tend to affect the most distant parts of our globe. It is a cliché worth repeating, in as much as the not so distant events of *9/11* imprinted in our minds just how interconnected our modern world really was [7]. In some areas in our country and other places, those events never really came to pass, because they left scars that will take time to heal, even if only considering the fact our daily travels constantly remind us of the threat these events left in our lives: As proof of such is the constant search with which travelers around the world have had to deal, as a result of these events which happened on US soil [5]. Even more targeted towards our current discussion, many will be dismayed at the thought that close to none of the tornadoes devastating the US ever originated from the US; these often took form in the coasts of Africa, only to land somewhere on the shores of the United States or some other distant land from Africa. Thus, unbeknownst to many, African communities, though suffering a great level of environmental injustice, are seldom the ones ravaged by deadly tornadoes [1].

Inversely, many experts demonstrated communities in developing countries such as those in Africa, and individuals living in those communities, were exposed to higher levels of environmental risk than were individuals living in developed countries such as the United States of America, in which there existed supposedly higher levels of environmental justice [1]. The existing increased risk in African countries, understandably, is most of the time the result of deliberate political programs of environmental racism, also termed as *environmental inequity* or *environmental injustice*. In effect, it has been proven race and poverty were determining factors in assessing exposure to environmental risk. In the U.S. for instance, some types of hazardous material disposal sites (landfills or incinerators) were more likely to be located in or near minority communities. Similarly, at the global level, developing countries are the target for hazardous waste disposal [2] [5]. If this review is to discuss environmental inequity, first, it needs to define the very notion of *environmental equity*.

## ENVIRONMENTAL EQUITY

Environmental justice or environmental equity was defined by Robert Bullard, director of the Environmental Justice Resource Center at Clark Atlanta University, in his seminal 1990 work *Dumping in Dixie: Race, Class, and Environmental Quality* as, “The principle that all people and communities are entitled to equal protection of environmental and public health laws and regulations.” In countries around the world, the concept of environmental justice can apply to communities where those at a perceived disadvantage—whether due to their race, ethnicity, socioeconomic status, immigration status, lack of land ownership, geographic isolation, formal education, occupational characteristics, political power, gender, or other characteristics—find themselves at a disproportionate risk for being exposed to environmental hazards. At a global scale, environmental justice can also be applied to scenarios such as industrialized countries exporting their wastes to developing nations; these are often located in the African continent. Unfortunately, African countries are only separated from other countries, distant as these may be, by windstorms: The latter know no borders.



In either case, “Environmental and human rights have no boundaries, because pollution has no boundaries,” says Heeten Kalan, senior program officer of the Global Environmental Health and Justice Fund of the New World Foundation in New York City [8] [9]. The issue of globalization is one of common concern to the environmental justice movement in many developing countries,” says Michelle DePass, program officer of the Environmental Justice and Healthy Communities Program at the Ford Foundation [9][4].

Another approach taken by the environmental justice movement is to address the international bodies that support projects that may affect disadvantaged populations. For example, GAIA, an environment consulting company has launched a campaign to stop the World Bank from funding incinerators around the world. To achieve this goal, GAIA locates expert researchers who can share needed information on the health effects of incineration with members near the proposed incinerator where the information may not be readily available. This company also facilitates linkages between members who may be campaigning against similar technologies or against the same incinerator vendor. In this manner, environmental justice organizations can share strategies and information quickly and effectively [9] [3].

## RESEARCH QUESTION

At this junction of this proposal, the question one may naturally pose is the following: Why has the environmental policy discussion been so homogeneous, as if all communities and countries shared the same level of risk? Furthermore, why would countries not think globalization would cause problems in developing nations to have repercussions in developed nations?

In the full version of this discussion, we offer to expound on these very issues. The interconnectedness of our global planet does not afford decision makers the latitude to act as if environmental problems could be treated in isolation. This reflection offers that it is cautious to think in terms of global solutions to the global problems of our environment, even if only because of the age of globalization in which we live, but also due to the environmental constraints binding the universe in ways expounded at the outset of this discussion and which are easy to understand. Issues of fairness and justice in environmental policy will also be reviewed, and implications for our global planet will conclude this reflection.

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## **The Role of Cultural Dimensions and Economic Development**

### **Abstract**

Culture's influence on the state of nations has been a largely overlooked factor in global studies of economies. To test the impact of cultural dimensions on development and growth, this research study examines the relationship of two major dimensions, Power Distance and Individualism, with the economic development of 70 regions over a period of 30 years. Both measures were found to have a significant relationship with the economic measures used. Among the contributions this investigation makes is its implications for policy makers and international organizations, in understanding the formation and outcomes of cross-national relations and making them more predictable.

*Key Words: culture; economic development; economic freedom*

### **Introduction**

“Globalization” describes the process of the increasing connection between markets, technologies, and people. Every country is deeply involved in a network of history, production, and trade. Globalization has enhanced the ability of many countries to expand economically, but not equivalently for all nations. As interconnectedness has become more apparent and the ability to gather and interpret information has evolved, people have become astonishingly aware of disparities throughout the world. Organizations and governments have sought to measure the differences between countries, and to identify factors that portend them.

According to the CIA World Factbook reports for 2012, the world produced almost 72 trillion dollars' worth of goods and services, but comparisons of GDP between countries reveals that growth is not progressing evenly in all places. In an attempt to stimulate economic development in lacking regions, international organizations have attempted to intervene by developing aid and incentive programs. Unfortunately these actions are often. “[There is] little robust evidence of a positive (or negative) relationship between aid inflows into a country and its economic growth....For aid to be more effective in the future, the aid apparatus will have to be rethought.” (Rajan, 2005) To begin to address disparities in the world, we must first understand how they came to be.

There is a vast amount and information available about the world, so much that it is easy to choose data that affirms conclusions already made about what causes poverty, malnutrition, human trafficking, and other horrors. “The problem...[is] not ignorance; it [is] preconceived ideas....The improvement of the world must be highly contextualized, and it's not relevant to have it on a regional level. We must be much more detailed.” (Rosling, 2006) The objective of this study is to address this gap by including cultural dimensions into the considerations of international organizations and policy makers, whom are under increasing pressure of their role in a global community.

### **Review of Literature**

In order to examine the interaction between culture and effective policies, they must first be measured. This study uses the acknowledged relationship

between economic freedom and development to bridge the role cultural dimensions may play in well-being.

The Fraser Institute's Economic Freedom Index measures the degree to which the institutions of a country can be considered economically free. "Individuals have economic freedom when property they acquire without the use of force, fraud, or theft is protected from physical invasions by others and they are free to use, exchange, or give their property as long as their actions do not violate the identical rights of others." (Gwartney, 1996) The database was first constructed to provide both an accurate representation of economic freedom and to measure its role in the world, particularly over time. It emphasized the index's relevance by linking economic freedom with high levels of income and rates of economic development.

Economic development is the quantitative and qualitative result of sustained government policies aimed towards improving economic health and level of well-being. It is the growth of a country measured by factors such as overall citizen health, literacy and standard of living as well as quality of infrastructure and technology people have access to. Economic development also results in economic growth, which represents increases in levels of a nation's productivity, measured by Gross Domestic Product (GDP). The more a country produces, the better ability it has to raise well-being.

Economic freedom-related decisions such as protection of property rights, freedom of trade, freedom of labor, and access to financial markets stimulate the market and draw participation not only from local companies, but also from abroad.

Such interaction creates shared benefit from research and design (R&D), production processes, and other knowledge, shifting the output curve or how much a country is able to produce. “Without exception, countries with either a high level or a substantial increase in economic freedom achieved positive growth. Correspondingly, the overwhelming majority of countries with low and/or contracting levels of economic freedom experienced declines in per capita GDP.” (Gwartney, 1996) Another study reaffirms that economic freedom is key in any attempt to improve economic and social well-being. (Vega-Gordillo, 2003) Yet, despite the prevalence of theories linking economic freedom and development, not all countries pursue its expansion. There must be an underlying reason for the institutional decisions that countries make.

Institutional Theory explains the interaction of formal institutions, which take form as laws, regulations, and government bodies, and informal institutions, which are less tangible. Formal institutions, as may be represented by economic freedom, have been extensively linked with economic development in a body of studies. There are also resilient structures, rules, norms and routines within a social structure that govern social behavior and are used as guidelines. (Scott, 2004) The impact of these informal institutions is little explored, despite that there is cause to believe that formal institutions are built on the informal. (OECD, 2013)

Unexpected conflict has arisen as multinationals and governments have sought to build beneficial international relationships. Laws of nations are clearly written, but differing interests and expectations are not so easily translated. Informal rules that govern countries may be explained by culture, defined as

integrated patterns of thought, belief and behavior of a collective of people, and is observed to be enduring to the forces of time. (Hofstede, 2010) In this study we assert that culture, as an informal institution, has impact on growth drivers such as economic freedom, and thus an impact on economic development.

A study published by Mathers (2010) examined the independent impacts of culture and economic freedom on growth, and concluded that culture may affect economic development through indirect channels, such as promoting the establishment of economic freedom. Further examination of this suggested relationship may lead to improved understanding of why some countries are better-off economically than others. The Hofstede study, the most widely recognized measure of cultural dimensions in business, used regressions and factor analysis to identify six major dimensions of culture for the purpose of better understanding their influence in the world. Those dimensions are Power Distance, Individualism vs. Collectivism, Uncertainty Avoidance, Masculinity vs. Femininity, Long-term vs. Short-term Orientation, and Indulgence vs. Restraint. Hofstede's (2010) publication identifies two dimensions particularly correlated with economic development: Power Distance and Individualism vs. Collectivism, a basis for which we use for further study.

Power Distance is the measure of how societies handle the fact that people are unequal. It is "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally." (Hofstede, 2010) High power distance is linked with political violence, income disparity, and unequal access to the advantages of society. In countries

scoring high in Power Distance, institutions are not expected to equally protect and advance the priorities of the majority of citizens, thus our first hypothesis is formed:

*H1a: Power Distance will negatively impact economic freedom.*

Individualism is negatively correlated with Power Distance. Its opposite, collectivism, describes systems in which “people from birth onward are integrated into strong cohesive groups that continue to protect the individual in return for loyalty.” (Hofstede, 2010) Individualism describes a culture in which “ties between individuals are loose: everyone is expected to look after him or herself and immediate family.” (Hofstede, 2010) High scores of individualism are linked with social mobility, a characteristic of economic freedom. Thus, our second hypothesis:

*H1b: Individualism will positively impact economic freedom.*

This study uses a mediation model to explain a relationship between cultural dimensions and economic development. In order to confirm H1a and H1b suggest a link, we further test:

*H2a: Economic Freedom will cause GDP per capita (PPP) to be higher.*

There is also the possibility that Power Distance and Individualism may drive economic development through channels other than economic freedom. Culture can be expected to affect the prioritization of income allocation and consumption, which may be shown as the differing degrees of investment in human capital as might be measured by health and education. (Minh, 2013) For comparability, we establish two last hypotheses:

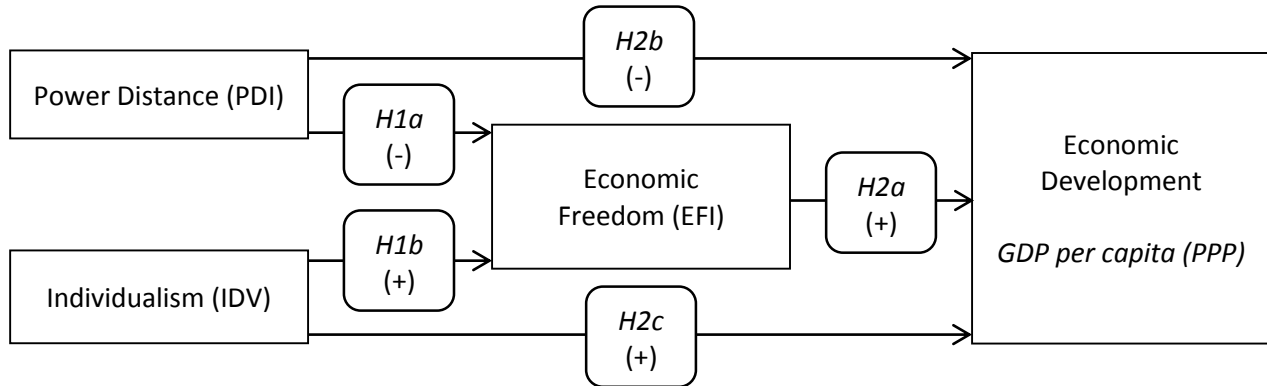
*H2b: Power Distance will have a downward pressure on GDP per capita (PPP).*

*H2c: Individualism will have an upward pressure on GDP per capita (PPP).*



All of the hypotheses are represented visually in Figure 1.

**Figure 1**



### Methodology

The purpose of this study is to examine the relationship between Individualism and Power Distance, economic freedom, and GDP per capita (PPP), to better understand how culture is a determinant of a country's long term development.

This study utilizes major dimensions of culture for preliminary investigation of culture's impact on economic freedom and economic success. There are three major studies of culture: the World Values Survey, Hofstede, and GLOBE. Since the dimensions calculated by Hofstede and GLOBE were derived by examining relationships of values observed by the World Values Survey, the study was eliminated. Dimensions "are meant to improve our understanding [of culture] by reducing...complexity." (Hofstede, 2010, p47) An evaluation of GLOBE questionnaires by Hofstede found that there was frequent use of "researchers' jargon, not reflective of the problems on the [respondents'] minds." (Hofstede, 2010, p51) Also, they separate practices and ideals, and correlations are observed within their dimensions. Hofstede uses language that is relevant to respondents and is mindful of what is being measured, making use of factor analysis and correlation coefficients to choose the best measures and avoid overlap. The GLOBE study was not

found to be a convincing measure of culture, and Hofstede specifically addresses a number of concerns regarding methodology, so it is used to represent culture in this study. Scores for Power Distance and Individualism were collected from the 2010 dataset, as independent variables.

Economic freedom has been studied extensively by two organizations: the Fraser Institute and the Heritage Foundation. The Fraser database was first constructed to provide both an accurate representation of economic freedom and to measure its role in the world, particularly over time. The Heritage Foundation has, since its creation corrected its lack of yearly observations of economic freedom (which allows for the analysis of economic freedom over time), but there are technicalities in method that make the Fraser measure preferable. The Fraser Institute's Economic Freedom of the World has 17 measures, while the Heritage Foundation only uses ten. It also relies on numbers wherever possible, where the Heritage Foundation allows for more judgment calls. For example, the Heritage Foundation equally weighs all of its components, while the Fraser Institute measures them degree of importance as determined by surveys answered by knowledgeable individuals. Thus, overall scores on a yearly basis were collected from the Fraser Institute. Index of economic freedom over 30 years were averaged to form the dependent variable. Averaging eliminates variability, and measures the responsiveness of countries to globalism. Five-year averages were also collected to see if there is an observable difference between the degree cultural dimensions can predict economic freedom over short and long periods of time. Both dimensions were regressed separately and together against economic freedom.

The final variable in this study, economic development, is represented by gross domestic product per capita (purchasing power parity), henceforth called GDP per capita

(PPP). “National wealth...stands for a lot of other factors” (Mihn, 2013) such as more modern technology, more social mobility, better education, and a larger middle class. Levels of productivity between countries are comparable on a per capita basis, equivalently distributed among its residents, and adjusted for Purchasing Power Parity (PPP) or the relative power of money to purchase a certain basket of goods, which is used to determine the cost of a similar basket of goods from one country to another. “GDP per person is an informative indicator of welfare across a broad range of countries” (Jones, 2010) and was found to be acceptable for the purposes of our research. Economic freedom is expected to have a lagged effect on economic development, so five-year averages of economic freedom are regressed against subsequent five-year averages of GDP per capita (PPP). Economic Freedom is collected from the World Bank from 1976 through 2005, and GDP per capita (PPP) is collected from 1981 through 2010. Initial size of GDP acts as a control, to explain for historical data that is not available to represent advances of national wealth.

The final relationship measured is for a direct impact of cultural dimensions on GDP per capita (PPP). The same data for Power Distance and Individualism used in the first set are regressed against the 5-year averages of GDP as well as a 30-year average. The initial size of GDP again acts as a control, and economic freedom is included in both sets of regressions for interpretation of findings.

Data available varied between sources. The Hofstede study grouped certain countries by region: East Africa, West Africa, and Arabic Countries. Economic freedom and GDP per capita (PPP) data available for countries in each of these areas was averaged to represent these regions. Countries that did not appear on all three data sets were

eliminated, leaving 70 nations for measurement. The regressions omit observations of missing data.

## Results

Table 1 lists the correlations of the variables used in the regressions. All variables are significantly correlated, suggesting links between them. One concern is the strong negative correlation between Power Distance Index (PDI) and Individualism (IDV). This is due to the fact that collectivist cultures tend to be reliant on power figures, while cultures that encourage individuals to be self-sufficient tend to be less dependent on others. (Hofstede, 2010) Despite the tendency of one to move with the other, the two dimensions are found to measure independent characteristics of cultures, as cases such as France and Belgium demonstrate. The correlation is important to note here because the overlap may cause the results to misrepresent the true nature of the relationships examined, particularly when comparing the impact of Power Distance and Individualism both individually and in multiple regressions.

**Table 1**

Correlations					
	PDI	IDV	EF	GDP	Initial GDP
PDI	1				
IDV	-.639**	1			
EF	-.379**	.413**	1		
GDP	-.490**	.540**	.678**	1	
Initial GDP	-.491**	.595**	.510**	.740**	1

*\*\* denotes significance at the 99% level*

The regression results between the cultural dimensions and economic freedom are shown in Tables 2 and 3. The betas for both dimensions hold very similar weight; however, individualism holds higher significance in a multiple regression, and the variation is little

improved. (Model 3) *Hypothesis 1a*, predicting that Power Distance would have a negative impact on economic freedom is not rejected. The relationship is significant, but a multiple regression suggests it is small. *Hypothesis 1b*, predicting that Individualism would have a positive impact on economic freedom, is also not rejected. A significant relationship is suggested, and the dimension explains more of the variance of economic freedom than does Power Distance.

**Table 2**

Economic Freedom (5-year averages)  
PDI = Power Distance; IDV = Individualism

	<b>PDI beta (sig.)</b>	<b>IDV beta (sig.)</b>	<b>R<sup>2</sup></b>
Model 1	-.309 (.000)		0.093
Model 2		.388 (.000)	0.149
Model 3	-.096 (.099)	.325 (.000)	0.152

*standardized betas are used*

**Table 3**

Economic Freedom (30-year averages)  
PDI = Power Distance; IDV = Individualism

	<b>PDI beta (sig.)</b>	<b>IDV beta (sig.)</b>	<b>R<sup>2</sup></b>
Model 1	-0.410 (.000)		0.156
Model 2		.492 (.000)	0.231
Model 3	-.162 (.242)	.389 (.006)	0.235

*standardized betas are used*

Tables 4 and 5 display regressions explaining the relationships of the independent variables with GDP per capita (PPP). The results suggest a strong positive relationship between economic freedom and GDP per capita (PPP) (Model 9). Its association remains strong in multiple regressions the cultural dimensions and the control variable, Initial GDP. There is strong support, then, for *Hypothesis H2a*, which predicted that economic freedom would have an upward pressure on GDP per capita (PPP). *Hypothesis H2b* stated that

Power Distance would have downward pressure on GDP per capita (PPP). The data supports a significant relationship for this hypothesis. *Hypothesis H2c*, which predicted that Individualism would have an upward pressure on GDP per capita (PPP) should also be accepted. The control, Initial GDP is also significant and strongly correlated, which is expected by the nature of the data.

**Table 4**

GDP per capita (PPP) (5-year averages)

GDP= Gross Domestic Product; EF = Economic Freedom; PDI = Power Distance; IDV = Individualism

	Initial GDP beta (sig.)	EF beta (sig.)	PDI beta (sig.)	IDV beta (sig.)	R <sup>2</sup>
Model 1	.685 (.000)				0.468
Model 2	.475 (.000)	.447 (.000)			0.621
Model 3	.419 (.000)	.436 (.000)	-.125 (.000)		0.632
Model 4	.418 (.000)	.435 (.000)	-.123 (.004)	.003 (.941)	0.631
Model 5		.533 (.000)	-.131 (.003)	.217 (.000)	0.515
Model 6			-.201 (.000)	.363 (.000)	0.263
Model 7				.493 (.000)	0.241
Model 8			-.436 (.000)		0.188
Model 9		.658 (.000)			0.431

*standardized betas are used*

**Table 5**

GDP per capita (PPP) (30-year average)

GDP= Gross Domestic Product; EF = Economic Freedom; PDI = Power Distance; IDV = Individualism

	Initial GDP beta (sig.)	EF beta (sig.)	PDI beta (sig.)	IDV beta (sig.)	R <sup>2</sup>
Model 1	.868 (.000)				0.749
Model 2	.630 (.000)	.407 (.000)			0.857
Model 3	.559 (.000)	.383 (.000)	-.172 (.002)		0.878
Model 4	.557 (.000)	.382 (.000)	-.169 (.012)	.007 (.925)	0.875
Model 5		.567 (.000)	-.168 (.069)	.241 (.014)	0.671
Model 6			-.261 (.032)	.465 (.000)	0.422
Model 7				.631 (.000)	0.39
Model 8			-.558 (.000)		0.301
Model 9		.763 (.000)			0.577

*standardized betas are used*

## **Discussion**

The models further show that the dimensions better explain economic freedom over a 30-year period than for the 5-year periods, as seen comparing Tables 2 and 3 and Tables 4 and 5. This suggests that culture (PDI & IDV) is a better predictor for long-term economic development than short-term economic development. Also, while Individualism maintains a significant relationship in a number of the regressions predicting economic development, it becomes completely insignificant when the control of initial GDP is added in an all factor model (Model 5 of Table 3). A reason for this may be that the impact of Individualism is explained by other variables in the models, such as economic freedom. Because it remains significant, Power Distance may explain economic development through other channels, such as investment and accessibility to health resources and education in countries.

The implications of this research for governments, multinationals, and aid programs are to re-evaluate how they target foreign entities. With this research first comes an element of understanding, by adding the variable of how countries are “wired” to develop better economically. The analysis shows that cultural dimensions, as well as economic freedom, are predictors of long-term outcomes of GDP per capita (PPP) for countries, factors that have implications for the tendencies of countries towards certain policies. Symptoms cannot be solved if the root problem is not understood. With increased understanding, criticism and blame become replaced with problem-solving and empowerment. Policy- and decision-makers can make more educated and conscious decisions of how their choices may impact their goals.

There are a number of limitations to this research, including the use of averaging of clusters of countries, assumptions about the relationship economic freedom holds with

development, and the omission of other cultural variables. Hofstede clusters three sets of countries: East and West Africa, and Arabic countries. It may not be appropriate to cluster countries, as it may not reflect the true nature of the data for those countries. Further, another problem with averaging is that the overall index scores of economic freedom were used; it is possible that cultural dimensions may impact certain areas of formal policies, and only some of those policies may hold significance with GDP per capita (PPP). Regressions with this data were run to test if economic freedom is correlated with changes in GDP per capita (PPP), and it was not found to be significant, a basis claimed by many studies relating the two.

Another limitation is that economic freedom may be caused by economic development. The most direct theory, assumed in our research, states that economic freedom causes economic growth, however we also consider the possibility of a reverse, or possibly reciprocal relationship. Changes in freedom are found to be causally related to growth, but the relationship is complex, with the two often being jointly determined (Dawson, 2003). A possible explanation for increased GDP causing economic freedom is that increased incentive and education would cause individuals within a society to pursue policies that allow them to further increase GDP. If economic freedom drives development, and development conversely drives economic freedom, countries may be expected to converge economically. If this is true, culture may also be expected to shift due to changes in policy and economic development. Under the assumption that culture is enduring, this study used data for Power Distance and Individualism from only one year.

A third limitation is that Power Distance and Individualism are, according to Hofstede et al. (2010), only two of the six dimensions of culture. There is reason to consider



that other variables may be involved in predicting economic freedom and development. For example, long-term orientation and uncertainty avoidance may predict the stability of policies. In future study, the other four dimensions should be included in regressions to determine if they are connected.

The data does show that power distance and individualism are significant, and further research should be done. Using a mediation model, this research found that Individualism is a predictor of economic freedom policies and institutions supported by a country, and thus a predictor of economic development. Power Distance, however, is more likely to have a direct impact or explain for other variables that are not included in this model. By including other variables and dimensions, the links culture holds with economic development can be better interpreted and more useful for applying to real-world situations.

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**STUDENTS ACTING AS CONSULTANTS: ADVISING SMALL  
BUSINESSES ON COST ACCUMULATION**

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January 2014

Keywords: Experiential Learning, Managerial Accounting, Cost Accumulation

## **STUDENTS ACTING AS CONSULTANTS: ADVISING SMALL BUSINESSES ON COST ACCUMULATION**

### **ABSTRACT**

This paper describes an instructional tool developed to enhance coverage of cost accumulation topics in a graduate level *Introductory to Management Accounting* course. The assignment entails visiting a small business and interviewing the owner to learn about the company's process for determining costs of products and/or services. Such active learning hones leadership and critical thinking skills by requiring students to employ interviewing and listening techniques as they act as business advisors to discuss cost accumulation processes with small business owners.

Student feedback suggests that students value the opportunity to engage in a realistic exercise that allows them to draw linkages between textbook material and the real world, while also acting in a consulting role to apply class concepts to help a small business. Furthermore, assessment data based on grading rubrics indicates that all students meet or exceed instructor expectations increasing the viable use of this course project.

## **1. Introduction**

A key task of all businesses is to ascertain the cost of products or services. Effective pricing strategies require accurate cost accumulation; however, for many small businesses, cost assignment proves to be a complicated task, primarily due to overhead allocation. Textbook problems oversimplify the complexity of cost accumulation by giving students all of the parts needed to “do the math” when calculating the amount of direct materials, direct labor, and overhead to be assigned to each unit. One way for students to appreciate the difficulty of cost accumulation is for students to walk through the cost accumulation process with a business owner so they experience the complexity of this process first-hand. This active learning assignment requires students to interview a business owner regarding the cost accumulation process used by the business. This assignment provides an experiential learning activity that deepens graduate students’ understanding of cost accumulation by demonstrating the complexity of this task in a way that cannot easily be captured by textbook problems or cases. In addition, this assignment gives students the opportunity to apply what they have learned in class to a “real world” setting, potentially advising a small business owner on how to improve their cost accumulation process. Finally, this project further hones students’ oral and written communication, as well as listening and leadership skills.

The remainder of this paper includes a brief review of the literature, a summary of the assignment material provided to students, teaching notes for the assignment including learning objectives and in-depth guidance on how to implement this assignment into a course. The final sections of the paper provide student feedback data and concluding remarks.

## **2. Literature review**

Over the past two decades, accounting education literature has called for an increased use of experiential learning assignments in the accounting curriculum (McCarthy & McCarthy, 2006; AECC, 1990; Albrecht & Sack, 2000). Such increased usage of experiential learning helps students develop a deeper understanding of a topic (Bonwell & Eison, 1991; Brickner & Etter, 2008; Cottell & Millis, 1993; Francis, Mulder, & Stark, 1995; McCarthy, 2010; Prince, 2004). Furthermore, the AACSB emphasizes the importance of active learning (AACSB, 2013) to enhance students' critical thinking skills, while MBA Programs continue to experience demands for leadership-laden curricula (Hansen, 2011).

Cost accumulation and product costing serve as major topics within most managerial accounting textbooks. Braun's (2013) review of fifteen introductory managerial accounting texts indicates that most devote an entire chapter to costing; furthermore, such coverage occurs early in the course based upon its placement in the beginning of textbooks. This suggests that most managerial accounting professors consider cost accumulation and product costing to be core concepts of a managerial accounting course.

From a practical perspective, business curricula strive to prepare students for leadership roles in business. Providing assignments that encourage students to behave as consultants forces a student to critically think about a client's issues and formulate advice regarding how to transform a business or process. Barsky et.al. (2008) and Cornell et.al. (2013) ask students to act as consultants for a campus bookstore and a religious organization, respectively. Both cases require students to interview business professionals and employ concepts learned in the classroom to formulate recommendations for the business. Subsequently, students reported that they enjoyed the realistic nature of the assignment and noted that the experience helps their

understanding by allowing them to apply course concepts in a “real world” setting while providing recommendations for improvements to the organization.

The literature contains several experiential learning assignments, cases and projects covering core management accounting principles (Burns & Mills, 1997; Lightbody, 1997; Greenberg & Schneider, 2010; Braun, 2013). However, few experiential learning assignments address cost accumulation or require students to act as a consultant for a small business. The project described in this paper uses experiential learning to reinforce a core managerial accounting course concept by exposing students to the complexity of reality as they act in a business consultant role.

### **3. Assignment material**

The assignment material for this active learning assignment consists of the following:

1. A one page handout with 6 guided points for students to address in the consulting engagement, as well as in the written paper and oral presentation.
2. Two rubrics: One rubric for the oral presentation and one for the written paper. The provision of rubrics sets the tone and expectation level of the assignment.

This complete set of assignment material is provided in Exhibits 1, 3, and 4, while the suggested solution is provided in Exhibit 2.

### **4. Teaching notes**

The following sections of the teaching notes contain information regarding: 1) learning objectives, 2) implementation guidance, 3) assessment, and 4) summary/limitations and concluding remarks.



#### 4.1. *Learning objectives*

Administration of this project occurs after in-class coverage of cost accumulation topics (i.e., job-order costing, overhead allocation) and requires students to interview a business owner, document the cost accumulation system in place, and advise the business owner as to how they may improve their cost accumulation system. Graduate business students working in business and industry are often expected to act in consulting roles. This active learning assignment prepares students to critically think and behave in this manner. More specifically the learning objectives include:

1. understand how businesses accumulate and track the costs of a product or service;
2. analyze the effectiveness of the business's current cost accumulation system;
3. recommend improvements to the cost accumulation process and system; and,
4. effectively communicate the results of the consulting engagement in oral and written form.

This project addresses many of the communication, critical thinking, analytical, and experiential competencies recommended in widely-discussed calls for accounting education change (e.g., McCarthy and McCarthy, 2006). Specifically, this assignment requires students to concisely write a maximum two-page, single-spaced paper summarizing the information gathered during the interview and providing any advice for the business on its cost-accumulation processes. In addition to the paper, students prepare a 5-10 minute PowerPoint presentation detailing their findings from the consulting engagement. The presentation is required to be prepared in a professional manner that is consistent with what a consulting firm would provide to a client. Exhibit 1 contains the assignment.

## 4.2 *Implementation guidance*

This section contains guidance regarding how we use the project in the classroom, as well as suggestions for alternate implementation. It also provides guidance regarding the amount of time required to administer, complete, and grade the project.

### 4.2.1 *Project Setting*

We delivered the project to three graduate sections of a required introductory managerial accounting course at one private institution in the Mid-Atlantic region of the United States that enrolls approximately 6,000 students. A total of 52 graduate students completed the project with an average class size of 17.3 students.

### 4.2.2 *In-class distribution and discussion of project*

We distributed the project and the grading rubric to students in class and thoroughly reviewed the requirements and the assessment criteria after coverage of job order costing and overhead allocation topics. At this time, we engage in a preliminary discussion of the project, including potential businesses to select for the consulting engagement, followed by the requirements of the assignment (See Exhibit 1). We also distribute both the oral presentation and written paper rubrics (See Exhibits 3 and 4).

We began the discussion by devoting some time to discussing the types of businesses that students should select for this consulting engagement. We instruct students to choose small businesses with an owner, manager, or accountant willing to spend some time discussing their cost accumulation system. The instructor stressed that the students would not need specific cost data or financial statement information that may be considered proprietary. Furthermore, we guide students to select businesses that would most likely use a job-order costing system, such as landscapers, construction companies, printing companies, and automobile repair shops. Students

who do not have a business to use for this project are told to speak to the instructor for help locating a business for the project. In the three semesters that this project was used, every student was able to identify a business willing to participate in this project.

After discussing the potential businesses to be used for this project, students were instructed to select a business, contact the business owner, and get permission to interview the person who is most knowledgeable about its costing system. Once obtaining permission, students set up an appointment to meet with this business person. We instruct students to follow the questions listed in the handout to guide them in collecting the data necessary for completing the consulting engagement (See Exhibit 1).

Additionally, we encourage students to consult the instructor with any questions, as this assignment is open-ended and different from most assignments seen in other classes. The instructors did not expend a significant amount of time inside or outside class discussing the project beyond the 20 minute discussion on the day of assignment distribution. On average students spent 6 hours completing the consulting engagement. The instructor spent approximately 15 minutes per student grading each consulting engagement report. The oral presentation piece of the assignment used 2-3 hours of class time as the presentations generated significant class discussion which was enjoyable for both students and the instructor.

We utilize the project as an individual assignment in a graduate course; however, the project could be used with upper-level undergraduates or as a team assignment. The use of teams helps mitigate the time commitment involved for both students and instructors. Alternatively, students could work in teams for the interview and oral presentation components of the assignment, but submit individual written papers; such implementation alleviates some of the typical problems encountered with team projects, but still reduces student and instructor time

commitments. Assigning this project as an individual assignment or as a team project is a matter of instructor preference.

#### 4.2.3 *Solution*

There is no one correct answer for this project since each student will select a different company. Even if there is duplication of business types (construction companies) among students, the specifics of the cost accumulation process will vary for each company, thus permitting a realistic discussion of the uniqueness of cost assignment in the “real” world.

The summary solution is presented in Exhibit 2. The suggested solution addresses each one of the requirements of the assignment. The first five requirements of the assignment require the student to gather data from the business owner regarding the company’s cost accumulation system. The sixth requirement forces the student to act as a consultant and take a step back by evaluating the system that the organization has in place to accumulate the cost of its product or service. In other words, we expect students to apply their knowledge of cost accumulation and critically think as to whether the business is doing an effective job in determining its product cost and, if not, provide advice/improvements that could be made to the current cost accumulation system. This requires a higher level of thinking and writing and should be graded accordingly.

#### 4.2.4 *Grading rubric*

Exhibits 3 and 4 provide a suggested grading rubric for evaluating student written and oral presentation skills. The grading rubrics capture various elements of the written assignment and the oral presentation. The rubrics divide the student work into the four learning objectives of this project. The four categories include: understand how businesses accumulate and track the costs of a product or service; analyze the effectiveness of the business’s current cost accumulation system; recommend improvements to the cost accumulation process and system;

effectively communicate the results of the consulting engagement in oral and written form. Instructors may adjust the grading scales or weights to tailor the assignment to their own educational objectives. As a whole, the rubrics help students understand the basis of their overall grade.

## **5. Results and discussion**

Overall, students perform well on the project with all students meeting or exceeding instructor expectations based on the grading rubrics. We define total project scores between 75 and 92 as “meeting expectations,” while total scores above 92 exceed expectations. Specifically, 27% of the students met expectations while 73% exceeded expectations. Mean scores on the written and oral requirements totaled 46.43 (3.07 std dev) and 48.49 (3.05 std dev) respectively out of 50 possible points. Table 1 provides a summary of student scores based on the grading rubrics.

Insert Table 1 here

Additionally, we surveyed students after the project presentations to gain insight into their perceptions regarding the assignment. The survey included 14 questions anchored on a 4-point Likert scale where 1 = “strongly disagree” and 4 = “strongly agree.” We anonymously collected data from three classes representing a total of fifty-two students. Table 2 presents summary statistics from the student survey.

Overall, the survey results illustrate that students found the assignment to be an effective way to “understand” (item 9, mean = 3.33) and “apply” (item 1, mean = 3.35) what they learned about cost accumulation to real business situations. Despite the challenging nature of the assignment (item 10, mean = 3.06), students indicated that they “prefer more assignments of this nature” (item 12, mean = 3.13) and recognize that “experiential learning exercises are effective

ways to learn technical material” (item 4, mean = 3.50). Regarding the consulting component, students viewed the project as a “realistic simulation of business consulting” (item 3, mean = 3.37) and felt that “interviewing/meeting with a business owner was a worthwhile experience” (item 2, mean = 3.52).

Insert Table 2 here

Finally, we asked students to provide any other comments, suggestions or ideas regarding the assignment; Table 3 reports a representative sample of student responses. Overall, students provide overwhelmingly positive feedback regarding the assignment. Student comments commonly use descriptive phrases such as “practical,” “worthwhile” or “beneficial.” Furthermore, several students articulated the benefits of acting in a consulting role by noting that it “built confidence” to share classroom concepts with a real business owner and pushed them “out of their comfort zone” in doing so. The only negative comments surrounded the time it took for student presentations during class. In larger classes, we recommend scheduling presentations over several sessions to effectively mitigate against this complaint.

Insert Table 3 here

## **6. Summary, Limitations and Concluding Remarks**

We used this instructional tool in introductory managerial accounting courses in our MBA Program; however, the assignment can easily be adapted for an introductory management accounting course at the undergraduate level. The strength of this assignment is its use of an experiential learning approach where students act as consultants to apply what has been learned in the classroom to a live business setting. Instructors will find this tool relatively

straightforward to implement and an effective way for students to help a small business with some of the knowledge gained in a managerial accounting course.

Naturally, some limitations exist and should be recognized. First, a unique project such as the one described here places time constraints on professors in grading each distinct project, while using class time for each student to make an oral presentation on their consulting engagement. In particular, there is a significant amount of time required to remain consistent in grading each unique project since individual projects involve a different business. The use of the grading rubrics and/or assignment as a team project, however, reduces time commitments. Furthermore, professors could require students to remain within one or two industries (e.g., landscaping companies or construction businesses) to increase project similarities and reduce grading time. Another possible limitation is that the project may not be reusable every semester due to potential leakage of assignments among fellow students. While there are multiple businesses that can be used, as with any assignment, students can pass projects down from year to year. Instructors can overcome this problem by maintaining a list of prior companies utilized for projects and forcing students to choose only new businesses.

Overall, the accounting education literature clearly encourages experiential learning assignments to provide students with real-world perspectives of accounting in business. We provide a framework for using an active learning assignment to supplement textbook problems on cost accumulation in managerial accounting courses. While we use the project as an individual assignment on the graduate level, we provide suggestions for modifying the assignment to include teams or undergraduate students. To date, both student feedback and performance prove overwhelmingly positive. Our experience further suggests that this interview

project effectively demonstrates the complexity of cost assignment in small businesses, while also enhancing students' leadership skills by providing an opportunity to act in consulting roles.



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## **Exhibit 1 Assignment**

Many businesses accumulate costs for each job performed and many of these businesses use a job-order costing system or a similar costing system. Examples of businesses that use a job-order costing system include landscapers, construction companies, printing companies, and automobile repair shops.

Visit a local business or contact a friend/family member that owns a business. Interview the owner, manager, or accountant to learn about the business as well as the cost accumulation process that the business uses to determine the cost of their product or service.

Write a maximum two page single-spaced paper that summarizes the information you obtained. In addition to the paper, each student will prepare a 5-10 minute presentation using PowerPoint (4 – 8 slides) summarizing the consulting engagement. Be sure to prepare it in a professional manner that is consistent with what a consulting firm would provide to a client. The paper and the presentation should include the following:

1. The name of the business and the type of operations performed (products or services sold).
2. The name and position of the individual you interviewed.
3. A description of the process of starting and completing a job.
4. A description of the accounting process and the documents used to accumulate costs and track the cost of a specific product or service.
5. In addition the paper should include responses to these questions:
  - a) Did the person you interviewed know the actual amount of direct material, direct labor, and overhead charged to a particular job?
  - b) How are direct materials and direct labor tracked?
  - c) How is the overhead allocated to each job?
  - d) If the job includes some estimated costs, how are the estimates calculated?
  - e) Does the business use the costs to determine the selling price of the product or service? If not, how does the business determine the selling price of the product or service?
6. As a consultant, you will need to assess the business's current costing system and advise the business owner or manager of any improvements that can be made to their costing system. In your opinion, is the business doing an effective job in determining their product cost? If not, what advice do you have for them?

The purposes of this exercise are to (1) simulate working on a consulting engagement, (2) provide you an opportunity to apply what you have learned about cost accumulation in a "live" business setting, and (3) improve your written and oral communication skills.

## **Exhibit 2 Suggested Solution**

### **Mold Detection and Remediation Specialists, Inc.**

Mold Detection and Remediation Specialists, Inc. (MDRS) provides comprehensive mold inspections for residential and commercial buildings. MDRS documents and collects scientific data throughout the dwelling, utilizing numerous forms of industry-accepted sampling techniques. These tests are used to identify the potentially-harmful molds that could be present in an indoor living environment. MDRS was founded in 2004, and since then, has been serving the tri-state area (PA, NJ, and DE) to provide homes and workplaces with a healthy environment. Dan Rostelli, President of MDRS, was interviewed for this cost accumulation consulting engagement.

MDRS has two main services: mold inspection and testing, and mold remediation. A job begins when a customer calls or emails MDRS requesting one of these two services. If a mold inspection and testing service is requested, professionally trained individuals go to the home or workplace to first test and inspect for mold. They determine the types and amount of mold samples necessary so they can provide a detailed report. When the inspection is completed, they look to see if the conditions are normal or abnormal, and depending on what it is, remedial actions are carried out to improving the air quality of the building. If mold remediation or water cleanup work is needed, MDRS provides an estimate of the work required and provides a price quote to the customer.

MDRS uses a job-order costing system for mold inspection and testing service and mold remediation work. The accounting process and the document used to accumulate and track the costs of a specific service include a job cost estimate sheet. This sheet includes the estimated labor cost and material cost (mold test kits, lab fees, building materials including lumber, drywall, carpeting, etc.) needed to complete the prospective job. This job cost sheet is used to estimate the total cost of the job and form a price quote to the customer.

The type of service requested determines the costs that it takes to complete a job. MDRS incurs direct labor costs and direct materials costs on each job. The direct labor cost includes the three full-time employees and one part-time employee employed by MDRS. The size and duration of the job dictates the amount of labor and materials needed to complete the job. Based on past experience Mr. Rostelli is very comfortable and usually on target with his estimate of the amount of direct materials and direct labor needed for each job.

In addition to direct materials and direct labor, MDRS has several overhead costs which should be added into the cost of a particular service. These overhead costs include remediation supplies, vehicle expenses, liability and workman's compensation insurance expenses, continuing education expense, small tools and equipment expense, and depreciation expense. As for the allocation of overhead costs, MDRS does not currently allocate these overhead costs into the cost of a particular job. MDRS uses the estimated direct materials and labor costs to determine the price of the service. This price is quoted prior to beginning the job and is typically not adjusted unless there is a major change in the scope of the work to be performed. Once the job estimate is completed and the job begins, MDRS does not actually track the costs for each customer's job.

After completing my interview of Mr. Rostelli and performing an assessment of the current costing system I have identified two opportunities for improvement that Mr. Rostelli should considering implementing at MDRS. The first suggestion is that MDRS should calculate

a predetermined overhead rate based on direct labor hours and allocate indirect costs (overhead) to each job based on the number of labor hours incurred on each job. Failure to take into account the indirect costs into the total cost of a job can mean the difference between showing a profit or a loss on the job. Secondly, MDRS should calculate the cost of every job as the business must know how much cost is incurred on each job in order to improve future price quotes and ultimately the profitability of the business. Without allocating overhead to each job and calculating a total cost for each job, MDRS does not know the profitability of each job, as well as, how they might improve the operation of the business.

**Exhibit 3**  
**Grading Rubric: Written Paper**

1=not present 2=weak/not clear 3=satisfactory 4=good 5=outstanding					
The name of the business and the type of operations performed (products or services sold). The name and position of the individual you interviewed. <b>(Learning Objective #1)</b>	1	2	3	4	5
A description of the process of starting and completing a job and the accounting process and the documents used to accumulate costs and track the cost of a specific product or service. <b>(Learning Objective #1)</b>	1	2	3	4	5
Did the person you interviewed know the actual amount of direct material, direct labor, and overhead charged to a particular job? <b>(Learning Objective #1)</b>	1	2	3	4	5
How are direct materials and direct labor tracked? <b>(Learning Objective #1)</b>	1	2	3	4	5
How is the overhead allocated to each job? <b>(Learning Objective #1)</b>	1	2	3	4	5
If the job includes some estimated costs, how are the estimates calculated? <b>(Learning Objective #1)</b>	1	2	3	4	5
Does the business use the costs to determine the selling price of the product or service? If not, how does the business determine the price of the product or service? <b>(Learning Objective #1)</b>	1	2	3	4	5
Analyze the business's current cost accumulation system. <b>(Learning Objective #2)</b>	1	2	3	4	5
Recommend improvements to the cost accumulation process and system. Is the business doing an effective job in determining their product cost? If not, what advice do you have for them? <b>(Learning Objective #3)</b>	1	2	3	4	5
Grammar and Clarity – does it need to be reread; does it cause confusion for the reader, is it well-organized? <b>(Learning Objective #4)</b>	1	2	3	4	5
Score – Paper _____					
Score – Presentation _____					
Total Score _____					
Comments:					

**Exhibit 4**  
**Grading Rubric: Oral Presentation**

Category	Scoring Criteria	Total Points	Score
<b>Organization (15 points)</b>	The type of presentation is appropriate for the topic and audience.	5	
	Information is presented in a logical sequence.	5	
	Presentation appropriately cites requisite number of references.	5	
<b>Content (45 points)</b>	Introduction is attention-getting, lays out the problem well, and establishes a framework for the rest of the presentation.	5	
	Technical terms are well-defined in language appropriate for the target audience.	5	
	Presentation contains accurate information.	10	
	Material included is relevant to the overall message/purpose.	10	
	Appropriate amount of material is prepared, and points made reflect well their relative importance.	10	
	There is an obvious conclusion summarizing the presentation.	5	
<b>Presentation (40 points)</b>	Speaker maintains good eye contact with the audience and is appropriately animated (e.g., gestures, moving around, etc.).	5	
	Speaker uses a clear, audible voice.	5	
	Delivery is poised, controlled, and smooth.	5	
	Good language skills and pronunciation are used.	5	
	Visual aids are well prepared, informative, effective, and not distracting.	5	
	Length of presentation is within the assigned time limits.	5	
	Information was well communicated.	10	
<b>Score</b>	<b>Total Points</b>	<b>100</b>	

Source: [http://hplengr.engr.wisc.edu/Rubric\\_Presentation.doc](http://hplengr.engr.wisc.edu/Rubric_Presentation.doc)

**Table 1**  
**Summary of Student Performance**

**Panel A:**

	<b>Mean</b>	<b>Std Dev</b>	<b>Median</b>	<b>Min</b>	<b>Max</b>
<b>Written Paper</b>	46.43	3.07	47	40	50
<b>Oral Presentation</b>	48.49	3.05	50	37	50
<b>Total Score</b>	94.92	4.57	96	78	100

**Panel B:**

<b>Performance Criteria Based on Total Project Score</b>	<b>Number of Students</b>	<b>Percentage of Students</b>
0-74: does not meet expectations	0	0%
75-92: meets expectations	14	27%
93 & above: exceeds expectations	38	73%



**TABLE 2**  
**Student Survey Responses**

Survey Questions:	Frequency distribution				Mean	Standard deviation	Median
	1	2	3	4			
1. This case helped me to apply what I have learned about cost accumulation to a real business situation.	0	6	22	24	3.35	.68	3
2. Interviewing and meeting with a business owner and/or manager was worthwhile experience.	0	2	21	29	3.52	.58	4
3. This project was a realistic <i>simulation</i> of business consulting.	0	5	23	24	3.37	.66	3
4. Experiential learning exercises such as this assignment are an effective way to learn technical material. <sup>^</sup>	0	0	18	18	3.50	.51	3.5
5. This assignment helped me understand how <i>direct materials</i> are tracked at an actual company. <sup>^</sup>	1	5	13	18	3.30	.81	3
6. This assignment helped me understand how <i>direct labor</i> is tracked at an actual company. <sup>^</sup>	1	4	17	15	3.24	.76	3
7. This assignment helped me understand how <i>overhead</i> is allocated at an actual company. <sup>^</sup>	0	5	19	13	3.22	.67	3
8. Costs were estimated more than I expected at my company.	2	10	13	12	2.95	.91	3
9. This assignment helped me understand cost accumulation.	0	5	25	22	3.33	.65	3
10. This assignment was challenging.	2	5	33	12	3.06	.70	3
11. Ambiguity and uncertainty do <i>not</i> bother me when I am asked to solve a problem.	2	12	25	12	2.91	.79	3
12. Generally, I would prefer to have more assignments of this nature in my classes.	1	10	22	19	3.13	.79	3
13. Visiting “live” businesses is an effective way for business students to learn.	0	1	19	32	3.60	.53	4
14. I prefer open-ended assignments like this one to end of chapter textbook problems with definitive answers.	0	11	24	16	3.09	.73	3

*Scale: strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 5*

<sup>^</sup> Survey items 4 through 8 were added to the survey after the first semester of the project’s use to gain more insight into students’ feedback on specific areas of cost accumulation in businesses; responses on these items total 37 students; responses total 52 students for all other survey items except 11 & 14 where 1 student omitted a response to both items.

**TABLE 3**  
**Sample of Student Comments**

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- *Very practical*
- *Very worthwhile*
- *Very beneficial*
- *Excellent and interesting assignment!*
- *This exercise helped me solidify the concepts we were reading about it & made them tangible and easier to understand.*
- *In some cases, it was quite scary to see how often [small businesses] manage by “gut.”*
- *I enjoyed the exercise a lot.*
- *Perfect introduction to the course.*
- *The project really provided a realistic view of cost accumulation. It definitely made me go outside my comfort zone to interview someone I wasn't familiar with.*
- *It was very helpful in learning the concepts by applying them to real life.*
- *I would recommend this case to other instructors because it gives you a real perspective of what we are learning in class.*
- *Taking class application to real-life situations is a win-win.*
- *Totally clear, simple, and wide-open to explore.*
- *I learn best when I DO something, especially accounting! Doing this project instead of just reading a book really helps.*
- *Really enjoyed the process. Was great getting to know the “behind the scenes” side of small business. After seeing all the presentations, you get a feel for the vast differences in small businesses!*
- *Good way to interact in a real business environment.*
- *Great project. Built communication skills and benefited from networking. I feel that having examples other than textbooks helps me learn.*
- *I gained confidence in myself through this project b/c I was able to show the manager what I knew/learned in class to apply to his business situation.*

# Humanitarian Logistics: Lessons from Operations and Supply Chain Management

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## ABSTRACT

Academic research on disaster relief management is a relatively new area. While in recent years some scholars have proposed various research frameworks for this area, it is interesting that to date there is no existing framework drawn from the perspective of pure supply chain. In this article we attempt to create a new research framework of Humanitarian Supply Chain Management (HSCM) that parallels to but is distinct from the framework of commercial supply chain management. We then identify some opportunities for future research in this arena after a systematic literature review.

**Keywords:** Humanitarian Supply Chain, Humanitarian Logistics, NGO, Disaster Relief Management.

## INTRODUCTION

Humanitarian Supply Chain traditionally refers to the activities involved in the whole chain of relief supplies to areas affected by both natural and man-made disasters. The primary humanitarian purpose is to prevent further loss of life and harm to humans, as well as provide immediate treatment to those with injuries and illness. Humanitarian supply chain has not caught attention from Operations Management academia until recent years and this emerging area is still relatively new. The literature on humanitarian supply chains has been the expected domain of supply chain oriented journals.

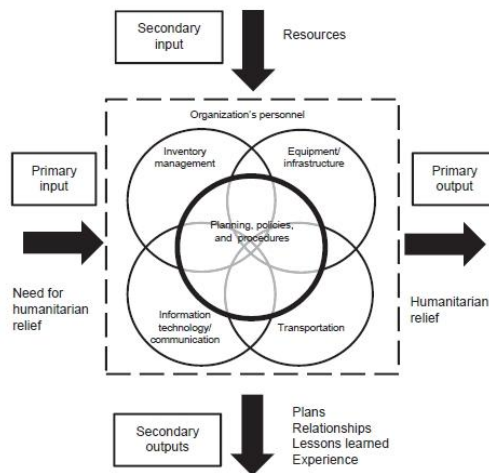
In order to draw a big picture for humanitarian relief management some researchers have done systematic literature review for this emerging field. In specific, Altay and Green (2006) survey the OR/MS literature in disaster relief management area and classify them by disaster relief phases, research methodology, research contribution, disaster type, and problem scenario; they then find out publication trends and pinpoint potential research directions. Galindo and Batta (2013) evaluate how OR/MS research in Disaster Operations Management (DOM) has evolved over the past years after Altay and Green (2006) was published and to what extent the gaps identified by Altay and Green (2006) have been filled; they find that there are no striking changes or developments on this field. Natarajarathinam, Capar and Narayanan (2009) are the first to provide a literature review on supply chain crisis management, a different concept with traditional risk management. By reviewing and analyzing the literature prior to August 2008, they describe the current practices, research trends and future research direction in supply chains crisis management area. The other two articles, i.e., Kovacs and Spens (2007) and Overstreet, Hall, Hanna and Rainer (2011), not only provide systematic literature review, but also propose frameworks for this research area. Kovacs and Spens (2007) propose a framework for disaster relief logistics distinguishing between actors, phases, and logistical processes of disaster relief (see Figure 1). Their framework differentiates the phases of humanitarian relief management and types of operations management, whereas it does not offer a landscape from the lens of supply chains. Overstreet, Hall, Hanna and Rainer (2011) borrow the theory of constraint and management information systems literature to develop a research framework using elements of logistics, which include organization’s personnel, infrastructure, transportation, information technology, planning/policies/procedures, and inventory management (see Figure 2). While the “input-output” system model they propose includes different elements of humanitarian logistics, it is yet not detailed enough to depict the “flow through” feature of supply chains. In short, to our best knowledge, it is interesting that insofar there is no existing framework of this area drawn from the perspective of pure supply chain. This observation raises a simple question: Can we shape a research framework for humanitarian supply chains by borrowing existing commercial supply chain framework?

**Figure 1**



**Figure 3.**  
A framework for disaster relief logistics

**Figure 2**



**Figure 3.**  
Humanitarian logistics  
research framework

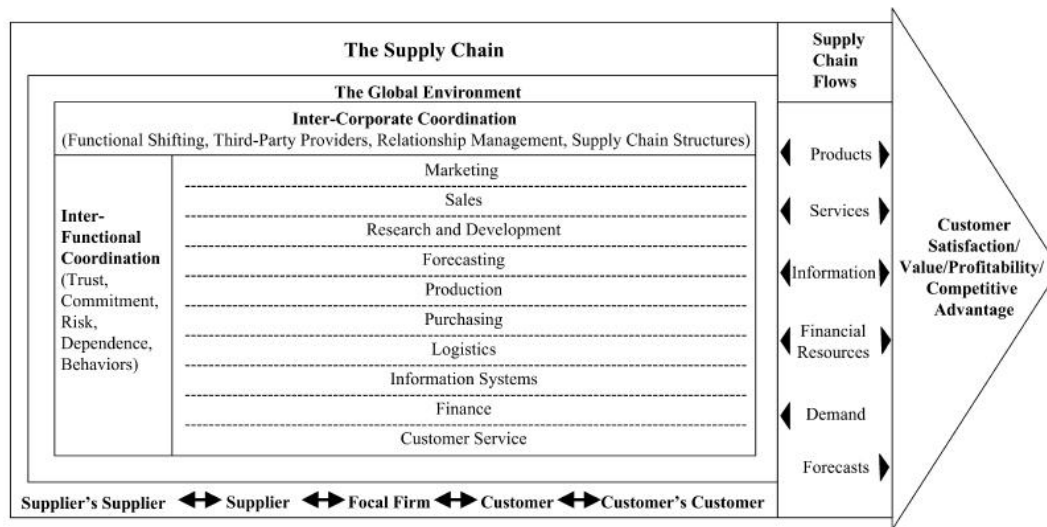
In this article we attempt to create a new framework of humanitarian supply chain that is paralleled to but distinct from the framework of commercial supply chain. We then identify some opportunities for future research in this area after a systematic literature review. The remaining part of this paper is structured as follows. In the next section we commence to search an existing framework of business supply chain management that fits with the characteristics of HSCM; a new framework for HSCM is thus developed. Next, we collect extant articles and categorize them within our framework. Following this we perform an analysis for these collected articles. Finally, future research directions are offered in this article.

## **A FRAMEWORK FOR HSCM**

Good research frameworks are supposed to help people make logical sense of the relationships of the components and factors that have been deemed relevant or important within the scope of a research arena. Over the past decades a number of scholars (e.g., Cooper, Lambert and Pagh, 1997, etc.) have proposed frameworks for business supply chain management. As one group of them, Mentzer et al. (2001) build a SCM framework covering aspects of system players, business functions, coordination, supply chain flows, SCM goals, etc. (see Figure 3). After reviewing some of the existing commercial SCM frameworks, we selected Mentzer et al.'s framework as a foundation of our framework development since it better fits with the unique traits of humanitarian supply chain.

**Figure 3**

**A MODEL OF SUPPLY CHAIN MANAGEMENT**



Hence, we build a framework for humanitarian supply chain mainly by borrowing the framework proposed by Mentzer et al. (2001). In specific, our framework (Figure 4) is drawn starting from an individual disaster relief organization. Although disaster relief organization is a more general term, typically nongovernmental organizations (NGOs) act as the spearhead in relief management when a disaster occurs. Therefore, for the purpose of making it more readable, we treat “NGO” and “disaster relief organization” as exchangeable terms in this article. Our framework comprises aspects of source, internal-coordination and external-coordination, relief chain flows, distribution and information. Supply chain management is a concept, “whose primary objective is to integrate and manage the sourcing, flow, and control of materials using a total systems perspective across multiple functions and multiple tiers of suppliers” (Monczka, Trent, and Handfield, 1998). For NGO’s operations, source undoubtedly is of particular importance given NGO’s dependence on source injection. According to Beamon and Balcik (2008), “source of revenue to nonprofit organizations is government funding, charitable donations from individuals and corporations, and in-kind donations (non-monetary contributions such as goods and commodities).” In our framework we commensurately categorize sources that contribute to the input of an NGO’s supply chain system into three types, including in-kind donation, monetary donation and government funding. An NGO is motivated to nicely deal with issues regarding source raisings. This is reflected in the external-coordination activities usually conducted by an NGO’s functional teams of public relationship, source raising, etc. In fact, as some have pointed out, “donors play such a large role in the humanitarian relief sector that the vast majority of NGOs currently regard donors (not aid recipients) as customer” (Beamon and Balcik, 2008). Hence the design and management of humanitarian supply chains have to emphasize donors’ heterogeneous goals and the coordination between NGOs and their donors are very demanding. In fact within a humanitarian supply chain the coordination between an NGO and other players (e.g., other NGOs, governments, etc.) has been deemed very complex, which is

due to the unique characteristics of this system. For instance, when one disaster happens usually there are lots of disaster relief organizations participating in the relief activities. It is not surprising that “there estimated to 3,000-10,000 NGOs operating in Haiti prior to the 2010 earthquake, a recent directory of registered NGOs and their key contacts runs to 82 pages (OCHA, 2010)” (Tatham and Pettit, 2010). Furthermore, the coordination within humanitarian supply chain is extended to other fields as shown in Figure 4. It is worth mentioning that trust and information are some of the key factors for the coordination within HSCM. Both factors have gained academic researchers’ attention and there exists two streams of literatures focusing on trust (e.g., Tatham and Kovacs, 2010) or/and information (e.g., van der Laan, E.A., de Brito, M.P. and Vermaesen, S.C., 2009). In commercial supply chain framework, three types of flows (i.e., goods/service, information, and finance) are dealt with. This is also the case within humanitarian supply chain. In Mentzer et al.’s (2001) framework, the flowing directions of the three types of flows are normally bidirectional between a company and its counterparties. In our HSCM framework, the relief elements except for information are drawn as flowing out to disaster areas. The component of “source” which we purposely emphasize actually acts as influx follows within humanitarian supply chain. Another point worth mentioning is that “people” is another relief element in NGOs’ supply chain output; also, distribution management is a big part for humanitarian relief management. Distribution management covers aspects ranging from demand management to logistics. When a disaster occurs, NGOs that involve in the relief activities need to forecast the demand from the disaster region; they then need to expeditiously decide and distribute what kinds of flows and what quantities to those suffering people. Again, coordination and information are two key success factors to these operations activities.

**Figure 4**

<b>(Humanitarian Aid Org.) Humanitarian Supply Chain</b>						
<i>Information</i>						
<i>Source</i>	<i>Internal-coordination</i>			<i>Relief Flows</i>	<i>Chain Distribution</i>	
In-kind Donation	Public Relationship			Relief Materials →	Disaster Region	
	Inventory Management					
Monetary Donation	Procurement			Services →		
	Logistics			People →		
	Tech Infrastructures			← Information →		
Government Funding	Funds Management			Funds →		
	Customer Service			← Demand Forecast →		
<i>External-coordination</i>						
Donors	Government	Other NGOs	Material Suppliers	3P Ls	Volunteers	Beneficiaries

## ARTICLE COLLECTION AND CATEGORIZATION

We conducted a literature search to collect articles included in Academic Search (EBSCOhost), ABI/Inform Global, and Compendex. After comparing keywords used in some literature review papers in this area, we decided to use the following keywords: “humanitarian” or “disaster” or “catastrophe” or “emergency” or “relief” or “crisis” AND “logistics” or “supply chain”. All the non-published or non-academic articles from the search results are excluded. Also, we enriched our article pool by extending from the reference list of some articles and from Google Scholar. Through these processes, we finally collected 147 articles which were published in 67 journals (see Appendix A). Twelve of these journals have published 85 articles in this area, which accounts for more than half of the total number of articles in the pool (see Table 1).

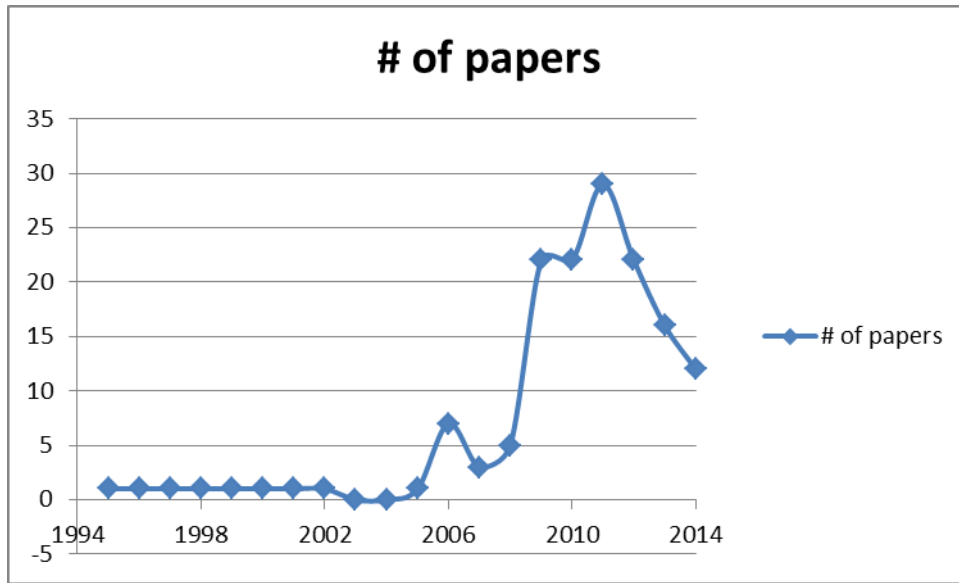
**Table 1 – Journal Ranking by Article Count**

No.	Journal	Paper #
1	International Journal of Physical Distribution & Logistics Management	17
2	Disaster Prevention and Management	13
3	European Journal of Operational Research	10
4	OR Spectrum	9
5	International Journal of Production Economics	7
6	Transportation Research	6
7	Socio-Economic Planning Sciences	5
8	Computers and Operations Research	5
9	Journal of Operations Management	4
10	The Journal of the Operational Research Society	3
10	International Journal of Services Technology and Management	3
10	Information Systems Frontiers	3
	<b>Total</b>	<b>85</b>

In addition, the research articles published in this field have been increasing with a fast pace even though the total amount is still small (see Figure 5). The year of 2011 witnessed the peak of the published article number; and interestingly, it is noticed that the number has decreased between 2011 and 2013. We believe this trend should be temporary. Our judgment is supported by the considerable quantity of papers (i.e., 12) that have been published as of February 2014.



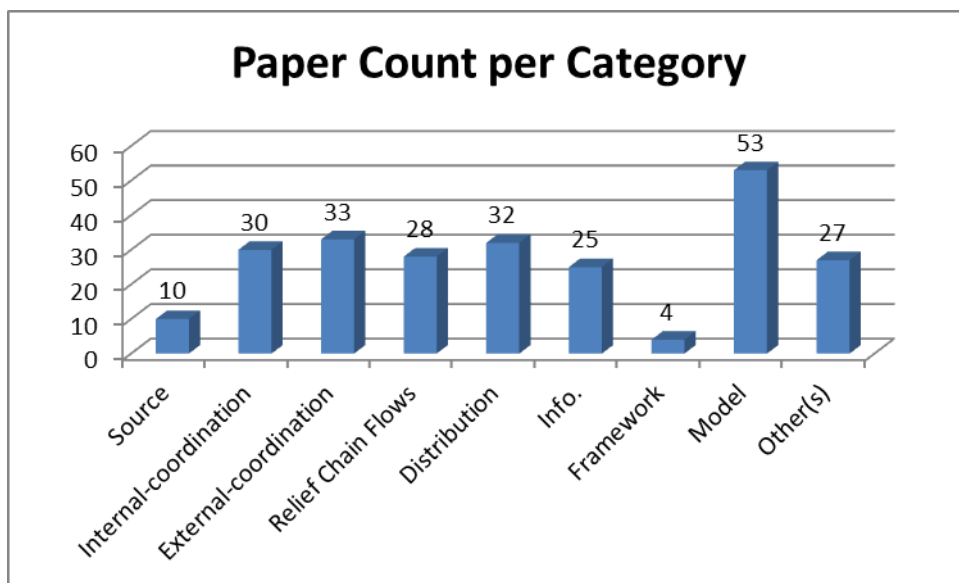
**Figure 5 – Article Count by Year**



## **ARTICLE ANALYSIS**

Based on our framework we classify the collected articles into nine categories, including source, internal-coordination, external-coordination, relief chain flows, distribution, information, framework, model, and others (see Table 2). From the categorization result, one of our observations is that the extant research on source of humanitarian relief management is relatively lacking. Although a large proportion of the existing studies have focused on the “downstream” part of the whole relief chain, research focusing on “upstream” relief chain has been neglected. This is also mirrored by the hot topics such as logistics issues in disaster region, relief material distribution, humanitarian relief coordination, and so forth; while topics such as fundraising and donation management are cool. Another observation is that there is a paucity of research discussing research framework of this area. It is noticed that over the past years more and more techniques or methodologies or theories in other research areas have been applied to the research in humanitarian supply chain, and the big picture of this research area is becoming clearer. However, research framework is important and demanding for a new research field. Our analysis for these collected articles suggests that only four articles explicitly provide research framework for this area. Further, we note that none of these frameworks are depicted in the angle of pure supply chain management – this has actually motivated us to conduct this study.

**Table 2- Article Count by Category**



## **FUTURE DIRECTION AND CONCLUSION**

Our review of literature in humanitarian supply chains suggests that more research is demanding although in recent years the research in this arena has gained a momentum to some extent. Based on our article pool, over the past two decades only 147 articles have been published. Meanwhile, despite that a number of theories or methodologies or techniques used in other areas have been imported to the research in humanitarian supply chain area, many of these extant research are conceptualized research or analytical research. Our data shows that more than 50 published articles (or higher than 35% of the collected articles) are studying analytical models; while research such as empirical research has not been done much. The fact of these implies that research in this area is still in its stage of infancy. And we believe there are myriad research opportunities for empirical researchers in this area.

Second, although a large proportion of the existing studies have focused on the “downstream” part of the whole relief chain (e.g., last mile delivery problems), research focusing on “upstream” relief chain has been neglected relatively. This is also mirrored by the status quo that hot topics such as logistics issues in disaster region, last mile delivery problems, local area coordination during humanitarian relief, and so forth. While topics such as fundraising and donation management are cool. It is “natural” and understandable since disaster region is the focus of the whole system during disaster relief period. Consequently, researchers spearheading in this research area would naturally focus on “downstream” part first. However, similar to commercial supply chain, humanitarian supply chain is a system that is formed by different components from upstream to downstream; and the whole chain is an “organic” system that requires excellent integration. Hence, the studies on other parts of the whole chain could be a direction for future research. We believe that academic studies on some questions would be very interesting. To list a few: Does the transparency of an NGO’s fund usage audit influence the NGO’s source raising ability? How does disaster relief organizations’ source raising ability during disaster period influence the performance of

humanitarian supply chain? How do different NGOs compete and coordinate on source raisings within the “eco-system”?

In addition, future research focusing on the component of information within this system could be another direction for research in this area. As mentioned earlier, although there is already a literature stream about the IT technologies in this field, the IT advancement is progressing so fast nowadays and the research opportunities would always be there. That said, some new information technologies can always be applied in the practice of humanitarian aid activities. And researchers can therefore grasp research opportunities, either the new application/implementation of information technologies or emerging management issues arisen from the new application/implementation.

To conclude, research frameworks are important and necessary because a good research framework draws a big picture of specific area which would be very helpful for people to understand the relationships of the important components and factors within that area. Most of the existing literature about research framework treats the disaster relief management as a logistics system (i.e., “humanitarian logistics”), yet there is a paucity of research frameworks that depict this system from the perspective of pure supply chain. The framework we developed offers a roadmap from a new lens for researchers. We have seen that during the development progress of OM/OR academic research only after people have done effluent research in logistics area did the commercial supply chain begin to receive academics’ attention. It appears that “history seems to repeat itself”. And it is our truthful hope that the framework we propose is helpful for people to see a clearer picture of humanitarian supply chains and ultimately would guild them in the operation practice or research in this arena.

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## Appendix A – Article Count By Journal

<b>Journal</b>	<b>Paper #</b>
American Review of Public Administration	1
Benchmarking	1
Business Horizons	1
Computers and Operations Research	5
Corporate Communications	1
Corporate Reputation Review	1
Defense & Security Analysis	1
Disaster Prevention and Management	13
Disasters	2
Economics	1
Ethics and Information Technology	1
European Journal of Operational Research	10
IEEE Transactions on Professional Communication	1
Information Systems and eBusiness Management	1
Information Systems Frontiers	3
Information Technologies & International Development	1
Information Technology & People	1
Information Visualization	1
Interdisciplinary Journal of Contemporary Research In Business	1
International Journal of Computational Intelligence Systems	1
International Journal of Disaster Resilience in the Built Environment	2
International Journal of Government Auditing	1
International Journal of Innovation, Management and Technology	1
International Journal of Logistics Management	1
International Journal of Operations & Production Management	1
International Journal of Organizational Analysis	1
International Journal of Physical Distribution & Logistics Management	17
International Journal of Production Economics	7
International Journal of Productivity and Performance Management	1
International Journal of Risk Assessment and Management	1
International Journal of Services Technology and Management	3
International Review of Public Administration	1
International Transactions in Operational Research	2
Journal of Advances in Management Research	1
Journal of Business Logistics	1
Journal of Contingencies & Crisis Management	1

Journal of Global Optimization	1
Journal of Humanitarian Logistics and Supply Chain Management	1
Journal of Industrial and Management Optimization	1
Journal of International Peace Operations	1
Journal of Japan Industrial Management Association	1
Journal of Management and Organization	1
	1
Journal of Manufacturing Technology Management	1
Journal of Multicriteria Decision Analysis	1
Journal of Operations Management	4
	1
Journal of Public Procurement	1
Journal of Supply Chain Management	2
Journal of the Association for Information Systems	1
Knowledge-Based Systems	1
Management Dynamics	1
Natural Hazards Review	1
Networks and Spatial Economics	1
Operations Management Research	2
Optimization Letters	1
OR Insight	1
OR Spectrum	9
Production and Operations Management	2
Public Administration & Development	1
	1
Records Management Journal	1
Review of African Political Economy	1
Socio-Economic Planning Sciences	5
Supply Chain Management	2
The European Journal of Development Research	1
The International Journal of Public Sector Management	1
The Journal of the Operational Research Society	3
Transportation Journal	1
Transportation Research	6
<b>Total</b>	<b>147</b>

## **An Application of Credit Scoring Models to Microloans Issued in the US**

**Nancy A. White**

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A substantial body of research has demonstrated that the credit risk determinants for large corporations differ from those for SMEs (small and medium enterprises). As a result, credit models developed to assess default probabilities for large corporations have been modified to incorporate these differences. One change that has improved model performance for SME's is the addition of qualitative variables, such as firm structure and industry type. The objective of this paper is to extend earlier work on the measurement of credit risk in SME's to the analysis of microloans granted in the United States, specifically those granted by Community Development Financial Institutions (CDFI's). In this paper, we hypothesize that the credit risk profiles of borrowers from CDFI's differ from those of other SME's. CDFIs are non-governmental organizations certified by the Department of Treasury to issue microloans (loans less than \$50,000) and small business loans (greater than \$50,000). CDFI clients can range from the unbanked to experienced entrepreneurs, but all are generally barred from the traditional loan market due to their credit risk. An alternate debt source, microloans differ from traditional loans because of the lender's focus on the "double-bottom line;" micro lenders provide pre and post loan technical assistance along with other support in addition to funds.

We will analyze a set of loans granted by a CDFI in New York City. The data set includes qualitative and quantitative information about borrowers that will be used to (1) develop a credit risk profile of this CDFI's clientele (2) develop a credit risk model to assess the default probability for loans in the data base; the model will include quantitative and qualitative variables. The profile of the CDFI's borrowers will be compared to those reported by other researchers. The results will enable CDFI's to identify borrowers that need additional monitoring and assistance.

## **"WHY SHOULD U.S. COMPANIES KEEP FUNDING PRIVATE HEALTHCARE BENEFITS: A LOOK AT THE FUTURE?"**

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Recently, large retail chains such as Target, Wal-Mart, and Home Depot joined a growing wave of companies in cutting healthcare benefits for their part-time workers as both coverage and provisions under the Patient Protection and Affordable Care Act (PPACA) begin to be realized. This paper looks at the question of, "why stop cutting healthcare with part-time workers; why not cut healthcare benefits for all workers?" For the past three decades companies have been battling mounting healthcare cost increases. For public companies share-holder wealth maximization is the fundamental business objective so the rational decision would be to minimize healthcare costs by forcing employees into public health exchanges. The results include lower overhead, increased share price and possibly more competitive U.S. companies. We investigate this central question for a sample of U.S. large capitalization "blue-chip" companies, and link accounting value savings to estimates of share price increases and other performance metrics. While the focus is on publicly traded companies, changes are already taking place in government and private business organizations, similar to those in public companies, where the focus is on cost containment.

Keywords: Healthcare Costs, Affordable Care Act, Cost Containment

### Introduction

In the Congressional Budget Office (CBO) March, 2012 report entitled, "CBO and JCT's Estimates of the Effects of the Affordable Care Act on the Number of People Obtaining Employment-Based Health Insurance", prepared by the CBO and the Joint Committee on Taxation (JCT) the underlying assumption about employer behavior regarding offering or not offering healthcare benefits is stated as follows:

"Because employers seek to offer compensation packages that are most attractive to current and potential employees at the lowest possible cost, their decisions about offering employment-based health insurance under the ACA will be influenced heavily by the subsidies available to some people through insurance exchanges, Medicaid, and CHIP [Children's Health Insurance Program] and by the tax treatment of employment-based insurance. As discussed in more detail below, if firms offer health insurance to some of their workers, they are generally required, under the provisions of the Internal Revenue Code, to offer it to all or most of their workers. Therefore, CBO and JCT (and many other analysts) expect that firms will generally make decisions about offering or not offering health insurance for their workers as a group. Accordingly, CBO and JCT anticipate that, when employers decide whether to offer coverage or not, they will weigh the value of the tax exclusion for employment-based insurance that is available to *all* of their employees if the firm offers coverage against the value of Medicaid and CHIP benefits and the exchange subsidies that will be available to *some* of their employees and their dependents if the firm does not offer coverage. As a result, the proportion of an employer's workers and their families eligible for Medicaid, CHIP, or exchange subsidies, and the amounts of those benefits relative to the amounts of the tax subsidies for the employer's workforce as a whole, will be central to that employer's decision about offering health insurance." -- CBO/JCT, March 2012, pp. 11

The CBO/JCT analysis proceeds to compare two "representative" healthcare plans for a family of four, in 2016: the first is an employer-based healthcare plan with a total annual premium of \$20,000; the second, is the second-lowest-cost silver plan obtained through the exchanges at an annual premium of \$15,400. The difference in the premiums is explained by CBO/JCT as follows:

"The difference in projected cost for the two policies reflects various factors: First, employment-based plans are expected to have an actuarial value of 85 percent (roughly comparable with the average for employment-based plans today), and silver plans will have an actuarial value of 70 percent. Insurance plans that have small deductibles and



co-payments have higher actuarial values than plans with large deductibles and co-payments." -- CBO/JCT, March 2012, pp. 14

The analysis proceeds for four income levels (Modified Gross Adjusted Income), and the results are shown in Table 1. The *critical error* of this analysis is that the *same quality of health coverage is not being compared between the two plans*. The employer-based health plan clearly offers a higher quality level, in lower deductibles and co-payments and out of pocket costs (at a minimum, as well as possibly more covered procedures, etc.) than the second-lowest-cost silver plan. By choosing the exchange plan that CBO/JCT did, they are comparing apples and oranges, i.e. they consider plans of differing cost only and do not account for the different level of quality in the plans. This is analogous to an investor who considers the returns of a mutual fund only without considering the risk of the assets that generated the returns of the fund. It is fundamentally flawed and so too must be the results of the CBO/JCT report (Table 1).

#### Healthcare: The Commoditized Profession

The discussion above has shown that the US Government, as a public policy, is looking at the healthcare profession based on cost of delivering services only. The key variable left out of the Government's analyses is quality of service whether quality is measured in dollars or in intangible benefits. Many U.S. professions have been facing these same pressures for decades, for example, the engineering services industries where the winning bid company has been the lowest-bidder. In this market the result is lower cost but with a lower quality of service.

In fact some in the human resources industry predict the formation of "private exchanges" which would offer employees a wide range of healthcare choices to be paid for with a "stipend" provided by their employer (Tolland, 2014). The cost savings for companies are realized with lower overhead in administrative and human resources needs which is especially important for mid-to-small sized companies. Whether this scenario will be realized is yet to be seen, yet the key point remains: that choice is entirely about cost and quality is subjective or left to the employee to pay for.

## Methodology

Our goal is still to estimate the increase in share prices of the DJIA companies (large U.S. companies) if the burden of paying for healthcare plans were shifted to a combination of the U.S. Government and the employees. The overriding purpose is to establish baseline estimates employing a variety of methods. The methods of estimating share prices are expected to incorporate accounting-based factor models along the lines of the Fama and French model, simple dividend discount modeling, CAPM modeling, and finally possibly some APT modeling may be employed. The research is ongoing and we are in the Literature Review stage so this section will need to be further refined as the research progresses.

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Congressional Budget Office, "CBO and JCT's Estimates of the Effects of the Affordable Care Act on the Number of People Obtaining Employment-Based Health Insurance", March, 2012.

Tolland, B., "Experts: In 2020 employees will be deciding their health benefits", *Pittsburgh Post-Gazette*, online, February 8, 2014.

**Table 1 - Illustrative Comparison of Costs of Employment- Based and Exchange Coverage by Family Income: 2016**

<b>Modified AGI - Family of 4 with 2 adults and 2 children</b>	50,000	74,000	99,000	124,000
<b>Modified AGI as Percentage of Federal Poverty level</b>	200%	300%	399%	500%
<b>EMPLOYMENT BASED COVERAGE (Premium \$20,000, average out of pocket \$3,200)</b>				
Average Marginal Tax Rate (federal, state, payroll taxes)	29.40%	32.80%	38.80%	38.70%
Average Federal and State Tax Subsidies for employer based plan	5,900	6,600	7,800	7,700
Total cost (including after tax premium and out of pocket medical costs)	17,300	16,600	15,400	15,500
<b>EXCHANGE COVERAGE (Premium \$15,400, average out of pocket costs \$6,400)</b>				
Percentage of income required to purchase 2nd lowest-cost silver plan)	6.50%	9.80%	9.80%	n/a
Premium subsidy	12,200	8,200	5,700	-
Cost-Sharing subsidies	3,600	-	-	-
Total cost (includes after-subsidy premium and out-of-pocket costs)	6,000	13,600	16,100	21,800
<b>COST FOR EXCHANGE COVERAGE v. EMPLOYMENT-BASED COVERAGE</b>				
Difference between cost of exchange coverage and cost of employment-based coverage	(11,300)	(3,000)	700	6,300
Percent difference between cost of exchange coverage and cost of employment-based coverage	-65%	-18%	5%	41%

Sources: Congressional Budget office and the staff of the Joint Committee on Taxation

Note: Marginal state income tax rates are calculated as the average across similar families in all states

# IDENTIFYING VALUES IN MEDICAL SERVICES

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## ABSTRACT

There are several approaches for selecting securities for investment. Some are interested in going for growth companies, and there are others who are constantly searching for value in companies. An investment analysis can be technical or fundamental in nature. Technical analysis deals mainly with historical prices and trade volumes. On the other hand, fundamental analysis concentrates on trends in economy, industries and company performances. The current research is interested in utilizing fundamental approach to select companies for a portfolio. The investigation uncovers undervalued companies in an industry. The targeted industry here is medical services. By taking a sample of companies in medical services, and by taking eight financial performance measures on each company in the sample, the objective is to segment the considered companies into several similar groups of companies. The companies in each group are expected to be very close in operational efficiencies. Equality in performance levels may not always mean equal price appreciations. The investigation therefore searches for a company or companies which are having less price appreciation when compared with the other companies in the group. In other words, the current investigation attempts to uncover valuable companies in the industry by using the segmentation approach.

## INTRODUCTION

The objective in portfolio selection is to select some companies for investment which could offer relatively higher positive returns during a planned period. In the process of selecting a few companies with high potential returns, investment analysts would patiently seek and analyze all the relevant past, current and anticipated information on many individual companies. The inherent assumption in this pursuit is that all the information is easily accessible for everyone. There are two main approaches for the analysis. One is the technical analysis which focuses on historical patterns in the price behavior and trade volumes of companies and markets. The second approach is the evaluation of all the financial and economic fundamentals in order to predict future performance of the companies. The current investigation is concerned with the fundamental analysis.

Even in fundamental analysis, some are interested in searching for high growth in earnings and cash flow with minimum risk. There are others who look primarily for better values such as lower PE with higher unrecognized earnings and cash flow potential. The present investigation is concerned in uncovering values in an industry using multivariate statistical analysis of past financial performance of companies in the industry chosen. The industry of interest currently is Medical Services.

In dealing with the financial information, we are assuming that it is possible to achieve superior returns by choosing portfolio using sophisticated statistical and mathematical analysis of relevant information. This thinking may be contradictory to the theories of market efficiency, random walk and market model. According to the market model, most of the stock prices move in tandem with the general market which in turn moves with the economic news. Recently, daily news on the euro crisis has significant impact on the world stock markets. The prices of sound companies are also negatively impacted by the declining markets and negative news.

Security valuation is one of the approaches that is actively utilized in stock selection. The present worth of the future earnings or dividends of an individual company is calculated by discounting the income flow at a chosen interest rate. This concept also has its difficulties. One problem is the Petersburg Paradox. The paradox arises when a company's present value becomes infinite if the expected rate of growth in income is more than the selected discounted rate of earnings. In reality, this is hard to accept and consider. Another problem with the method is in determining the discount rate. The discount rate can vary during a certain period.

Markowitz's introduction of optimization theory to portfolio selection had a significant impact on portfolio selection. He wanted to maximize returns or to minimize risk with some constraints and goals. He assumes that stock returns are normally distributed. He takes variance of returns as risk and he considers covariance between every pair of securities. The amount of data collection to make the technique workable is huge and therefore, it is hard to implement.

Capital asset pricing is a very popular concept that is widely used today for identifying underpriced securities. The method studies the relationship between return and risk. The technique calculates the Alpha value for each security where  $\text{Alpha} = \text{Expected return} - \text{equilibrium return}$ , where equilibrium return of security is a function of the Beta value of the security and return on market portfolio. The companies with higher positive Alphas are more underpriced. Beta measures the variation of security relative to the variation of the market portfolio.

Even though there are many theories and approaches for portfolio selection as outlined, the objective of the current research is to show that multivariable classification method to portfolio selection is a useful tool.

## **PREVIOUS RESEARCH**

In the past, there was significant research to establish the value of a company's reported financial information in the investment analysis. Ball and Brown in 1968 investigated the value of accounting data in explaining the security prices. In the Accounting Review of July 1986, Senyo Tse also studied the relationship between accounting information and security prices using cross-sectional data.

There are many regression models to predict earnings, prices and risks. Discriminant analysis was used in identifying troubled companies, and there were factor analytic models for establishing potential stock returns.

James Farrel, in the May/June 1975 Financial Analysts Journal, published a segmentation analysis of prices. He analyzes

monthly price changes of several companies in several industries. He looked for companies with similar price fluctuations.

### **CURRENT RESEARCH**

The purpose of the current study is to investigate the applicability of the multivariate segmentation techniques in the process of portfolio selection. The problem of interest here is to select companies from a chosen industry which show promise for superior returns in the following year. A sample of companies from the selected industry would be divided into several groups with the companies in each group exhibiting close financial fundamentals. The groups with superior fundamentals would be chosen first. From these groups, underappreciated companies would be selected for a portfolio for the following year. The price performance would be monitored in the following year to assess the usefulness of the technique in portfolio selection.

The current analysis differs from the analysis of Farrel's since his analysis is restricted to the price behavior over several years. The plan here is to analyze financial measures such as earnings yield and return on equity in a given year with the objective of selecting securities for the following year.

### **DATA**

Annually reported financial data for the year 2012 was collected from the Value line survey for a sample of companies in the medical services industry. The variables considered in the data are:

Revenue yield, Earnings yield, Cash flow yield

Dividend yield, Book Value yield, Net Income margin

Equity Debt Ratio, Return on Equity. All the variables are standardized to make them scale independent.

### **ANALYSIS**

The main purpose of the analysis is to divide the sample into several approximately similar groups. The criterion for the groups is that the companies in each group should have minimum total difference in the performance measures selected. The distance measure used for the closeness between companies is the Euclidean distance. The multivariate statistical procedure that is applied for segmenting the companies is the Ward's hierarchical clustering. This technique would minimize the sum of variation within the groups and maximize the sum of variation among the groups. A similarity measure for each group is noted. The maximum value for similarity is 100 and the minimum is 0. One or two groups with high similarity and which have companies with sound fundamentals are chosen for further analysis. The prices at end of 2012 for all the companies in a chosen group are compared with the objective of identifying underappreciated company or companies in the group. The identified companies are expected to offer higher returns and lower risks in the following year.

## RESULTS

**TABLE 1: A Grouping of Companies**

<u>Companies Grouped</u>	<u>Similarity Level in Group</u>	<u>Distance Level in Group</u>
<u>CI, UHS</u>	<u>89.74</u>	<u>0.94</u>
<u>AET, UNH</u>	<u>89.40</u>	<u>0.97</u>
<u>AET, UNH, HUM</u>	<u>86.87</u>	<u>1.20</u>
<u>CI, UHS, SEM</u>	<u>86.34</u>	<u>1.25</u>
<u>DVA, WOOF</u>	<u>85.48</u>	<u>1.33</u>
<u>HLS, LH</u>	<u>84.37</u>	<u>1.43</u>
<u>LPNT, AMED</u>	<u>82.97</u>	<u>1.55</u>
<u>HMA, THC</u>	<u>82.65</u>	<u>1.59</u>
<u>OVA, WOOF, MD</u>	<u>74.82</u>	<u>2.30</u>
<u>AET, UNH, HUM, DGX</u>	<u>73.14</u>	<u>2.45</u>
<u>HNT, HWAY</u>	<u>72.21</u>	<u>2.54</u>
<u>AET, UNH, HUM, DGX, WLP</u>	<u>64.35</u>	<u>3.26</u>
<u>HNT, HWAY, LPNT, AMED</u>	<u>62.07</u>	<u>3.46</u>
<u>CI, UHS, SEM, HMA, THC</u>	<u>61.48</u>	<u>3.52</u>
<u>DVA, WOOF, MD, HLS, LH</u>	<u>53.85</u>	<u>4.21</u>
<u>CYH</u>	<u>NA</u>	<u>NA</u>
<u>MDSO</u>	<u>NA</u>	<u>NA</u>

From table 1, one can see that the top two groups with only two companies in each group have the highest similarity levels and lowest distance levels. In one group, Cigna(CI) and Universal Health Services(UHS) are matched, and in the other

group Aetna(AET) and United Health(UNH) are matched with close financial performance measures. Despite the sound fundamentals for all four companies in the two groups, cigna appears to be slightly underappreciated in one group, and similarly Aetna has lower appreciation in the other group. If one wants to select companies to include in the portfolio of 2013, Cigna and Aetna appear to be better prospects when compared with the other companies in these two groups.

Another group in table 1 that may be of interest is where Health Management Associates(HMA) is matched with Tenet Health Care(THC). Despite their similar financial fundamentals with about 83 similarity level, Health Management Associates is a low priced stock with lower P/E in comparison to Tenet Health Care. Therefore, Health Management Associates could be a good candidate for any portfolio in 2013.

From the segmentation of twenty one companies in the medical services industry, and a close scrutiny of 2012 performance of the companies it appeared that Cigna, Aetna and Health Management Associates were appropriate for the 2013 portfolio. At the end of 2013, the price appreciation of the selected companies were compared with the price appreciation of the other companies in the groups. The results can be seen in Table 2.

**TABLE 2: A Comparison of 2013 Price Appreciations**

<u>Companies in Group</u>	<u>Selected Company from each Group</u>	<u>2013 Price Increase</u>
<u>CI</u> <u>UHS</u>	<u>CI</u>	<u>CI:64 %</u> <u>UHS: 68%</u>
<u>AET</u> <u>UNH</u>	<u>AET</u>	<u>AET: 49%</u> <u>UNH: 39%</u>
<u>HMA</u> <u>THC</u>	<u>HMA</u>	<u>HMA:41%</u> <u>THC: 30%</u>

As anticipated, Aetna and Health Management Associates appreciated better in their groups. Cigna’s appreciation is slightly weaker than the other company in it’s group. Its appreciation was 64% while the other company experienced 68% gain.

**CONCLUSIONS AND FUTURE RESEARCH**

The proposed multivariate segmentation technique has been proven to be a viable tool for selecting companies to invest from the medical services industry. A classification of companies in medical services using Ward’s method and the distance criterion of Euclidean distance seemed to be workable tools for selecting companies to include in a portfolio. Even though the current analysis and results are relevant to 2013 and to medical services companies, experience with some other years and some other industries may be appropriate to gain added confidence with the method. A comparison of Ward’s Method with the other segmentation approaches could also be appropriate.

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## **PARADOX: LISTENING TO INNER VOICES IN AN AGE OF INSTANT CONNECTIVITY**

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### **ABSTRACT**

In many schools today, faculty members are encouraged to promote the concept of "inner voice" to their students. Using "inner voice or mindfulness" has been shown to promote reflection, enhance critical thinking, and to reduce stress. Students have better academic outcomes as a result of mindfulness. At the same time, we all live in a world of instant connectivity and decision making. Hence, there exists a major paradox in our learning expectations for students. We discuss the issues that arise in today's classrooms as a result of the technological environment our students occupy. We describe some techniques that we use to mitigate the effects of technology on the mindful approach that we would like to foster.

Keywords: **mindfulness, technology-mediated learning, critical thinking, multitasking.**

### **INTRODUCTION**

Mindfulness requires a focus and attentiveness for the current reality within our minds. It is that little voice that talks to us and determines our frame of reference. Research has shown that multitasking and having multiple activities currently running within the human mind produces a state of divided attention, distraction, and adverse memory effects [6]. It also leads to an inability to determine what is important versus background noise. In addition, in the context of a learning environment like a classroom, the accessibility of wireless technologies brings a continuous stream of information and "attention grabbers" to students, thus adding to and competing with the visual and auditory information being presented by a teacher, to the detriment of learning, and retention of material [14]. All of these factors run counter to the goal of mindful thought and critical thinking. According to a definition analysis by Kompf & Bond [7], critical thinking involves problem solving, decision making, metacognition, rationality, rational thinking, reasoning, knowledge, intelligence and also a moral component such as reflective thinking. Critical thinkers therefore need to have reached a level of maturity in their development, possess a certain attitude as well as a set of taught skills.

### **THE PARADOX**

Mindfulness meditation- the practice of attending to present moment experience and allowing emotions and thoughts to pass without judgment has shown to be beneficial in clinical



populations across diverse outcomes [3]. Mindfulness also includes a kind of “stepping back” from immediate distractions and short-term goals, and contemplating what is truly important to the individual for the long term. Bill George [5] discusses how mindfulness helped him to become a better leader, and how to orient his life for greater overall satisfaction by practicing mindfulness. The practice of mindfulness includes contemplation, which requires time and attention to specific ideas or thoughts. This is not always possible with technologies that intrude on human attention.

Today’s reality for our students is that they are being inundated with infinite amounts of data, and technological bids for attention, and yet they lack the ability to filter or evaluate what they receive. Students have been trained to multitask by observing others, and the sheer quantity of available information has almost made it seem as though multitasking is a requirement of modern life. The popular literature often describes how heavy multitaskers are incapable of shutting off the stream of data even when they are disconnected from their technology [11] [10] [13].

We want our students to be critical thinkers with the ability to reflect and synthesize meaningful information to make better decisions in a 21<sup>st</sup>-century global economy. That requires that students have the ability to stay focused when they are pulled between face-to-face interactions with other students, a constant stream of messages that appear through various social networking sites such as Facebook or twitter, text messaging, and streams of information that comes through various news sources. The common pattern of instant notification in the virtual world has trained us, and our students, to respond instantly when this happens. There is no time to consider all inputs before an opinion is formed, or a decision is made. Verifying information sources, or the information itself for accuracy, is neglected for the sake of speed. News outlets themselves have been caught out with fake stories, because fact checking is no longer emphasized [4].

This emphasis on immediacy leads to reactions rather than considered, thoughtful actions. Responding quickly has been around since before social media. However, there seems to be an inherent trust in social media by our students (maybe because you pick whom you follow on Twitter or Facebook or Instagram,) but this inherent trust causes individuals to respond quickly, without verification and without pausing to determine the best course of action—just the fastest response. This instantaneous reaction to life problems biases the way we solve problems. Individuals can listen in several ways: for understanding, for information that agrees with their frame of reference and, lastly, listen for revenge. As faculty, we want our students to listen for understanding. Listening for information that simply agrees with their frame of reference is merely parroting back status quo, rather than challenging them to think critically. Lastly, listening for revenge is evidenced by cyber bullying, based on incomplete information. The sad events that have succeeded some cyberbullying actions are not events that anyone wants to encourage or repeat. Instead, it is necessary to teach our students that important facts that determine relatedness are best shared in a collaborative and trusting environment. This implies that pivotal conversations need to be face-to-face and given time to mature [2].

Given this context, that dilemma we face is: How do instructors teach students to slow their reactions to information, in an environment that is technology mediated and designed to foster faster responses? The underlying assumptions inherent in this are that quicker decisions are

better, and that whatever is displayed on the screen is accurate. How can we, as faculty, teach students to slow down, and use their inner voice and gain the benefits? How do we wean students away from the fast access to information that is easily available but may not be accurate? How do we combat the dependence on technological distractions, when technologies have been built to encourage more use, rather than less [12]? Addiction to technology has been documented in many news stories, particularly in the context of video gaming. In the Diagnostic and Statistical Manual of Mental Disorders, Internet Gaming Disorder has been included among the conditions being considered for future study and possible addition to later DSM editions [16]. How do we teach our students to think critically about technology and its products? Perhaps a greater question might be how to bring to students the understanding of how to control how they use and think about technology, rather allow technology to manipulate and control their thinking.

We cannot stop the use of technology. But we must dispel the “illusions of understanding” [8] that technology fosters. Cognitive processing, followed by understanding is not the same as simply recalling. Technology can support and replace recall, (“I don’t need to remember this...I can always look this up on the Web.”) but cannot replace true thought and the true understanding that becomes part of a student’s mental model of the world, and the mental framework into which new knowledge is integrated.

We would like to share some techniques that have worked for us in slowing down our students’ reactions to information in a way that helps true learning take place, based on their feedback and observations to fellow students and faculty. These are low-tech interventions and deal with the power of questions and the use of visual metaphors.

### **A. In-Out Listening**

Synecticsworld, 2010 [15] suggests that listening for understanding follows a certain pattern, or “listening curve.” The level of listening is highest at beginning of the conversation, but as the conversation progresses, attention level dips and rises. Full concentration on what is being said happens over surprisingly short and regular spans of time. We have limited attention when listening to others because we are connection makers, based on past experience, i.e. our own paradigms of what is right and wrong. After 8-12 seconds, we start making connections to what we’re hearing, seeing and feeling.

A process called “in-out listening” has been demonstrated to provide more true learning for understanding based on the ability to reflect on and capture thoughts. Because our minds process much faster than we speak, we use the excess processing capability to generate thoughts and connections. Our minds contain vast storehouses of experiences, associations and data. True and persistent learning takes place when new data is assimilated and becomes part of a student’s whole mental construct. As we have already indicated, data acquisition is fueled by today’s technology, which makes so much data available so easily. As teachers, we can help our students use techniques to create the connections between the data to produce knowledge. We need to be able to enhance these abilities in the presence of the technological distractions that exist.

Process:

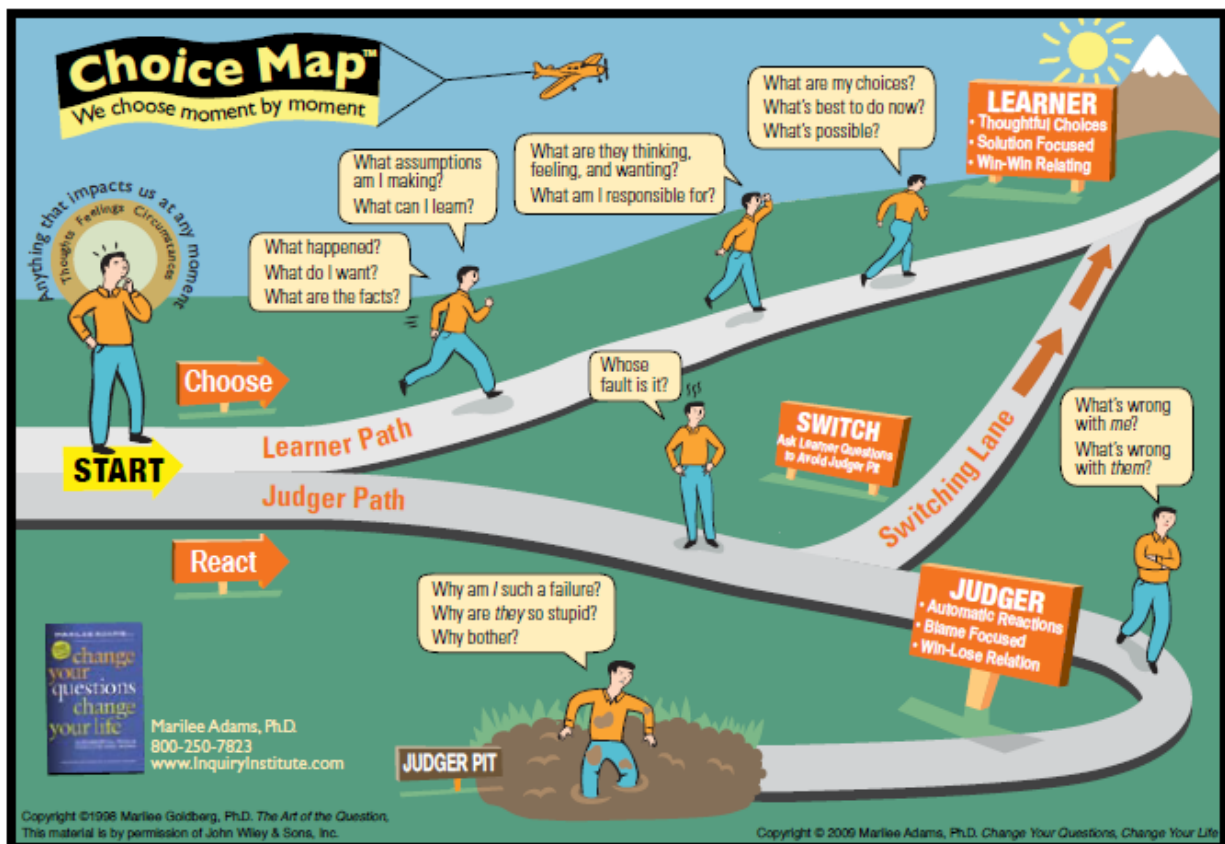
Focus our thoughts by first paying attention to what we are hearing, seeing, or feeling and then to the connections these things generate in the mind.

Second, temporarily tune out of the conversation and make a note of these connections on a piece of paper. A keyword or phrase will do.

Third, team back into listening to the conversation and wait for an opportunity to offer the ideas these connections gave you. The process eventually yields better ideas and creates a climate of understanding between the parties involved in the conversation.

## B. Great Results Begin With Great Questions

“Change your questions change your life” [1]. The premise of this approach is that we have two choices in life when considering questions and thinking. We can either pursue the path of judging which ultimately leads to the judger pit, or we can choose to take the path of learner and pursue win-win, critical thinking results based on both facts and emotions that yield better end results.

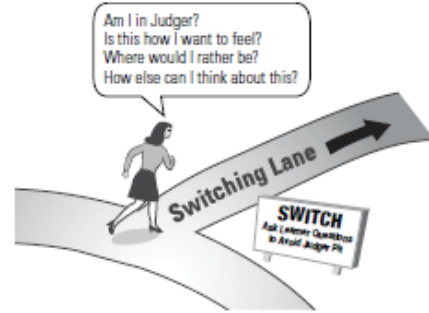


# The Choice Map™ and You

Imagine it's you who's standing at the crossroads on the left side of the Choice Map. Something has just happened. Now you have to solve a problem or make a decision. Maybe it's related to an important goal in some area in your life. Perhaps it's with your business or career. Maybe it's in a relationship with family, friends, or colleagues. It's about your health, finances, or plans for the future.

Do this experiment while you think about that situation. First, ask yourself Judger questions (see below) and notice how they affect your mood and confidence. Now, breathe, switch and instead ask yourself Learner questions (see below). What was it like the second time? What about your mood and confidence? What solutions and possibilities can you see now?

You really can change your questions and change your life. When you find yourself in Judger and want to be in Learner instead, ask yourself Switching questions and "reset" to Learner, including: *Am I in Judger? Is this how I want to feel? Where would I rather be? and How else can I think about this?*



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**Use the Choice Map™ as a powerful tool for getting better results. It's simple and it works!**

### Judger Questions\* include:

- What's wrong with me?
- Whose fault is it?
- Why are they so stupid?
- How can I prove that I'm right?
- Haven't we been there, done that?
- Why bother?

### Results of Judger Questions:

- A mood of pessimism, stress, and limitation
- A mindset that's judgmental, reactive, inflexible
- Relating with "attack or defensive" behaviors

### Learner Questions\* include:

- What do I want?
- What works?
- What are the facts and what can I learn?
- What are my choices?
- What action steps make sense?
- What's possible?

### Results of Learner Questions:

- A mood of optimism, hope, and possibilities
- A mindset that's thoughtful, understanding, flexible
- Relating that is connected and collaborative

\* We all ask both kinds of questions and we have the capacity to choose which ones to ask — moment by moment by moment.

Visit our website to download free copies of the Choice Map; you can also send it to colleagues, friends, and family. The Choice Map is from the best-selling book, *Change Your Questions, Change Your Life: 7 Powerful Tools for Life and Work* by Marilee Adams, Ph.D. She is also president of the Inquiry Institute. The website is filled with other free resources as well as Question Thinking™

offerings such as tele-seminars, workshops, executive coaching, coach training, keynotes, and Q-Storming® that can make a positive difference for you—at work and in life.



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**FIGURE 1.** The Choice Map

The Choice Map (FIGURE 1) provides students with a visual representation of how their language influences their decisions. Conducted in a group setting, we provide students with a problem or situation to solve and then videotape group dynamics as they discuss their individual points of view and finally reach a group consensus. Once each group has finished their dialogue, we debrief the group dynamics and look for the specific questions they were utilizing with each other to determine if they are on the path of learner or judger.

Judger questions include:

- What's wrong with me?
- Whose fault is it?
- How can I prove that I'm right?
- Haven't we been there, done that?
- Why bother?

Learner questions include:

- What do I want?
- What works?
- What are the facts ?
- What action steps makes sense?
- What's possible?

After debriefing, we ask the groups to place a stick pin on which path they think they were on and why. We also discussed the concept of switching questions that help to reset their thinking.

The switching questions are designed to help them get on the path of a true learner:

- Am I a judger?
- Is this how I want to feel?
- Where would I rather be?
- How else can I think about this?

We map this process back to their own life with the way they are currently managing the constant stream of data that has requests for their input. The breakthrough comes when students admit they need to slow down and think about their responses in a more thoughtful way. When we begin to use this type of language of learner versus judger throughout the remainder of the semester, we begin to see light bulbs go off with many of our students.

A side benefit of this process is enriched advising conversations as faculty knowledgeable in this process can begin to ask learner questions of their advisees and help them to reframe their thinking around their academic issues.

### **C. Mission Mapping**

Simplify making problems and issues mind-sized with metaphors. A metaphor compares one thing to another, and suggests a likeness. If we can compare complex business issues to something simple and well known, we begin to create a language for conversation in problem-solving that is jointly understood.

After working with our students concerning the importance of creating a language of inclusive understanding of what it takes to become a true learner, we begin to introduce them to yet another way of thinking about problems and issues from the perspective of a learning community.

Mission mapping brings people together to work on important process issues that require:

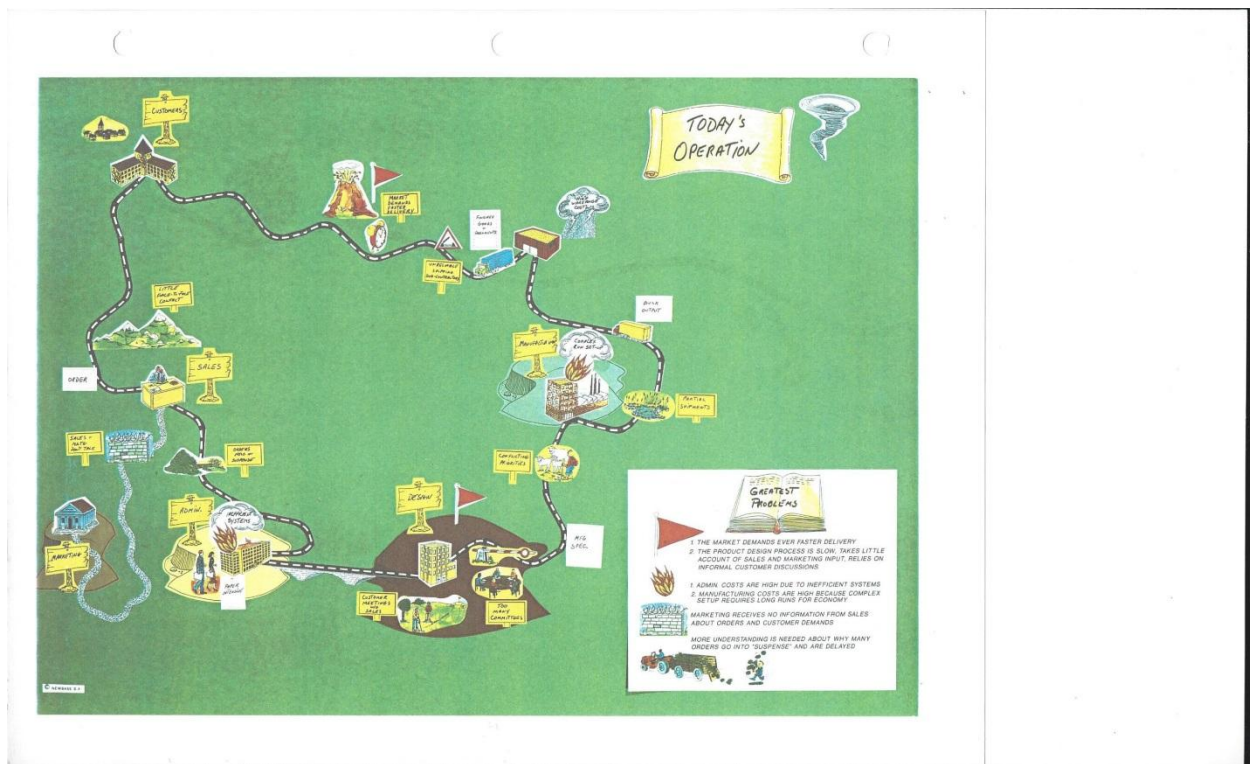
- clear and open communications
- participation and commitment from all
- fresh systems thinking
- speed (there's that word again!)

The process is fun, intuitive and allows students to work together in a low-tech environment where they are encouraged to participate and have full input into the process.

Student teams are given workbooks with self-sticky icons that represent buildings, roads, sign posts and other images concerning the environment. The buildings represent different stakeholder groups who have a say in the problem or issue. Roads represent the different communication patterns between the stakeholder groups. Signs and other icons are utilized to build a language of how this system operates in the current state the desired future state and the pathway from current to future. What follows is a simple example of how groups create a current

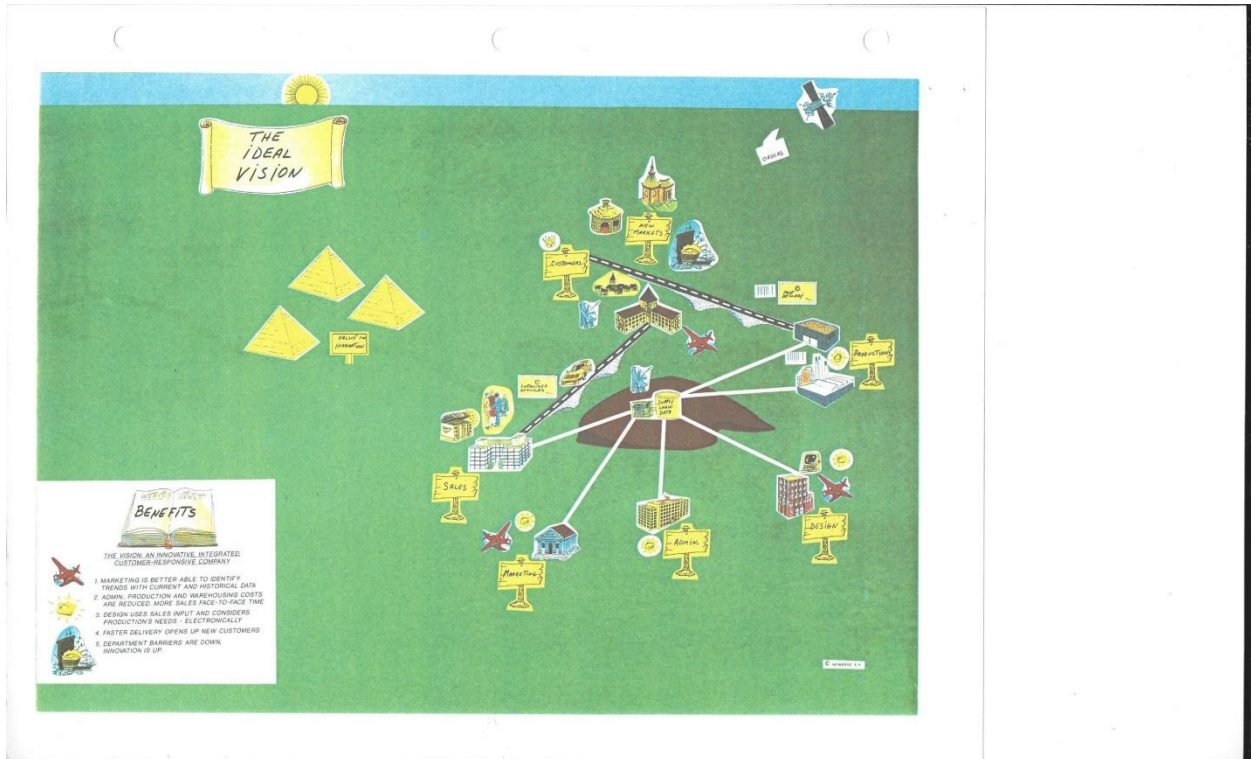
state map of how things currently operate. A desired future state map, the vision and how we can transition from the current state to the desired future state. In developing the transition map we use the metaphor of water indicating rivers, streams, and backwater. Water represents movement and flow. By using simple metaphors we can describe the challenges and issues facing the transition from the current state to the future state.

This process requires students to get out of their seats and work on building their maps on a classroom wall for all to see and reflect on. The mind tends to think in patterns and color [9]. By building the maps, students have an opportunity to reflect on what they see, move icons around to better represent their collective thinking, and create a visual map of their combined thoughts. When shared openly in the classroom, the entire room has the opportunity to see and hear the thinking that took place within each and every team. The outcomes are often very divergent points of view, and provide an opportunity to work collectively in creating a common ground of understanding the issue or problem. This collective learning creates an opportunity for both self-reflection of how each student viewed the issue as compared to the larger group. Building a learning community in the classroom is one of our key objectives.



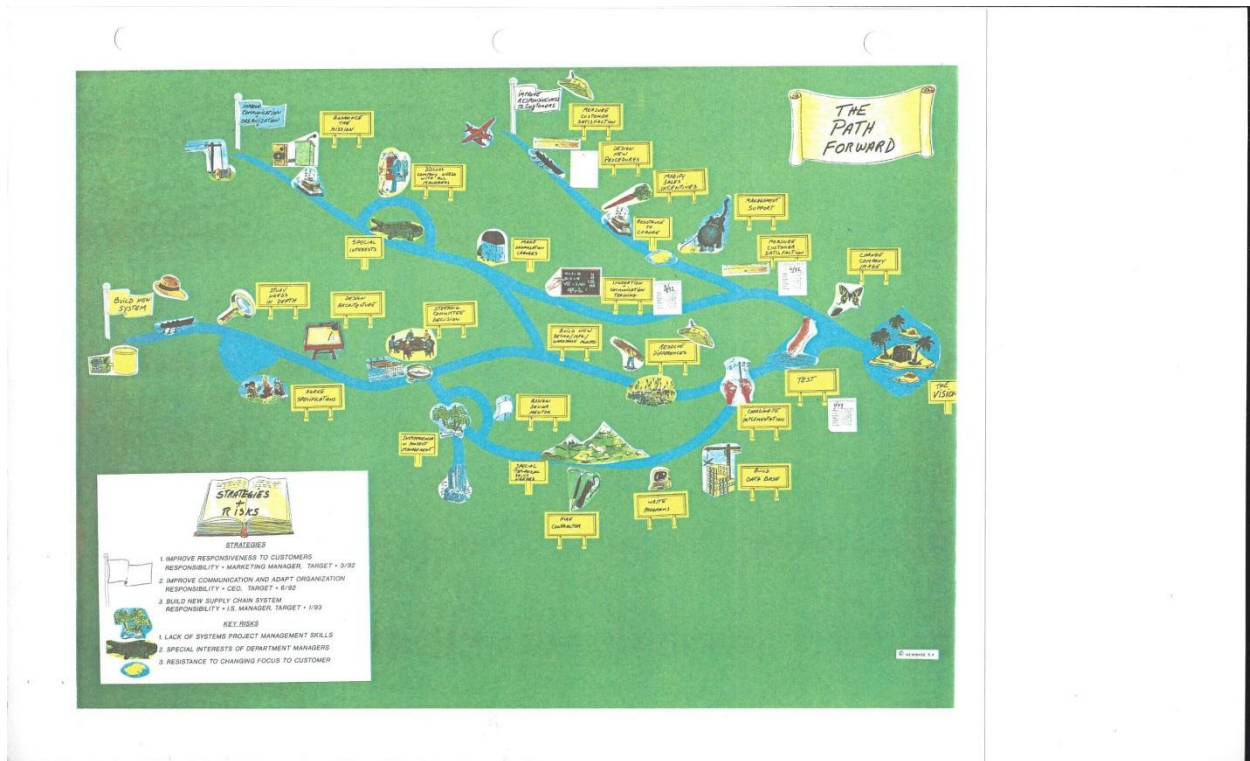
**FIGURE 2. Mission Map: Current State**

Notice the poor lines of communications between groups as well as the isolation of stakeholders depicted in this metaphor.



**FIGURE 3.** Mission Map Future State

In the future state, we see the lines of communications much cleaner and all the key stakeholder groups connected for efficiency and speed of problem-solving.



**FIGURE 4.** Mission Map

In the path forward, this picture depicts how we will navigate turbulent waters to transition from our current state to her desired future vision.

Most project managers will recognize this metaphor journey as a creative way of project charting with critical path. However, this metaphor intervention allows for creative thinking that eventually could be turned into a traditional project plan using today's technology.

## CONCLUSIONS

We have seen how low-tech interventions can in fact enhance critical thinking and slow down the process of making decisions both from an individual standpoint as well as a group perspective.

As we are launching students into a 21<sup>st</sup>-century world, we recognize that different generations have very different ways of approaching problems. But we should not abandon the ways that have worked in the past, and perhaps adapt those to the current technological environment. Perhaps technology can provide the glue that allows for both low-tech and high tech processes to complement each other and provide the tools for the 21<sup>st</sup>-century leaders we are graduating.



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**YOU DON'T NEED TO BE DUMB TO TAKE SMART DRUGS:  
THE EMERGENCE OF ALTERNATIVE DRUGS FOR SUCCESS IN THE  
WORKPLACE**

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**ABSTRACT**

Performance enhancers are popular in today's society, whether for recreational use, athletics, or even in the workplace. Nootropics, also referred to as „smart drugs“ are a special type of performance enhancer that have been increasingly used in the workplace [17]. There are many risks associated, with taking nootropics for non-medical purposes, however, including mood changes, safety, as well as other physical risks. Additionally, ethical concerns arise, leaving individuals to question whether the use of these powerful drugs is really worth it. This paper will examine the manner in which nootropics are and may be used in organizations.

**Smart drugs, productivity**

**INTRODUCTION**

There are numerous types of smart drugs on the market today available in both prescription and non-prescription forms. Nootropics, which are also referred to as „smart drugs“, neuro enhancers, intelligence enhancers, or memory enhancers are categorized as either drugs, supplements, foods, and nutraceuticals that improve one's mental processes and functioning in such areas as memory, cognition, attention, and ability to concentrate (Mind Nutrition, 2013). In 1972 Dr. Cornelia E. Giurgea created the word *nootropic*, a word derived from the Greek „altering one's mind.“ Giurgea's explanation of nootropics is that these are substances that alter specific processes in the brain dealing with „pure“ cognition, memory retrieval or formation without any damaging peripheral or central effects [21, p.976]. There are scientific medical examiners who oppose of the relative effectiveness of nootropic drugs [19]. Additionally, these drugs are thought to be able to improve the brain's supply of oxygen, and/or activate nerve growth resulting in a change in the neurochemicals present [24].

There were specific criteria that Giurgea used classify a substance as a nootropic. It must enhance learning and memory; enhance learned behaviors under conditions which are known to disrupt them; protect the brain from physical or chemical injury; enhance the tonic cortical/subcortical control mechanisms; exhibit few side effects; have extremely low toxicity;

and lack the effects of typical psychotropic drugs [20]. As of 1991, an estimated 100,000 people in the United States were taking smart drugs, up from zero ten years prior [7].

## **ADAPTING TO TODAY'S WORKPLACE**

A typical day for many individuals involves waking up and immediately consuming some sort of caffeinated beverage or pill to start the workday. Other individuals continue to take coffee, Red Bull, five-hour energy, or other supplements to stay awake during the day. As new technology and medical enhancements have evolved, more powerful substances are replacing the average cup of coffee [5]. Scientists are seeking to create new drugs that will boost memory, concentration, and planning, but will be less harmful than a cup of coffee. Recent trends show individuals working longer hours, under pressure to perform to meet rising expectations, and in fear of being laid off [8]. While some stress in the workplace is normal, an excessive amount can be detrimental to health and performance [16]. The stressful environment that many companies have created has influenced employees to try nootropics. According to Anders Sandberg, a research fellow at Oxford University's Future of Humanity Institute, "A lot of enhancers are more or less about fitting us into the modern world rather than the African savannah where our ancestors roamed" [13, pg. 94].

Nootropics allow people to work harder, smarter, and longer in attempt to enhance human potential. Cognitive enhancement drugs could make people perform better at work by allowing for improved attention span, improved focus, enhance memory capabilities, and have the ability to stay awake for longer periods of time [12]. These effects will allow employees to operate at a higher level of cognitive functioning, resulting in an outperformance of competitors who choose not to use nootropics. With super-human like effects, individuals could easily be capable of moving ahead in their profession, leading to possibly promotions, advanced salaries, or other monumental rewards for greater work performance.

Workers are also trying to adapt to an environment that consists of being inside with limited physical movement. Employees may sit at a desk all day in a small cubicle, crunching numbers while staring at the computer. The use of cognitive enhancement drugs gives individuals a greater sense of satisfaction and leads to enrichment of the job that they are performing, even though the job itself may not be engaging [13].

## **CHARACTERISTICS OF NOOTROPICS**

In the development of treatments for disorders such as Alzheimer's disease and Parkinson's, their "alternative" effects that astonished researchers. These nootropic drugs are in a class available only by prescription for individuals suffering from certain neurological disorders, but are also being purchased over the internet and possibly elsewhere on the black market by those who do not have any such disorders [6]. For example, a more common smart drug is being used "off label" to boost performance when its original purpose was to help sufferers of narcolepsy [3][6]. Another example Cohen and Birtwistle provided was the alternative use of Methylphenidate, commonly known as "Ritalin," originally prescribed for individuals who suffer

from ADHD, but now widely used by healthy individuals to improve attention and decrease potential distractions [6]. Researchers are actively seeking to examine the full effects of these drugs on healthy individuals [14][25].

## **REGULATIONS GOVERNING NOOTROPICS**

Currently, an individual may not obtain nootropics unless they have been prescribed for a certain condition. There is not a specific regulatory process for the study of cognitive enhancement drug use in health individuals [13]. Because the FDA already approves many of these drugs for the treatment of specific illnesses, doctors have the ability to prescribe it to patients for “off label” purposes to treat other disorders. Kirby explains that entrepreneur Jeremy Cole researched the drug Modafinil for about a year and proceeded to find a local doctor who prescribed the drug to treat “work-related somnolence” [13]. Other individuals eager to obtain this drug are resorting to online drug companies from other countries and ship them overseas in the black market trade [5].

Regulation may improve pending the results of a research collaboration between the U.S. and Canada to develop new way in treating diseases unknown to neuroscientists [15]. These projects will investigate brain activity patterns in the hopes of inventing and refining new technologies for the future. Lindsay explains that this research will result in a better comprehension of the effect of smart drugs on brain activity [15]. Regulation of new drugs emerging as a result of this research project will be dealt with by government agencies, which will also consider ethical issues related to their use. He advocates this approach because he believes it will result in the release of the best brain supplements to the market [15].

Due to the lack of educational efforts and minimal media coverage, individuals lack adequate knowledge about smart drugs. Recent research studies suggest that the use of underground cognitive enhancement products grows from searching online forums to gain informative data and to learn about pharmaceutical regimens being used [13]. These forums give in depth real world accounts of individuals using smart drugs and their personal experiences.

## **ETHICAL CONCERNS**

The use of drugs to increase cognition and enhance performance raises many ethical concerns. There is much debate about the implications of off-label cognitive enhancement drug use, including cost, effectiveness, productivity, and future outcomes [4]. Assuming that they are effective and safe, the question of whether the drugs should be used widely to boost productivity in the workplace and make businesses more competitive is does not have a clear answer. Critics of this type of use claim that neurological enhancement will permanently change the brain [1]. Many of these individuals argue that since there is no data concerning the long-term effects of these drugs, we do not know whether, over time, the chemistry and makeup of the brain will be changed permanently. It is clear that in some cases individuals continuously take these drugs without harmful effects long term. For instance, Adderall used for ADD and ADHD is prescribed for children at a very young age. These children have gone on to live normal lives and have suffered minimal long-term effects from these drugs [11][19].

Another ethical concern is access to the drugs. The current system of distribution is based on financial resources, meaning that the rich are able to get easier access to these drugs, and will have the means to acquire an advantage over the poor [1]. In his article, “A Battle for Your Brain,” he observes that new medical technologies are being distributed unfairly. An alternative argument that Bailey makes is that if everyone were to take neurological enhancements every person would eventually have the same relative advantage, making the drugs irrelevant [1]. Others suggest, however, that there is a benefit to everyone taking these drugs because the overall productivity and wealth of society would increase [1].

There are certainly individual ethical boundaries that could be crossed by taking these drugs. For some, taking a pill in order to enhance cognitive functioning is viewed as morally wrong. Bailey quotes a critic of smart drugs, Francis Fukuyama, “The normal, and morally acceptable, way of overcome low self-esteem was to struggle with oneself and with others, to work hard, and to endure painful sacrifices, and finally to raise and be seen as having done so” [1]. By using neuroenhancers, individuals may be seen as going against traditional American values of hard work and self-respect. Also, individuals will have to decide whether the meaning work has for them is worth the risk of obtaining performance assistance from a prescription drug. For those who derive their self-respect from work, it would be worth taking a neuroenhancer to increase their sense accomplishment and fulfillment.

### **PRICING AND SUPPLIES OF NOOTROPICS**

Since there is a large demand for the purchase of smart drugs, they are relatively expensive. When one of these drugs is prescribed by a doctor for “shift work sleep disorder” or narcolepsy, insurance companies will usually reimburse the patient for [9]. The cost differential between the prescribed uses list above and non-medical use is large. For example, the average cost for Provigil, the smart drug currently being used most predominantly is \$45 per month with insurance, but ranges from \$300-\$600 per month without insurance. According to IMS health, prescription sales for this drug have increased by 73 percent in the last four years from an average of \$832,687 in 2007 to an astonishing \$1,440,160,000 in 2011 [9]. Because many individuals cannot obtain a prescription from their doctors, however, they are resorting to the black market to purchase them. Drugs purchased on the black market may not be sourced from a reputable supply channel. Drugs obtained in this manner can cause an array of issues including being substandard and adulterated [24]. Individuals buying drugs on the internet could be at risk of getting an altered drug, which may be even more harmful to their health than the original drug itself.

### **MEDIA IMPACT**

The media plays an important role in how individuals view smart drugs. The term „neuroenhancement“ has gained a lot of attention from the media because of its potential benefits, although evidence has been emerging about possible risks/side effects of these drugs. The hype about neuroenhancers has raised public expectations for the future [18]. The media has also been accused of hyping up the positive effects of neuroenhancers and downplaying their

potentials risks, resulting in more individuals potentially being eager to try them. This phenomenon is being called a “neuroscience revolution,” [18]. According to Partridge et. al news carriers are overstating the prevalence of individuals using smart drugs [18]. They use words such as “wide spread” in order to try to normalize the practice and encourage others to engage in this drug craze to increase performance quickly. A study conducted of media coverage showed that 87% of articles mentioned the prevalence of neuroenhancement, 94% portrayed it as common or increasing in society, 66% referred to academics to support these claims, but only 15% questioned product benefits [18]. The portrayal of non-medical use of drugs for neuroenhancement purposes has shaped Americans’ beliefs about off label smart drug usage, potentially leading to an even greater desire to try them.

One concern about the portrayal of this behavior as normal is that parents and children may be apt to try out these drugs for no particular reason [18]. Part of the media hype about smart drugs is from movies. Taylor explains that in the Hollywood film *Limitless*, actor Bradley Cooper takes a drug NZT-48 and turns into a superhuman [24]. The movie character is able to access all of his brainpower and becomes the perfect version of himself, a financial wizard, profound businessman, and gains abilities to rise to the top of the world. Although the character does experience negative effects of addiction and withdrawal, the film is just one example of the media glorifying the effects of drugs similar to NZT-48 as providing unrealistic capabilities, functioning, and unimaginable power.

## **PERSONAL EXPERIENCES**

Through interviews and blogs, we can better understand the individual experiences of those who take smart drugs to enhance workplace performance. A successful executive of a billion dollar Internet security firm, David Asprey, decided to take Provigil (generic form of Modafinil.) His day starts at 4:45 in the morning and he is able to make it through the whole day. He states, “It can be the difference between I’m just making it through the day to I had the best day of my life,” [10]. Asprey decided to experiment and stopped taking it for three days and it was a disaster. He explained that it was almost as if he „fell off.“ The analogy Asprey used was that when he returned to taking the Provigil after the short break, it was like going from black and white to color as in the scene from the “The Wizard of Oz,” [10]. Even though this drug has not been thoroughly tested for off label use, Asprey states that he would not leave the door without taking this pill in the morning. He would not give it up even it will shorten his life [10].

Another individual story is from Peter Borden. Borden’s life was hectic due to the fact that he worked two jobs; during the day he did quantitative analysis and project management for a venture capital start up; at night he was developing a frequency trading system for a Wall Street start up of his own [14]. Borden needed more time to work on his own start up business so he decided to order a supply of Modafinil. While taking Modafinil, he experienced a level of concentration that he had never felt before. Kolker explained that Borden felt as though he had a crisp sense of awareness without the speed of Adderall [14]. Borden also explained that he made fewer errors in his work and that he had the final product had better quality. Many businesspeople working on Wall Street fuel themselves with Modafinil in order to gain power, whereas individuals in the technology and computer services field use this drug in order to find

shortcuts, and advance their performance [14]. Modafinil clears and focuses the mind rather than speeding up the heart rate and brain simulators as caffeine does [2]. Through first hand accounts, it has been shown that there are many individuals who use these drugs to improve cognitive enhancement experienced positive results and feel they need to continue with these drugs regardless of the potential risks they may create in the future [23].

Blog entries were accessed to learn additional information about the use of smart drugs and their effects. In the blog “Smart Drugs Brain Hacks” an anonymous user expressed concern that the side effects of smart drugs are not known because there has not been a scientific review of their off label use [22]. There were a few comments about side effects including headaches and dizziness, but the majority stated there are more benefits than negative consequences from using smart drugs. This review of blogs revealed that there are many unanswered questions regarding the use of smart drugs for non-medical purposes, supporting need for them to be examined by scientists to determine their long-term effects.

## **CONCLUSIONS AND RECOMMENDATIONS**

Smart drugs like Modafinil and Ritalin contain powerful components that boost memory, alertness, and attention span throughout the day, effects that tempt “high stress” Americans to try them. However, our research indicates that many issues remain unresolved as to the legitimacy, ethics, and safety of using nootropics for off label purposes. The debate about their use will be shaped not only by the needs of today’s organizations, but also by the stance of employees on issues of the meaning of effort, success, and integrity in the business world. Efforts to make these drugs legal for off label use are limited, although new research projects on the effectiveness of neuroenhancers on brain activity are underway. The science behind how these drugs work, including potential side effects, and risks is key to properly informing society about their use to enhance cognitive intelligence.

## **A FUTURE “SMART DRUG” CULTURE?**

Smart Drugs may have the ability to change and redesign the workplace for the 21<sup>st</sup> generation. With drugs and technologies allowing people to work at inhumane levels, pressure to conform to keep up may cause serious harm. These pressures could lead individuals to be coerced into using enhancers by employers who may be allowed to forcibly dope their employees [16]. The picture is not entirely negative, however. Louv believes that work will evolve over the next decade with enhancement technologies potentially making a significant contribution [16]. Some economists are already predicting a future where everyone is sleeping less, staying awake longer at night, and having a care free lifestyle [14]. In any case, the manner in which neuroenhancers are managed in the future will change and redefine our culture in ways that we still cannot anticipate.



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*This project was supported by the Roger Williams University Provost's Fund for Student Research*

## **The Selfishness of Selflessness**

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Acknowledgments: I would like to thank my professor Nabeela Alam and my peers for all of their productive and insightful suggestions and comments.

### **Abstract**

Dana, Cain, and Dawes (2006) followed Roy Baumeister's 1982 format for testing self-presentation. Dana, Cain, and Dawes' experiment showed some individuals give because they do not want to appear selfish (self-presentation), not because they actually care about the well-being of the person they give to. I define such desire not to appear selfish as shame aversion.

Guilt, like shame, has also been theorized to effect altruism (Davidson, 2003; Tracy and Robbins, 2004). With guilt aversion, one gives because one does not want to feel guilty for not meeting one's own expectations. This is unlike shame aversion where one gives because one does not want to feel shame for not meeting public expectations. In either case individuals give not because they care about the well-being of the person they give to. Unfortunately, many behavioral economists have defined guilt aversion as shame aversion. This experiment sets to isolate the difference between and properly define shame aversion and guilt aversion in giving.

## **Introduction/Literary Review**

The selfish rational choice model has been the mainstay of predicting human preferences in economics. However, this model has struggled to predict pro-social behavior. Several other mechanisms have been theorized: inequity aversion (Fehr and Schmidt, 1999), preferences for fairness and reciprocity (Rabin, 1993), social norms (Fehr and Gaetcher 2000), pure and impure altruism (Dawes and Thaler, 1988), reputational concerns (Davidson, 2003; Tracy and Robbins, 2004; Dana et. al, 2006), and guilt aversion (Davidson, 2003; Tracy and Robbins, 2004). All of these mechanisms suggest a psychological phenomenon not previously thought to influence utility.

### *Guilt vs. Shame*

Guilt and shame, often used interchangeably, are in fact different emotions. Two psychological schools of thought exist as to exactly how they differ. The first, the self-behavior distinction (Cohen et. al, 2011), states that guilt occurs when one makes judgments on one's specific actions and negative feelings arise from that judgment. Shame on the other hand occurs when one makes judgments about oneself as a whole and negative feelings arise from this analysis of the global self (Tracy and Robbins, 2004). The test of self-conscious affect-3 (TOCA-3), a psychological scale, uses self-behavior as a distinction to measure guilt and shame (Tangney et. al, 2000).

The second school of thought, the public and private distinction (Cohen et. al, 2011), states that when transgressions are not publically exposed they produce feelings of guilt. When transgressions are publically exposed they produce feelings of shame (Ausubel, 1995; Smith et. al, 2002; Cohen et. al, 2011; Dilinberger and Sadowski, 2012). Basically, guilt is more private and comes about when one feels one has violated one's own conscience (Tadelis, 2008; Dilinberger and Sadowski, 2012); while shame comes

about when one feels one's failures have been displayed publically (Cohen et. al 2011; Dilinberger et. al 2012). The dimensions of conscience questionnaire (DCQ-Psychological Scale) relies on this distinction to differentiate between guilt and shame (Johnson et. al, 1987; Cohen et. al, 2011).

Research through the use of TOCA-3 has also shown guilt leads individuals to negative behavior evaluation (e.g. I think I made a mistake) as well as repair actions (i.e. apologizing), while shame leads individuals to negative self -evaluation (e.g. I think I am a terrible person) and withdrawing actions (e.g. hiding) (Tangney & Dearing, 2002; Cohen et. al, 2011).

*General Format for Testing Self-Presentation (Shame Aversion): The Curtain*

Because shame has to do with the public view of transgression it motivates self-presentation. Self-presentation is the desire to please an audience and/or to “create, maintain, or modify” one's public image. In 1982, Roy Baumeister of Case Western reviewed the current body of research on self-presentation. From analysis of numerous experiments Baumeister found testing self-presentation came down to setting up a figurative curtain for a participant to hide behind. In his findings, anonymity was the curtain. An experimenter would create two situations identical in all respects except in the first, actions are public but in the other, actions are private. In such a format, self-presentation influences behavior if results change from the first treatment to the next. Dana et. al follows such a format and finds that self-presentation motivates giving.

In 2011, Steven Tadelis proposed a new figurative curtain, nature. Tadelis used an ocean front restaurant to illustrate his point. A diner has finished his meal, but would prefer not to tip the waiter, however, this diner also does not want to appear selfish to the

waiter. Tadelis concludes that this diner would be more likely to tip if he was sitting inside than outside. Outside, the diner's socially unacceptable action of not tipping could be disguised by a windy day. The waiter may come out, see no money, but think the wind blew it off the table. Inside, this same scenario is impossible, thus, there is no other conclusion to be drawn other than the diner chose not to tip.

Tadelis examines his theory with a repeated trust game. At the first node player one decided to either play the game or take an even money split. At the second node player two has the option to let nature decide or to keep all the money for himself. If player two lets nature decide nature will either choose a fair outcome or all the money for player two. In the first treatment player one never finds out what player two decided, thus player two has the ability to hide behind the curtain of nature. In the sequential treatments the curtain is peeled back, first with allowing player one to know player two's actions and then allowing the whole room to know player two's actions.

Tadelis finds that player two is more likely to be generous (let nature decide) the more the curtain is removed. However, because the experiment was done with the same participants over six sequential rounds the results are cloudy. Players were likely affected by what they experienced in previous rounds, so change in behavior may not have all been due to the varying degree of public actions.

#### *Previous Tests of Guilt Aversion*

Guilt has been identified as an important motivator for pro-social behavior such as altruism (Tracy and Robins, 2004). Guilt aversion has been tested by many behavioral economists, although improperly, because they defined guilt aversion contrary to psychological literature. Ellingsen et. al, 2010, Pelligra, 2011, and Charness et. al, 2006

all defined guilt aversion as player i wanting to meet player j's expectations. However, this definition matches that of self-presentation and shame aversion.

In 2011, Smith et. al properly defined guilt aversion. However, they did not test guilt aversion in an economic setting because the main goal of the experiment was to find the areas of the brain most active when experiencing guilt.

The goal of my experiment is to properly isolate and test the influence of guilt aversion and shame aversion in dictator games. To do so I plan to combine Dana et. al 2006 experiment, Tadelis' curtain of nature, and the Guilt and Shame Proneness Scale (GASP).

### Introduction to GASP

GASP is a psychological scale with the goal of measuring one's predisposition to feel guilt and shame. The creation of the scale had two goals. The first, combine both the self-behavior distinction and the public/private distinction; and the second, make four subscales that analyzed the NBE (negative behavioral evaluation) and repairing actions of guilt, and the NSE (negative self evaluation) and withdrawing actions of shame. The TOCA-3 scale had properly tested the self-behavior distinction and the DCQ scale had properly tested the public/private scale, but no scale had combined both distinctions, nor included the NBE, NSE, withdrawing, and repairing actions. The scale was developed in 2010 and has successfully combined all the distinctions into one sixteen question survey with four subscales: Guilt NBE, Guilt Repair, Shame NSE, Shame Withdrawing (Cohen et. al 2011).

### Design

#### Study 1- Anonymity as a Curtain



In the Dana et. al experiment they took a dictator game and included an exit option. The dictators could exit the game for a cost of ten-percent of the endowment (one-dollar). By exiting, the dictators ensured that the receivers never knew the game was played. A second experiment included the exit option, but the game was anonymous to the receiver regardless of the choices the dictator made. Significantly less exit was seen during the second study, suggesting receiver expectations plays a major role in giving. At the end of the experiment the receiver will be given the option to send a message to their partner. I believe that if a receiver has expressed feelings of guilt in the exit survey they will send a message to their partner.

**Hypothesis 1 (Shame Aversion):** Shame is the psychological reason behind why receiver expectations matter. In the experiment dictators paid a cost not to have their selfish actions (transgressions) made public (aka. known to the receiver) (Dilenberger et. al 2012), therefore individuals who exited had a higher propensity for shame than guilt.

**Hypothesis 2 (Guilt Aversion):** Not all participants exited the study when given the option, even those that gave less than \$9. I hypothesize this occurred because these participants were more prone to guilt than shame. Because these participants cared more about guilt than shame they lost less utility by publishing their actions than having to deal with the guilt that would ensue if they chose to exit. Additionally, guilt averse individuals will be more likely to send a message at the end of the experiment.

To test my two hypotheses I will run Dana et. al's experiment and employ the GASP survey. The survey properly distinguishes between guilt and shame. Additionally, it subdivides guilt and shame each into two categories, guilt into NBE and repair, and Shame into NSE and withdrawal.

### Study 2-Nature as a Curtain

I will test the same two hypotheses, but instead of using anonymity as a curtain I will use nature as a curtain in a traditional dictator game. Nature will have a fifty percent chance of intervening and giving the receiver no money. In the first treatment, the receiver will have no way to find out if nature gave them zero dollars or if it was the dictator. This gives the dictator a curtain to hide behind and thus the ability to act selfishly without appearing selfish. In the second treatment, everything will be the same, however, the receiver will find out if it was the dictator that gave them zero or nature. At the end of the experiment the receiver will be given the option to send a message to their partner. I believe that if a receiver has expressed feelings of guilt in the exit survey they will send a message to their partner.

**Hypothesis 1 (Shame Aversion):** Participants who are shame prone will more frequently act selfishly (give zero dollars) with a curtain (in the first treatment) than with no curtain to hide behind (the second treatment).

**Hypothesis 2 (Guilt Aversion):** Guilt prone participants act generously (give more than zero) regardless of the presence of a curtain (in both treatments). This will occur because guilt prone care more about how their actions make them feel in private, thus they will not act selfishly. Guilt averse individuals will also be more likely to send a message at the end of the experiment.

### **Procedure**

#### Overview Study 1

There will be eighty students selected from Grinnell College through campus advertising and paid experiments. Economics majors will not be allowed to participate in the study. The experiment will be conducted in four sessions with at least eighteen participants in each session. All participants will complete an unrelated survey during which the dictator and receiver roles will be administered silently. All participants will be paid \$10 to complete the unrelated survey; this allows all dictators to exit without the receivers knowing the experiment ever took place. As in Dana et. al 2006 two separate studies will be completed, both with an exit option, but the first with anonymity gained through exit (paying to establish a curtain) and the other with anonymity guaranteed regardless of exit (curtain always there). Participants will be given the GASP survey after they have completed the experiment.

#### Detailed Procedure Study 1

Participants will be seated in one large room. Initially they will be given an unrelated survey to complete. Questions asked will be quite meaningless, such as how much time do they spend walking their dog? Such questions do not prejudice the mind with thoughts of morality and giving and will therefore unlikely influence the results of the experiment. Roles will then be randomly assigned and dictators will be given a sheet of instructions (the words dictator or receiver will not be written on the instructions). Dictators will be asked to allocate \$10 of real money to an anonymous receiver who has already been chosen and is in the room. They can give in any amount of \$1 increments (0-10, 1-9, 2-8 etc.). The instructions will state that the dictator's instructions will be given to the receiver as well as the allocated money. This way the

dictator knows that the receiver will have full knowledge of what game was played and the options the dictator was faced with.

Next, the dictators will be discreetly handed the set of instructions detailing how the dictator can make the game anonymous to the receiver (i.e. not public); this option is called the exit option. If the dictator chooses this option he/she will be given \$9 dollars and the receiver \$0, however the receiver will not be handed any instructions about the game but will receive his/her money for completing the unrelated survey; they will have no knowledge that a dictator game was ever played. The dictator has no option to change his or her original allocation offering. It is simply the 9-0 allocation with exit or what they chose to offer initially.

After they decide in favor of the exit option or not they will be handed the GASP survey.

Just as in Dana et. al 2006 the second experiment will be conducted in the exact same way, however the experiment will be anonymous to the receiver regardless of exit or not. This serves as a control to ensure exit was motivated by receiver expectations (shame aversion) and not other factors.

### Detailed Procedure: Study 2

The setup will be largely the same as the first study. Eighty participants will be seated in a large room and given an irrelevant survey. Then the dictators will be given their set of instructions (as in study 1, the words dictator will not be used on the instructions).

The instructions will state they have been given \$10 and have been assigned to a random participant in the room. They can choose to allocate any amount of their \$10 (in dollar increments) to the other participant. The instructions will then say nature has a fifty

percent chance of intervening. If nature intervenes the other participant will be given zero dollars. As in the first study, the instructions will state that the other participant will receive an exact copy of the dictator's instructions. In the first treatment the receiver will not find out if nature intervened, thus establishing a curtain for the dictator. In the second treatment, the receiver will be told if nature intervened regardless of what they receive, thus removing the curtain for the dictator.

### **Discussion and Predictions**

In general, I would expect individuals who are more shame prone to act selfishly behind a curtain, but act more generously when the curtain is removed. I would expect to see guilt prone participants act generously regardless of the presence of a curtain or not.

In the context of the first study, I predict individuals that chose to exit have a higher shame propensity and individuals who kept \$9 or less have a higher guilt propensity than shame. The theoretical pathway for such a hypothesis rests in the distinction between how shame and guilt are felt in public versus private settings. Shame is brought out in public settings, while guilt is brought out in private (Ausubel, 1995; Smith et. al, 2002; Cohen et. al, 2011; Dillinger and Sadowski 2012).

In the context of the second experiment, participants more prone to shame than guilt will act selfishly (give zero dollars) in with a curtain (first treatment), but will act generously (give more than zero dollars) without a curtain (second treatment).

Participants more prone to guilt than shame will act generously (give more than zero dollars) in both treatments.

Lastly I predict in both experiments a participant who acts selfishly (gives zero dollars) regardless of the presence of a curtain or not (in both treatments) will have lower

overall scores for both guilt and shame. In theory there should a turning point number (a guilt or shame score of at least this number necessary to see the effect of guilt or shame), but determining the actual turning point number will take a larger sample than I have in my experiment.

These two experiments will give a better understanding of the roles both guilt and shame play in altruism and it will supply more evidence to the public and private distinction between shame and guilt.

### **Summary and Conclusion**

Over the years economics has proposed theories to help explain the existence of altruism, giving to someone else even at a cost to one's self. However, recent studies have shown that what might appear as altruism is actually individuals giving to prevent a cost to themselves. Dana, Cain, and Dawes showed people give to meet receiver expectations. I hypothesize this is because people want to avoid the cost of feeling shame. Additionally, I hypothesize people may give to avoid the cost of feeling guilt. If the predicted results hold true, further evidence will be added to the growing case that not all giving is actually at a cost to the giver. I arrive at my results using a traditional one shot dictator game, influenced by Dana et. al and Steven Tadelis and I use the GASP scale to measure shame and guilt.

### Appendix: The GASP Scale

[http://wpweb2.tepper.cmu.edu/facultyadmin/upload/url1\\_7865230971286\\_Guilt\\_and\\_Shame\\_Proneness\\_GASP\\_Scale\\_August2011.pdf](http://wpweb2.tepper.cmu.edu/facultyadmin/upload/url1_7865230971286_Guilt_and_Shame_Proneness_GASP_Scale_August2011.pdf)

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**BEHAVIORAL CULTURAL INTELLIGENCE: THE INFLUENCE OF  
MULTICULTURAL INTERACTION, TIME SPENT IN FOREIGN COUNTRIES,  
AND LANGUAGE SKILLS**

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BEHAVIORAL CULTURAL INTELLIGENCE: THE INFLUENCE OF MULTICULTURAL INTERACTION, TIME SPENT IN FOREIGN COUNTRIES, AND LANGUAGE SKILLS

**Abstract:** The purpose of this study is to examine the relationship that multicultural interaction, language skills, and total time spent in foreign countries have on behavioral cultural intelligence. We measured this by administering an 86-question survey to 101 undergraduate college students at a university in the United States. The questionnaires addressed the relationship between the independent variables of multicultural interaction, language skills, and total time spent in foreign countries and the dependent variable, behavioral cultural intelligence. The results indicated that a higher level of multi-cultural interaction and language skills resulted in a significantly higher level of behavioral cultural intelligence. Practical implications, limitations, and future research are also discussed in this paper.

*Keywords:*

Cultural intelligence, language skills, time spent in foreign countries, multicultural interaction.

## **Introduction**

Earley and Ang (2003) introduced the concept of cultural intelligence at a time in which the world was becoming increasingly globalized. Technology paved the way for improved communication, easier travels, and international business practices. As globalization increases, intercultural interactions also increase, which allow for the sharing of values and understanding of different cultures. Cultural intelligence has already attracted significant attention worldwide and across diverse disciplines. Despite this, the concept is still relatively new, and researchers

question what exactly influences one's cultural intelligence, and how one develops cultural intelligence.

As Sternberg and Detterman (1986) pointed out, intelligence is not a concept that is easily definable not only because of its nature, but also because of the nature of the concepts that it represents. Cultural intelligence or CQ is a person's ability to adapt successfully to cultural settings that are new and unknown (Earley & Ang 2003). Someone who has a higher level of cultural intelligence can use this to his or her advantage because this type of intelligence can help influence people's behaviors, attitudes, and potentially predict outcomes and performance during cross-cultural encounters (Van Dyne, Ang, Ng, Rockstuhl, Tan, & Koh 2012). In taking the concept of intelligence one-step further, Ang and Earley (2003) later refined the former concepts of intelligence and developed their own conceptual model of cultural intelligence. They applied a framework that borrowed from multiple disciplines, including traditional views on cognitive analysis, as well as motivational and behavioral analyses.

According to Ang and Van Dyne (2008), intelligence is an aptitude that goes beyond someone's thinking capabilities, and as such they theorized that cultural intelligence or CQ, should be divided in four different factors: metacognitive CQ, cognitive CQ, motivational CQ and behavioral CQ. As this construct is relatively new there are still areas that need to be addressed including the identifications of the antecedents of cultural intelligence (Ang and Van Dyne, 2008). The objective of this study is to address this need by examining the role of language skills, time spent in a foreign country and multicultural interaction's impact on cultural intelligence.

## **Cultural Intelligence**

Since its inception, CQ has gained notoriety due to its contemporary relevance to globalization, international management, and workforce diversification (Van Dyne et al. 2012). Van Dyne et al (2012) argue that as the world becomes more globalized and intertwined, this construct is an important tool for business and management because it is malleable, adaptable, and more importantly, it can have incredible applications in the world market and future research.

Ang and Van Dyne (2008) have observed that before the development of CQ as the type of intelligence that allows individuals to function effectively in cross-cultural settings, there had been a previous consensus that limited and relegated the concept of intelligence as an ability that could only be expressed or achieved within a classroom or academic setting. However, they argued that further research has proven that the traditional view of intelligence can indeed go beyond a classroom setting and that there is a “growing interest” in developing ‘real-world’ intelligences that can be applicable within other specific areas like social, emotional and practical intelligences. As a result, we see that CQ is ‘domain-specific’ and has special relevance to multicultural settings and global contexts, thus making it complimentary to other types of intelligences like the ones aforementioned. Nevertheless, even when complimentary, CQ differs from the other intelligences (social, emotional, and practical intelligences) because it is a malleable individual difference that it is specific to particular types of situations (culturally diverse) and it is not culture specific. Additionally, Van Dyne et al (2012) found that this same malleability is what makes CQ so special because it can be increased by actively participating in different activities such as “education, travel, international assignments, and other international assignments” (297), thus showing that it is not an static ability.

As conceptualized by Earley and Ang (2003), cultural intelligence or CQ is a multidimensional construct with four factors: metacognitive, cognitive, motivational, and behavioral. The first three factors are categorized as mental capabilities that correspond to a person's cognitive functioning, whereas the behavioral factor refers exclusively to one's behavioral ability to "flex motors skills" and exhibit a variety of verbal and non-verbal actions (Van Dyne et al. 2012).

The first factor of cultural intelligence, metacognitive CQ, refers to an individual's level of conscious cultural awareness during cross-cultural interactions (Ang & Van Dyne 2008). According to Ang and Van Dyne (2008), the metacognitive factor of CQ is a critical component of CQ for a number of reasons: "it promotes active thinking about people and situations in different cultural settings, it triggers active challenges to rigid reliance on culturally bounded thinking and assumptions, and it drives individuals to adapt and revise their strategies so that they are more culturally appropriate and more likely to achieve desired outcomes in cross-cultural encounters" (5).

Cognitive CQ, the second factor of CQ, reflects the knowledge of norms, practices, and conventions in different cultures that has been acquired in life from educational and personal experiences. It involves processing and organizing the metacognitive awareness and turning it into actual knowledge. The cognitive factor of CQ is a critical component of CQ itself, because the knowledge of culture influences people's thoughts and behaviors; therefore, understanding a society's culture and its components allows individuals to better appreciate the systems that shape and cause specific patterns of social interaction within a culture. Therefore, those with a higher cognitive CQ are able to interact better with people from different cultural settings (Ang & Van Dyne 2008).

The third factor of CQ, motivational CQ, reflects the capability to direct attention and energy toward learning about and functioning in situations characterized by cultural difference. Motivational CQ is a critical component of CQ because it is a source of drive for individuals; it triggers effort and energy that is, in turn, directed toward functioning in the novel cultural setting. Behavioral CQ, thus, reflects the capability to exhibit appropriate verbal and non-verbal actions when interacting with people from different cultures (Ang & Van Dyne 2008).

The last factor, behavioral CQ, refers to the extent to which an individual acts appropriately by expressing verbal and non-verbal behaviors in cross-cultural situations. Behavioral CQ is a critical component of CQ, because verbal and non-verbal behaviors are the most salient features of social interactions. “Because behavioral expressions are especially salient in cross-cultural encounters, the behavioral component of CQ may be the most critical factor that observers use to assess other’s CQ (Ang & Van Dyne 2008, 7).

According to Ang and Van Dyne (2008), behavioral CQ “reflects the capability to exhibit appropriate verbal and non-verbal actions when interacting with people from different cultures”. This factor of CQ is one of the most significant in the communication process between individual of same or different cultures because verbal and non-verbal behaviors are the most prominent features seen during cultural interactions (Ang & Van Dyne 2008). Recognizing the importance of verbal and non-verbal behaviors as a normal part of interactions with other people, we decided to focus our research on behavioral CQ; we believe this is a key concept for understanding human behavior. Although we might take for granted the types of communication we engage in every day, it is important to mention that even when we are not talking with words, we are still communicating and conveying information to others. We must evaluate others’ verbal and non-verbal messages, so there is no room for miscommunication or misinterpretation

during interactions, especially during cross-cultural interactions. When people have face-to-face contact, they rely on the other person's body expressions (voice, face movement, and words) to make sense of what they are saying; however, we cannot access the other person's "latent thoughts, feelings or motivation" just by observing them (Earley & Ang 2003).

In behavioral CQ, we find that there are facets that further explain how the concept of CQ operates. These are repertoire, practices/rituals, habits, and newly learned. These facets are necessary for individuals to overcome problems when engaging in cultural interactions because they provide a framework for thought and behavior. Earley and Ang (2003) argue that the behavioral facet of CQ is tied to both the cognitive and motivational aspects of CQ because "CQ requires knowing what to do and how to do it (cognitive) as well as having the wherewithal to persevere and exert effort (motivational)" (81). People also need to have their behavioral repertoire responses in check and readily available, so they can use them in a given situation to avoid cultural misunderstandings, because not all behavioral responses work in when communicating in different countries (Van Dyne et al. 2012). On the other hand, if these repertoire responses are lacking, then individuals must have the ability to "acquire such behaviors," so they can adapt successfully to the new environment (Earley & Ang 2003). In order to learn and acquire such repertoire of behaviors, people need aptitudes, abilities, and skills to navigate and understand the intricacies of every-day life. For instance, aptitudes are the experiences an individual can accumulate throughout his or her life and they also influence a person's ability to gain other abilities in the future. Abilities are an "aptitude in action" (Earley & Ang 2003) and they reflect achievement in mental or physical contents, they are domain-specific, and people acquire them over a period of time. Last, skills are abilities and aptitudes that are displayed on a motor level. All three repertoires of behaviors are important in order to discuss

the sub-dimensions of behavioral CQ because they help explain how people acquire and display their own communication behaviors. These sub-dimensions of behavioral CQ are verbal behavior, non-verbal behavior, and speech acts, and they are affected by determinant factors such as background, culture, education, and interests.

The first sub-dimension, verbal behavior, refers to how people talk when engaged in an interaction with other people. It includes the tone of voice, speed, inflection, the degree in which people reflect “warmth, enthusiasm, and formality conveyed by style of expression,” (Van Dyne et al. 2012) and also the degree in which people take turns to speak or use silence between words.

The second sub-dimension, non-verbal behavior, is the behavior that is not conveyed by speaking words, but rather when people convey them by using body language, facial expressions, and even types of clothing (like formal versus informal clothing styles). These cues may be subtle, but they are not to be taken lightly. It is important for people to be able to identify them and respond adequately in a given cultural interaction because they are culture-based and not all non-verbal behaviors may have the same meaning or message (Van Dyne et al. 2012). The level of awareness a person can have of their own non-verbal communication skills can improve their communication with others in face-to-face settings (Graham 1984).

Last, speech acts refers to the way in which people communicate different types of messages according to the rules of behavior of a given place. Different cultures have different ways of behavior, and this is important because speech acts can help communicate the local standards of behavior in terms of norms, values and morals. It is also important because since speech acts are culture-specific, certain cultures would expect a certain type of behavior when someone is conveying a message (Spencer-Oatey 2008).

As Van Dyne et al. (2012) point out, having these sub-dimensions of behavioral CQ are



important because they force people to adapt their behavior to the cultural setting where they are, rather than relying on habitual behavior that may be culture-based; but, on the other hand, they emphasize the complexity of intercultural interactions. Having these behavioral sub-dimensions can help enhance and foster communication, respect, and understanding for all parties, thus increasing the rate of success and achievement for all people. This study uses behavioral cultural intelligence as its dependent variable.

### **Multi-Cultural Interaction**

Multicultural interaction is often thought of as an issue that can create team conflict through cultural differences, which can lead to different expectations or working norms. Issues such as “differences in work, norms and behaviors, violation of respect and hierarchy, lack of common ground, language fluency, and ways of communicating” can arise when working with people whose cultures differ from each other (Ang & Van Dyne 2008).

Of course, multicultural interaction experiences can also often provide positive results, by providing new approaches and opinions to a project and therefore, leading to more effective output and team interactions. A case study by Deloitte found that the impact on diversity of team effectiveness has clear implications for business, and that cultural diversity acted as an indirect way to enhance interactions. The multicultural nature of a team has the potential to provide unique opportunities for listening, growth, and understanding, ultimately forming bonds amongst differences and a stronger sense of identity (Deloitte). Therefore, we are testing to see if there is a correlation between multicultural interaction and behavioral CQ:

*Hypothesis 1: A higher level of multi-cultural interaction results in a higher level of behavioral cultural intelligence.*

## **Foreign Experience**

One can argue that time spent exploring and experiencing foreign countries and cultures can greatly impact the way that travelers view themselves and their own cultures. Experience abroad is thought to be a way to broaden one's mind and to think on a deeper, more culturally sensitive scale. Multicultural experience (MCE) can be defined as the amount of cultural exposure short-term business travelers experience on business trips (Tay, Westman & Chia 2008). Additionally, MCEs provide opportunities for business travelers to increase their knowledge of specific cultural environments. Greater cross-cultural experiences should build travelers' confidence in their ability to function in different cultures. A greater number of trips abroad should also expose travelers to wider repertoires and deeper understanding of behavioral norms (Tay, Westman & Chia 2008). The amount of time spent traveling abroad could potentially lead to increasing changes in verbal and non-verbal communication strategies. Therefore, we are testing to see if there is a correlation between total time spent in foreign countries and behavioral CQ:

*Hypothesis 2: A higher level of total time spent in foreign countries results in a higher level of behavioral cultural intelligence.*

## **Language Skills**

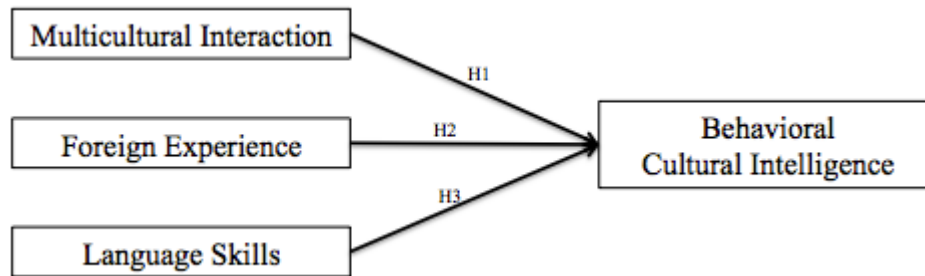
Language may be seen as the method of human communication, either spoken or written, using words as a form of expression. It is also a vital tool that people use on a daily basis to communicate with others. Although English is often used as the predominate language in multicultural business organizations, the ability of an employee to communicate via foreign languages

is extremely attractive to international companies. For instance, foreign language abilities play a important role in areas such as business administration because it helps increase the opportunities for understanding and learning other cultures (Griva & Sivropoulou, 2009), thus creating better communication and cohesion amongst the members of a group. Those who are not able to speak a foreign language in roles performed across cultures or with people from different backgrounds, however, can feel alienated and excluded from the main group because they are not able to adequately convey their emotions, opinions, and messages to others (Janssens & Brett 2006). If employees have limited language skills and are unable to understand one another, they can feel lost, confused, and disconnected from their peers (Marschan-Piekkari, Welch & Welch 1999a). Moreover, another research study conducted by Marschan-Piekkari et al. (1999b, 383) concluded that when people work in multicultural environments with people who speak different languages, those who are unable to speak a common corporate language will be also left out from participating in company activities thus leaving them confined to “their local operation” thus reinforcing their previous idea of language skills being a fundamental tool for people to integrate to the new environment and feel accepted amongst their peers. Therefore, any foreign language skills are beneficial to understand and can be used in business when targeting a certain segment of the business’ market.

Good communication in foreign language has become crucial in today's world (Cole & Deskins 1988), which is owed to the impact of globalization. For global competitors, the most important factor is the ability to communicate on a wider, quicker, and clearer basis (Schorr, 2005). According to Earley (2002), people who have difficulty learning a new language should have a lower level of CQ. Therefore, we are testing to see if there is a correlation between language skills and behavioral CQ:

Hypothesis 3: *The more languages one speaks, results in a higher level of behavioral cultural intelligence.*

Hypotheses  
Figure 1



## Methodology

The participants in this study were undergraduate students from a four-year university located in the United States of America. These students were administered questionnaires in classroom settings inside the school in eight different batches and in different classrooms. Respondents' participation to fill out the questionnaires was voluntary and instructors' permission was granted in order to distribute the questionnaires during each session and classroom.

The questionnaire consisted of 86 questions, and it took participants about 20 minutes to complete. In order to minimize bias when answering the survey, students were told that there were no right or wrong answers. They were instructed to read the questions carefully before responding and also that the purpose of this study was for the overall business workforce. Additionally, participants were also made aware that this study was taking place not only in their school, but also in different colleges across the United States, as well as international schools.

## Sample

Table 1  
Subjects and Demographics

Sample	Total
Questionnaires distributed	125
Questionnaires answered out of 125	102 (81.6%)
Questionnaires dismissed	1
Males	44
Females	57
Sample total	101

We distributed 125 questionnaires, from which 102 students replied. The initial response rate was 81.6%. Out of the 102 questionnaires administered, only one questionnaire's responses were deemed unusable. Therefore, our sample total was 101 respondents. The people surveyed during this research were strictly college students pursuing an undergraduate degree. Out of the 101 people surveyed, the respondents included 57 female and 44 males. The youngest person surveyed was 18 years old and the oldest person surveyed was 25 years old.

## Measures

In order to explore even further behavioral intelligence, we used a questionnaire that came directly from Van Dyne, et al.'s work that used a Likert-scale to measure the responses that tested our three independent variables: multicultural interaction, language skills, and total time spent in foreign countries and their relationship with behavioral intelligence.

The questionnaire had a total of 86-question and it was divided into four parts; the first three parts used Likert scales, and the last part was comprised of open-ended questions. The survey questions referred to cultural intelligence, its four factors, and the 11 variables described by Van Dyne, et al. (2012). Likert-type or frequency scales use fixed-choice response formats and are designed to measure attitudes or opinions (Powers & Knapp 2010). Participants were

offered a choice of five to seven pre-coded responses, including a neutral point, which allowed the individual to express how much they agreed or disagreed with a particular statement. Out of the 86 questions in the questionnaire, 9 measured behavioral CQ, our dependent variable. For example, one of the questions to measure behavioral CQ asked participants to describe on a scale from “1” to “7” to identify if they changed their “use of pause and silence to suit different cultural situations.”

To measure the independent variable of multicultural interaction there was one question that specifically asked, “to what extent have you spent time during the past year interacting with people with cultures different from your own culture?” This question was measured through a Likert scale ranging from “1” to “6”, “1” being the number that described the statements asked in the least accurate way and “6” the most accurate way. Throughout the study, there were other questions that pertained to multicultural interaction, which we used as additional support for our hypothesis.

To measure the independent variable of language skills, there was an open-ended question that asked participants to list the languages other than English they could speak “reasonably well.” To measure the independent variable of time spent abroad there was an open-ended question that asked participants the estimated total number of weeks they have spent outside the United States.

Finally, we used age, gender, and education as control variables in our study.

## Results

Table 2  
Descriptive Statistics

	N	Minimum	Maximum	Mean	Standard Deviation
Language Skills	101	0	2	.61	.65
Multicultural Interaction	101	1	6	4.01	1.39
Total Time Spent Abroad	101	.0	996.0	21.23	100.47
Age	101	18	25	20.59	1.14
Gender 0=men, 1=women	101	0	1	.56	.50
Education*	101	1	4	3.17	.87
Behavioral CQ	101	1.93	6.26	4.01	.95

\* Years of University

Table 2 describes the statistics of the main features of the collection of data. The language skills of our sample range from zero to two languages spoken in addition to English, with a mean of 0.61. Therefore, the majority of the sample speaks less than one additional language. Multicultural interaction ranges from 1 through 6; 6 is the maximum amount of interactions the participants of the survey had. The total time spent abroad ranges from zero to 996 weeks, showing that our sample has a wide range of travel experience. The average age of the sample size is about 21 years old, which is expected because the sample frame is conducted amongst university students. Slightly more than half of the sample was made up of women, which is reflective of the university at which the study was conducted. Higher education levels range from 1 through 4, in which only undergraduate students were included.

Table 3  
Correlations

	Behavioral CQ	Lang. Skills	Multicultural Interaction	Foreign Experience	Age	Gender	Education
Behavioral CQ	1						
Language Skills	<b>.431</b>	1					
Multicultural Interaction	<b>.523</b>	<b>.171</b>	1				
Foreign Experience	<b>.160</b>	.068	.162	1			
Age	-.015	-.092	-.060	.076	1		
Gender	<b>.103</b>	.124	<b>.151</b>	.046	-.279	1	
Education	.047	-.096	.081	.008	<b>.752</b>	-.267	1

Bold  $p < .05$

Table 3 describes the correlations between Behavioral CQ and all of the independent variables and the control variables being tested. The data shows that there is a significant but moderate correlation between behavioral CQ and language skills (.431), and between behavioral CQ and multicultural interaction (.523). However, there is a relatively low yet significant correlation between time spent abroad and behavioral CQ (.160), between language skills and multicultural interaction (.171), and also between multicultural interaction and total time spent abroad (.162).

For the control variables, gender was the only that was relatively significant; gender correlated to behavioral CQ was low but significant (.103) and correlation of gender and multicultural interaction was also low but significant (.151). Additionally, the correlation between age and education was also significant (.752), which is logical and expected. There were no other significant correlations.



Table 4  
Single Regressions

	$R^2$	Standardized Coefficient	F-Score	Sig.
Behavioral CQ				
Language Skills	.186	.431	22.57	.000
Multicultural Interaction	.273	.523	37.19	.000
Time Spent Abroad	.026	.160	2.59	.111
Age	.000	-.015	.021	.885
Gender	.011	.103	1.06	.305
Education	.002	.047	.220	.640

Table 4 shows the single linear regressions between a given variable and the dependent variable of behavioral CQ. Given that  $R^2$  is higher for language skills (.186) and multicultural interaction (.273), the data proves that these two variables explain a large amount of the variation, 19% and 27% respectively. Given that the independent variable of total time spent abroad, in addition to the control variables, all have  $p > .05$  shows that they do not explain a large majority of the variance. Therefore, our data suggests that there is not a strong relationship between total time spent abroad or the control variables when compared to behavioral CQ. Also, we discovered that age had no significant relation with behavioral CQ, as  $R^2$  results are .000. The other two controls, gender (.011) and education (.002) also were not significant.

Table 5  
Hierarchical Regression  
Standardized Betas and Significance

	Model 1	Model 2	Model 3
Age	-.122	-.106	.018
Gender	.106	.064	.002
Education	.166**	.183**	.031
Time Spent Abroad	.163**	.135**	.061
Language Skills		.422***	.354***
Multicultural Interaction			.450***
Behavioral CQ	DV	DV	DV
Adj $R^2$	.007	.179	.361
$F$ -Score	1.17	5.36	10.41
$F$ -Score Sig.	.329	.000	.000
$\Delta$ Adj. $R^2$	.007	.172	.189

\* $p > .05$ , \*\* $p > .01$ , \*\*\* $p > .001$

To examine the relationship between the control variables, independent variables, and the dependent variable of behavioral CQ, a hierarchical multiple regression analysis was performed. The results are listed above in Table 5. Variables that explain the relationship with behavioral CQ were entered in three models. In model 1, the control variables of age, gender, and education were combined with total time spent abroad because of their lack of relationship to behavioral CQ, as proved in our previous regressions. In model 2, the independent variable of language skills was added into the regression analysis, which is when the significance has begun to show when Adj.  $R^2$  equals .179. In model 3, the final independent variable of multicultural interaction was added, in which more of the variance was explained, when Adj.  $R^2$  equals .361. Only two of the independent variables, language skills and multicultural interaction, contributed significantly to the explanation of the variance in the relationship with behavioral CQ. Therefore, H1 and H3 were supported. H2 is not supported.

## Conclusion

The objective of this study was to examine the relationship that multicultural interaction, language skills, and total time spent in foreign countries have with behavioral CQ. Since behavioral CQ “reflects the capability to exhibit appropriate verbal and non-verbal actions when interaction with people from different cultures” (Ang & Van Dyne 2008) we realize the importance that communication has for people, especially in today’s globalized world.

The results of our data support H1: A higher level of multi-cultural interaction results in a higher level of behavioral cultural intelligence with a .450 rate. Our results also support H3: A higher level of language skills results in a higher level of behavioral cultural intelligence, with a .354 rate. Therefore, behavioral CQ is significantly related to language skills and multicultural interaction.

With these results, we can speculate about the influence behavioral cultural intelligence may have in areas such as business and education, as they can all benefit from understanding and applying this important construct of cultural intelligence. As previously mentioned, higher levels of behavioral intelligence can increase an individual’s ability to communicate properly in a cultural setting because this ability will prepare them better to communicate and understand people from cultures different than their own. In the case of business, researchers have proven that if there is inadequate communication between technicians and administrators when working abroad, this can lead to misinterpretations (Hall 1959), thus straining business relations between people.

As Ang and Van Dyne (2008) pointed out, individuals with high behavioral CQ are flexible and can adjust their behaviors to the specifics of each cultural interaction. Educators have realized the importance of preparing students for demands in diverse workplaces and

international environments. Educated students also develop cultural intelligence from different learning styles, and from styles of teachers and peers. Therefore, if students with a high level of cultural intelligence were facing a language or culture different from their own, they would be able to better assimilate because they would know how to behave, communicate, and adapt to the situation. This would seem to suggest that higher levels of cultural intelligence could be especially beneficial for students focusing in international business, international marketing, or international relations.

However, our results were not able to support H2, that: A higher level of total time spent in foreign countries results in a higher level of behavioral cultural intelligence as significance was  $p = .061$ .

### **Limitations**

We acknowledge that our research has limitations. First, the nature of our sample may not accurately reflect the opinions of all the students in the United States because the sample was taken at just at one university. Because of this, the students may have a bias built-in because the group was very homogenous in nature, in terms or demographics and psychographics.

Second, it would be logical to assume that our sample's perception of time spent abroad includes mostly family vacations and study abroad semesters, given that they are college students. These particular experiences may not add a great deal of impact because they may not accurately reflect the quality of the cross-cultural interaction. Rather, the quality of the time spent abroad, including immersion in the foreign culture, interaction with peers, and intense observation of customs, norms, and values could, therefore, make the quality of the interaction abroad much more meaningful.

Another limitation of our study is the instrument that we used to measure our data for the independent variable of multicultural interaction. In our survey, we only asked one question specifically asking about previous multicultural interaction. There were other questions that probed the subject, but none of which were tested from our data. In future research, we should expand the measurement and strengthen the instrument to define multicultural interaction.

### **Future Research**

Even when the development of behavioral CQ as factor of cultural intelligence is fairly new, we realize that much more can be done in order to discover its potential, applications, and development in the real world, especially now when the world is experiencing more interconnection and globalization than ever before.

We believe that for future research our model could be expanded in order to further analyze the effect that variables such as language, multicultural interaction, and total time spent abroad have with the sub dimensions of the behavioral factor of cultural intelligence. Additionally, all factors of cultural intelligence, metacognitive, cognitive, motivational, and behavioral, as well as all these factors' sub dimensions, can be added to further research in order to analyze its influence with other variables that may help explain human behavior.

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# CULTURE INTELLIGENCE'S IMPACT ON PROBLEM SOLVING PERFORMANCE

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## ABSTRACT

The effectiveness of multi-cultural personal interaction is becoming ever more important regardless of the field within which we work. This study examines the impact of cultural intelligence on 210 university students' ability to analyze and develop a solution to a cross-culturally related case study. The results suggest that cultural intelligence does impact the ability of a subject to successfully complete the case study. Of the control variables used, only the number of years of university education was found to have a small, but significant, positive impact on the case study results. Implications for theory and practice are discussed and the limitations of the study and future research directions are addressed.

**Key Words:** cultural intelligence, performance

## INTRODUCTION

In today's world of increasing globalization the ability to successfully solve problems and conflicts in culturally diverse situations appears ever more challenging. As such we face a growing need for the ability to understand how to effectively interact with individuals from diverse cultural backgrounds. Relatively recently Early and Ang [4] developed a construct they labeled as cultural intelligence (CQ) which they defined as a person's ability to effectively function in culturally diverse situations. Since then, CQ has been found to be associated with wide range of outcomes including cultural adaptation [11], cultural judgment, decision making, and task performance [1] and have also been related to general interaction and work adjustment of foreign workers [2].

Sachsenmaier [15] has suggested that universities need to do much more to prepare students for a global society by adding globalization-related topics to curricula including methods of analysis and connections with multiple disciplines. He concludes that the "ease of cultural interaction is emerging as an essential ability for leaders in all lines of work."<sup>(1)</sup> However, there is little research to suggest that culture intelligence can actually impact a student's ability to do analysis of situations in which cultural differences play a significant role. The objective of this study is to address this gap in the literature by examining the relationship between students' level of cultural intelligence and the degree to which they are able to use this ability to analyze a business situation and identify culturally-related problems and develop appropriate solutions to those problems.

## CULTURAL INTELLIGENCE

Cultural intelligence (CQ) is defined as an individual's capability to function and manage effectively in culturally diverse settings [4]. This definition is consistent with Schmidt and Hunter's (2000) definition of general intelligence as "the ability to grasp and reason correctly with abstractions (concepts) and solve problems"(3). It also seems fitting the more global approach to intelligence as suggested by theories of practical and multiple intelligences [18] [19]. Cultural intelligence is not only seen as one of these "multiple intelligences", it is also seen as conceptually and measurably distinct from others such as general or analytical intelligence (IQ), social intelligence (SI), and emotional intelligence (EQ) [5] with a distinguishing characteristic being that cultural intelligence applies to multiple cultural settings while social and emotional intelligence may not apply in another cultural setting [20]. CQ is therefore a "culture-free construct" meaning that it is not culture specific [12] [20]. In addition, CQ is to be distinguished from a personality trait as it represents adjustments a person can make to be effective across cultures while a personality trait describes what a person will normally do across time and situation [1].

As conceived by Earley and Ang [4] and developed by Van Dyne, Ang, and Koh [21], the factors that make up the discrete construct of the broad measure of cultural intelligence (Total Cultural Intelligence or TCQ) include: Metacognitive CQ; Cognitive CQ; Motivational CQ; and Behavioral CQ. Metacognitive CQ refers to the conscious awareness which an individual has regarding cultural interactions. Cognitive CQ is seen to reflect the individual's knowledge of a particular group's values, beliefs, and norms. Motivational CQ reflects the capability to direct energy and focus to learning about cultural differences. Finally, behavioral CQ reflects the capability to choose appropriate verbal and physical actions when interacting with people of different cultures.

When considering the potential impact of CQ on addressing a range of culturally specific problems it would seem that each of these may have a significant impact, and research has suggested that one or more of the factors of CQ have an impact on cross-cultural adaptation [22], on trust [14], on group performance [8], expatriate performance [9], the likelihood of U.S. subjects' acceptance a foreign work assignment [6], and global leadership skills [13]. Given especially the findings regarding the positive relationship of CQ and cultural adaptation the following hypotheses are suggested:

*H1: Meta-cognitive CQ will have a significant positive impact on the subject's ability to appropriately address a culturally-related case problem.*

*H2: Cognitive CQ will have a significant positive impact on the subject's ability to appropriately address a culturally-related case problem.*

*H3: Motivational CQ will have a significant positive impact on the subject's ability to appropriately address a culturally-related case problem.*

*H4: Behavioral CQ will have a significant positive impact on the subject's ability to appropriately address a culturally-related case problem.*

## METHODOLOGY

The sample for this study consisted of a convenience sample of 210 mostly upper-class university students from one U.S. university. Subjects were from a wide cross-section of majors from the schools of business, communications, arts and sciences, and health sciences and had an average age of 20.9 and average of 3.5 years of university education (see Table 1).

**Table 1**  
**Study Subjects**

	Number	Mean	Std. Dev.
Women	101	-	-
Men	109	-	-
Total Subjects	210	-	-
Age	-	20.9	2.40
Education*	-	3.5	1.21

\*Education=number of years of university

The instrument used in this study to measure the CQ factors was a 20 item instrument developed and extensively tested for reliability and validity by Van Dyne et al. [21]. The results indicated a robust instrument with a high degree of validity and reliability, including a convergence validity of observed CQ and self-report CQ in which they were found to have an acceptably high correlation. Their self-report instrument was used in this study. Additional research [17] confirmed this instrument to have “strong psychometric characteristics with a stable factor structure” (51). Factor analysis of the four CQ factors was also conducted for this study (maximum likelihood, varimax rotation) which confirmed all four CQ factors with the lowest loading of the twenty questions making up the four CQ factors being .426 with this and all others being above the .400 threshold suggested for acceptable loading factor items. In addition, internal reliability was conducted with all Cronbach alpha scores being above the .700 (see Table 4).

All surveys were administered in a classroom setting and participation was voluntary. There was 97% participation with 240 surveys collected. From these, surveys from subjects who were not U.S. citizens were eliminated as were surveys that were not fully completed, resulting in 210 usable surveys. Survey questions used a seven-point Likert scale with “1 = strongly disagree and 7 = strongly agree”. An example of the questions used is: “I know the legal and economic systems of other countries.” This survey was administered approximately two weeks before administration of the case study phase of the study to minimize potential “connection bias” which might occur if the two parts were administered together. No mention was made of the case study and the CQ instrument being connected.

The case used in this study was adapted from a published case [3] and was approximately three pages in length. The case described in some depth the negotiation process and interaction between managers from two non-U.S. countries that represented distinctly different cultures. It was written in such a way that a number of cultural and non-cultural potential problems were

suggested. The case was first completed by three international business university professors to see if the case and questions would be a suitable case for this study. Revisions were made and then given to 3 international business managers to check the suitability and interpretation of the professors. All six reviewers agreed that cultural problems were the source of the primary case problems. Finally a class of 20 university students were administered the case to assure that it would be understood and to once again check to see if a range of analyses and solutions would be found and to check the time allotment that students would comfortably need to complete the exercise (approximately 75 minutes).

The following directions were given for the case analysis: "Please read the case carefully and answer the following questions. You may need to read the case multiple times to answer these questions. Please write clearly." There were four questions that the subjects were asked to discuss including:

1. List the problems or issues in this case that you believe to be potentially important in identifying what went wrong as well as what will need to be addressed to remedy the situation.
2. Of the problems or issues listed in Question 1, which ONE problem/issue do you see as the most important to be addressed.
3. What are the "case facts" (evidence in the case itself) that led you to see this as the single most important problem or issue. Give as many facts as necessary to explain your choice.
4. List at least 5 steps you would suggest are needed to correct this "most important" problem and/or assure it does not happen again.

Students were administered the case and allowed 90 minutes to complete the case analysis and answer the questions in a "Blue Book".

Two international business faculty members and one very experienced expatriate business manager scored the cases. Definitions of "culture" and appropriate responses were discussed based on pilot tests conducted. The twenty original cases were independently scored (4 point scale) by all three individuals with an inter-rater reliability scores ranging from 85% to 95%.

The following criteria for the scale were used for the scoring of the cases:

**4** – Appropriately sees culture/cultural differences as the major problem and gives adequate support for this view in the "why" and appropriately addresses cultural issues in the "how."

**3** – Appropriately lists culture/differences as one of the possible problems, but does not as the major problem, but does address some appropriate degree of cultural issues in the "how."

**2** – Appropriately lists culture/differences as one of the possible problems, but does **not** address, or address appropriately, these cultural issues in the "how": If listed as a major problem is not able to support this position with case facts or does not appropriately address any cultural issues in the "how."

**1** – Does not use cultural issues in an appropriate manner, or has very little or no references to appropriate cultural issues as playing a role.

All 210 cases were scored independently by one professor and the expatriate manager. Those cases where scores differed were then done by the second professor and the score of agreement was the one used.

## RESULTS

As seen in Table 2, the mean scores for the four factors ranged from a low of 3.53 for cognitive CQ to a high of 4.97 for motivational CQ while the average case score was 2.02. Table 3 displays the range of the case score with 40 percent of the subjects not seeing cultural issues as having importance in the case and 60% see varying degrees of importance. Within this latter group only 28 percent saw culture as playing some degree of a role in the problems and also included some appropriate culturally-related strategies when identifying steps to address the primary problem.

**Table 2**  
**Descriptive Statistics**

	Mean	Std. Dev.	Number
Meta-Cognitive	4.80	.909	210
Cognitive	3.53	.834	210
Motivational	4.97	1.02	210
Behavioral	4.35	.985	210
Case Result	2.02	1.06	210

**Table 3**  
**Case Scores**

Score	Frequency	Percentage
1 - poor	84	40%
2	68	32%
3	26	13%
4 - excellent	32	15%

Table 4 displays the correlations of the research and control variables. Of the control variables both age and education had some degree of significant correlation with the case result, while the four CQ factors each had somewhat stronger significant correlations with each of the CQ factors.

As can be seen in Table 5, in the regression model with just the control variables (Model 1) 4.5 percent of the variance is explained by primarily education which is the only significant variable among the controls. Model 2 demonstrates the significantly greater impact of the CQ factors explaining an additional 16.2 percent of the variance bringing the overall  $R^2$  to .234. Of the four CQ variables with in this model motivational and behavioral CQ was significant, thus supporting

two of the hypotheses H3 and H4 which suggested that motivational CQ and behavioral CQ would have significant positive impacts on the case scores. H1 and H1 which stated that meta-cognitive and cognitive CQ would have the same impact were not supported. Collinearity statistics using Variance Inflationary Factor (VIF) were run with none having a VIF score of greater than 1.7. Levine et al. [10] suggest that VIF scores below 5 would suggest that collinearity between variables should not be a problem when interpreting the results.

**Table 4**  
**Correlations**

	Alpha	Age	Gen	Edu	Meta	Cog	Mot	Behave	Case Result
Age	-	1							
Gender	-	.038	1						
Education	-	<b>.404</b>	.114	1					
Meta-Cognitive	.801	.177	-.086	.094	1				
Cognitive	.782	.087	.056	.131	<b>.428</b>	1			
Motivational	.793	.098	-.020	.057	<b>.321</b>	<b>.308</b>	1		
Behavioral	.860	.017	-.069	.111	<b>.570</b>	<b>.456</b>	<b>.451</b>	1	
Case Result	-	<b>.175</b>	.037	<b>.224</b>	<b>.282</b>	<b>.289</b>	<b>.339</b>	<b>.339</b>	1

**Bold =  $p < .05$**

**Table 5**  
**Multiple Regressions (Std. Beta)**

	Model 1	Model 2
Age	.101	.077
Gender	.012	.032
Education	.182**	.141*
Meta-Cognitive		.070
Cognitive		.102
Motivational		.205**
Behavioral		.136*
Case Result	DV	DV
F-Score	4.27	7.79
$R^2$	.059	.234
Adj. $R^2$	.045	.207
$\Delta$ Adj. $R^2$	-	.162

\* $p < .05$ ; \*\* $p < .01$

## DISCUSSION

The objective of this study was to examine the relationship between a student's level of cultural intelligence and his or her ability to use that knowledge to analyze a business situation and identify culturally-related problems and develop appropriate solutions to those problems. These results suggest that motivational cultural intelligence and behavioral cultural intelligence does enhance this ability as does the years of university education. These results reinforces the previous findings of positive impacts of cultural intelligence on a range of performance behaviors including cultural adaption [22], team performance [8], expatriate performance [9], and extends our knowledge of the impact on these performance outcomes to now include the ability to successfully complete a culturally-oriented case study analysis. For business executives and educators the case for the importance cultural intelligence as an important predictor of performance continues to be reinforced with the results of this study.

It is interesting to note that in this study meta-cognitive and cognitive intelligence were not significant predictors of the case analysis results. Meta-cognitive as defined and measured in this study refers primarily to the awareness the subject has regarding the presence of cultural issues, while cognitive may be seen as specific cultural knowledge. Given that 40% of the subjects were apparently not aware of the cultural interactions causing significant problems in the case, and another 32% did not develop a solution addressing cultural issues, it is possible that these weaknesses are reflected in the magnitude of the lack of meta-cognitive and cognitive significance and/or that even those with some level of meta-cognitive (cultural awareness) was not at a threshold necessary to suggest cultural sources to the case problem for these subjects.

As suggested by Hammerich and Lewis [7] the ability of employees to work with people with cultural differences is increasingly valued by the corporate world. Many of our university students will be entering globalized world of business, and as pointed out by Sachsenmaier [15] universities need to do much more to prepare students for a global society by adding globalization to curricula - including methods of analysis and connections with multiple disciplines. Given that the subjects in this study had 3.5 years of university education and that the average case result score was barely above 2.02 (on a scale of 1-4), this study would support his observation. All educators need to do more to facilitate the growth of a student's cultural intelligence as the need for cultural intelligence extends beyond the traditional business organizations to politics, the arts, health care, and any function that requires teamwork within what have become our multi-cultural societies.

The primary limitation of this research study is the inability to generalize beyond the sample population of the study as only one university was used. Also there was no incentive given for the completion of a rather extensive time commitment and full effort may not have been given by study participants as they might have seen little or no personal value resulting from the effort. While the study variables did capture a little over 20% of the variance in case performance, this still leaves a lot of variance unexplained. Future research should extend the number of variables examined including such things as personality, international experience and perhaps grade point average and courses taken. This study only administered one case analysis for evaluation. Multiple cases addressing a wider range of cultural situations and administered during multiple

time periods would significantly strengthen the reliability of the results. Finally, especially with multiple fields of study such as used in this study, it would also be of interest to evaluate the impact on the degree of experience a student has doing case study analysis.

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# **The Closed-loop Supply Chain Network with Competition and Design for Re-manufactureability**

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## **ABSTRACT**

In this paper, a two-period closed-loop supply chain network is investigated, with manufacturers as decentralized decision makers who compete for market share. In the first period, each manufacturer decides on the production quantity and level of re-manufactureability, which has impact on the cost of both new and remanufactured products. In period two, manufacturers can manufacture and/or remanufacture products, taking into account that consumers have different valuations of new and remanufactured products. We derive the optimality conditions and establish that the governing equilibrium conditions can be formulated as a finite-dimensional variational inequality problem. Through a series of case studies, we answer several important research questions, such as the impact of re-manufactureability design and the consumers' perception of the remanufactured product on profitability and market share.

## **Marketing Strategies and Sustainability: The Case of Coca Cola and Proctor & Gamble**

**Minoo Tehrani, Roger Williams University**  
**Eda Surucu, Amanda Losapio, Russell Greenstein**  
**Roger Williams University**

This study examines the sustainable practices along the marketing activities of multinational corporations. The research focuses on product, packaging, and distribution practices of two of the largest global corporations: Coca Cola and Proctor & Gamble. The first part of the research concentrates on the sustainable practices that these companies have already implemented. The second part of the study recommends strategies that can enhance such practices. The final section examines the positive impact on tangible and intangible assets of these companies, such as financial and reputation.

## **NAFTA: Sustainability**

**Minoo Tehrani, Roger Williams University**

**Marii Lambert, John Tyler Corcoran**

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The research focuses on the lack of sustainable practices in economic integration pacts in general and NAFTA in particular. This study examines the environmental and human resource problems and issues that have plagued Mexico since the start of Maquiladora plan. In addition, it investigates the long-term impacts of the lack of sustainability on the success of the companies that have relocated to Mexico. The final part of the study concentrates on the values of sustainable practices that can enhance the long-term success of the Maquiladora companies.

# Netiquette in e-Learning

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As more and more people communicate via social media it is important for users to understand the standards or etiquette they should follow. Many organizations and societies have their codes of conduct (American Computing Machinery, American Accounting Association, American medical Association, etc.) that members must follow. Unfortunately, such is not the case with the Internet, perhaps because the Internet is not controlled by a single entity. Given its proliferation and in many cases its abuse, it becomes more important to create a “standard” code of conduct for the Internet. Internet, however, is global and has numerous global players making it impossible to control individual’s behavior. However, we can create netiquette for specific groups. This paper is an attempt in that direction. This paper studies Netiquette as it relates to eLearning. We will study Netiquette from the perception of one stakeholder, the student.

## Introduction

Netiquette is the ethics of digital communication and consists of two factors, the Internet and etiquette. Much has been written about the Internet and etiquette but only recently have researchers started studying Internet etiquettes. Diversity and the anonymity of the internet is making it an important research area. Recent cases of cyber bullying resulting in the death of a teenager, a gay student committing suicide because of thoughtless posting by roommates, kids being lured into indecent acts, are only some of the reasons that Internet etiquette needs to be developed. Studymode (2013) provided a good reason for studying etiquette, and asked the question: “ Why should we be concerned about etiquette issues in the business arenas of the 90s? Basically because diversity, based on gender, cultural background, age, and degree of experience in today's business, creates a clash of standards and behavioral expectation. Not only are these differences internationally a concern, but also a concern among the relationships of Americans”. Due to the global nature of the internet, it is available 24/7 from any time, any place in many different languages. The same is true for eLearning which is also available 24/7 but in a restricted environment. There are many communication modes in eLearning. In this paper we will focus on etiquettes as they relate to discussion forum.

## eLearning and Netiquette Model

Aggarwal and Adlakha (2012) have defined eLearning as web-based learning in any time, any place environment. Many times e-learning provides a false sense of anonymity. Communication is a big part of any eLearning environment and there are many stakeholders in the eLearning process. Communication consists of chat room discussion (synchronous), Forum (asynchronous) and e-mails (asynchronous). In many cases, there are also discussion areas that are created for group purposes. In e-learning, there is no face-to-face contact and all communication is done via digital medium using e-mails, chat rooms and discussion forums.

It is important that students and faculty follow acceptable etiquettes but at this stage what is acceptable is questionable since there are no acceptable standards. We propose to a study student's perception of acceptable set of netiquette in e-Learning communication in the forum. The following section describes the study.

### **The Experiment**

The present study was conducted at an urban public university in the Mid-Atlantic area. The university has diverse student population. Two MBA courses, one introductory and another an elective course were selected for this study. Both courses are online. The introductory course is required of all students, whereas, the elective course is required for certain specializations. Both courses have diverse student populations in terms of gender, race and nationality. Students were asked to rank do's and don'ts of communication in the forum.

### **Methodology:**

We used a questionnaire format to get student's responses. Following tables(s) summarize student's perception of communication. Students were asked to rank 15 factors in order of importance to them 1 being most important and 10 being least important.

Students on the average used the internet for 29 % of time per week for work, 71% of time for other activities. Only 14% of time was spent on social media. It was surprising that social media was not ranked 1.

Next we study student's ranking of netiquette factors. Survey showed that students perceive what you write in the forum is of most important. This may be due to the academic nature of the forum. Posting hasty response to questions could lead to ridicule, more questions and/or rebuke from other students. Ethical posting was ranked number 2 and respect other's view was ranked number 3. This is not surprising since in academic environment we stress ethics and students feel they should respect others and what they post must also be ethical.

### **Conclusions:**

As the Internet diffuses, more and more monitoring is needed to keep everybody civil and safe. This requires a universally accepted protocol that everybody must (should) follow, but may also create conflict with free speech. Authors believe everybody has right to free speech but with a "responsibility". It is this responsibility that is addressed in the paper. While it is hard to monitor and enforce standards on the internet, we can provide guidelines for specific groups. This paper attempts to develop netiquette for a specific group (e-Learning) of students and could create a groundwork for further improvements.

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Provided on request

## **Ethical Decision-Making under Total Quality Management (TQM)**

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### **ABSTRACT**

With the near-collapse of financial markets in 2007-2008 and the subsequent scandals, the pendulum has again swung back – in the field of business education – to the question of how business ethics is taught. To explore along these lines, a scenario involving an ethical conflict in a Total Quality Management (TQM) initiative was developed. A class of operations management students was asked to respond. Though the students had no formal business ethics education, the overwhelming majority chose an ethical option. In the light of the results obtained from this experiment, the implications for business education and business are discussed.

*Keywords:* **Business ethics, Total Quality Management, moral leadership**

### **INTRODUCTION**

“When the bubble finally burst and the crash came, it soon became clear how corrupt and leaderless the [...] system had become.” [5, p. 684] This was not written about the near-collapse of the financial system in 2007-2008. It was not written after the Enron-era scandals early in the millennia. It was written in 1995 about the October 1987 stock market crash; not the crash of the U.S. stock market, but the crash of the Australian stock market. It is no surprise that a renewed focus on business ethics followed the near-collapse of the U.S. financial system in 2007-2008 and the subsequent scandals. Specifically, how do business schools educate ethical business leaders (a topic that seems to get revisited in the aftermath of the bursting of a financial bubble)? In addition, the topic of quality management also attracts renewed attention following a financial crisis, as excess capacity confronts reduced demand. Therefore, not unexpectedly, there has been a substantive amount of recent work, which demonstrates how business ethics and quality are two sides of the same coin (see, for example, [3]). How can ethics and quality be two sides of the same coin? Ethical managers and employees focus more on serving the customer than lining their pockets. The means by which ethical managers and employees can place the highest value on customers is by providing them (customers) with the highest possible quality goods and services.

If there is a renewed current focus on teaching ethics, exactly how do business educators teach this fundamental topic? Teaching business ethics has traditionally been accomplished through the use of the case study method. As Todd Bridgman [1, p. 2] writes “Typically, business ethics

cases are used to teach moral reasoning by exposing students to real-life situations which puts them in the position of a decision-maker faced with a moral dilemma.” However, most longer and more complex cases are written from the perspective of a CEO or an executive making corporate policy decisions [4]. Falkenberg and Woiceshyn [2, p. 214] point out “...relatively few business graduates will become senior executives; thus, additional cases highlighting the typical decisions of middle managers and professionals are needed.” Even more recent work has posited that case studies should “... encourage ... students to attend to structural constraints on managerial decision-making” [1, p. 4].

How, then, does the business educator demonstrate to students the link between quality and ethics in a manner that gives them an introduction to the real world of business decisions? This paper introduces a short fictional scenario that poses an ethical and moral dilemma to a manager implementing her company’s TQM initiative. The scenario was presented to an introductory operations management class, where the students were required to describe and briefly justify the decision they would make if they found themselves in the given situation. The student responses are then analyzed; both to learn about their reasoning and for the purpose of improving the current scenario for future use, or for creating new scenarios.

### **ETHICS AS EXCELLENCE**

In 1995, John Milton-Smith wrote that the decade of the 1980s “...was a decade of unsurpassed greed.” [5, p. 683] One wonders what he would say of the first decade of the new millennium. Just as during the period after the greed-filled 1980s, “...business schools and professional bodies [have come] under increasing pressure to address the issue of business ethics and to ‘develop and educate’ a new generation of more ethical business-people.” (Milton-Smith, 1991 as cited in [5, p. 684]) This reaction – the idea that “If only business schools could produce ethical business-people, then we would have no more financial bubbles and scandals” – is a logical reaction to the bursting of a financial bubble and the concomitant scandals. More recent news about Barclays and JPMorgan [9] simply serves to illustrate that the scandals are not over, by any means. Interestingly, though, in one study of the teaching of business ethics in business schools “... a significant minority of staff and students opposed the teaching of business ethics on the grounds that unethical behavior had become the norm and profit maximization was *the* [emphasis added] critical business value.” [5, p. 685] Let us hope that this viewpoint never gets more than only “a significant minority” of support.

How, then, do business schools, and for that matter businesses, combat this worldview? One answer is “...ethical organizations develop, encourage and enable people at every level to exercise ethical judgment. They are led by executives who promote and practice the covenantal ethic as part of a long-term shared vision.” (Robert, M., 1991 as cited in [5, p. 685]) The result is that “...employees obtain a sense of direction, an understanding of how they are contributing to the corporate mission and confirmation of whether or not the organization’s espoused values really are its priorities for the purposes of everyday decision making.” [5, p. 692] This paper focuses on educating business students to be cognizant of the ethical and moral conflicts that sometimes accompany everyday business decisions. It is the student (later an employee) in these everyday situations that create the ethical and moral foundations of the ethos that shapes eventual



corporate behavior. Since situations requiring ethical and moral decisions occur in all facets of business life, it is appropriate and, indeed, necessary to incorporate situations requiring ethical and moral decisions into all facets (i.e., courses) of a business curriculum.

## **ETHICS AND QUALITY: PERFECT TOGETHER**

Why mention ethics in conjunction with quality? Lussier and Achua write that "...to sustain [a] quality initiative in the organization, top management must demonstrate commitment by displaying consistently high ethical standards and by cultivating a high level of trust and respect from members, based not just on stated values but on their willingness to make personal sacrifices for the sake of upholding these values." [3, p. 210]. Philip B. Crosby stated this point much more succinctly: "Quality boils down to one word – integrity." [3, p. 210] So how does society foster ethical organizations? Prior to exploring this question, it is helpful to review the three key existing ethical management models, suggested by Maguad & Krone [3, p. 211]:

1. Moral management: "Conforms to the highest standards of ethical behavior and strives to operate within the confines of sound ethical practices predicated on such norms as fairness, justice, respect for rights and due process."
2. Immoral management: "Focus[es] on exploiting opportunities for corporate or personal gain. Not only is it devoid of ethical principles, but it also implies a positive and active opposition to what is ethical."
3. Amoral management: Not just a middle position between moral and immoral management. Amoral managers believe that different rules apply in business from those in other realms of life.

So what determines into which category an employee falls? We believe that a small percentage of employees actively place themselves in the first category and another small percentage of employees place themselves in the third category. A significant percentage of employees are left to be placed in the second category. We further believe that the size (or percentage) of this second category determines whether the organization as a whole can be considered ethical or not, because it determines whether there are just a few bad apples or the whole lot is bad. What influences can prevent the whole lot from being bad? As Maguad and Krone [3, p. 211] write, "...of utmost importance is the need for top management leadership. The behavior of managers has the most important influence on the ethical behavior of their subordinates." Thus, if a change is to be made in the ethical standards of top managers, how is such a change to be accomplished? As stated previously, most business cases are written for top managers, and the need exists for more cases to be written for middle managers and business professionals. This is especially important when one remembers that a very small minority of top managers start out at the top level. Most work their way up, and are aided in their upward journeys by top management. The problem with this system is that people tend to surround themselves with likeminded individuals, leading to Michael A. Roberto's treatise: *Why Great Leaders Don't Take Yes for an Answer: Managing for Conflict and Consensus* [7]. Maguad and Krone [3] speak of having strong organizational ethics programs and the need for ethics education as a means to prevent ethical lapses.

We believe that ethics education should be emphasized among students and lower-level employees, so that these individuals get adequate practice and exposure in making ethical decisions under “low-pressure” situations and, therefore, do not find themselves in the situation of making their early ethical decisions as a top manager in a “high-pressure” situation. Our adopted scenario, nevertheless, is involved with quality. Why are we then spending so much time on ethics? Maguad and Krone [3, p. 216] write about internal ethics failures vs. external ethic failures and note that “... [internal ethics failures] go largely unnoticed and unmanaged.” Bottorff draws an explicit link between quality and ethics, when he states “...[over] half of all documented quality costs could be attributed to the cost of ethics failures.” [3, p. 216]. The result is that “... the associated ethics component [of quality costs] is costing companies billions of dollars or pounds annually.” [3, p. 216] So, there we have it: Ethics and quality - perfect together. Ethics education will therefore improve quality and save costs. The question, then, is how to teach ethics, especially to students and those below the top management echelons?

### **CASES, MORAL DILEMMAS, AND MORAL REASONING**

Properly constructed cases “...provide a ‘halfway house’ between abstract concepts and real life experience.” [6, p. 142] But, as was pointed out earlier, most ethics cases are written from the perspective of top management. So, the need exists for ethics cases targeted at middle managers and professionals. Additionally, Adler has written that cases should be emphasized that focus not on “...individual bastards, but on cases that tell us something about the broader system and how it permits, encourages, even forces firms to do terrible things.” [1, p. 8].

All of these ideas led us to attempt to create a fictional case that illustrated the link between ethics and quality that did not involve top managers. The result was a scenario or “mini-case” developed for an introductory operations management class that raises an ethical conflict in the implementation of a TQM initiative within a company and asks students to respond. Student responses are then analyzed to determine if the fictional scenario is effective in terms of evaluating, whether or not students choose the option that is ethically sound.

The scenario adopted for our purposes is outlined below:

**(N.B.:** Although the companies and the CEO mentioned here are real, the scenario is entirely fictitious.)

*You are the plant manager for the Ft. Wayne, Indiana plant where Zollner Pistons are manufactured. The pistons manufactured in your plant are sent to Ford’s Cleveland Engine Plant No.1 where they will go into 3.5-liter EcoBoost V-6 engines. As part of Ford’s quality initiative, top-tier suppliers (of which Zollner Pistons is one) have been asked to implement similar quality initiatives – thereby ensuring that Ford receives parts and components with minimal defects. Consequently Dr. Gerd Kleinert, the CEO of Kolbenschmidt Pierburg (the company that owns Zollner Pistons), assigns you – the plant manager – the job of implementing TQM in your plant. As part of this assignment you must implement a process control system (e.g., quality control charts). After all, Ford is a major customer, pistons are extremely important in the functioning of a vehicle engine,*

and pistons that are either too small or too large are useless. Due to the importance of high quality, Dr. Kleinert tells you that he will determine whether or not you will receive your \$100,000 annual bonus based on measurements displayed on your control chart(s). Specifically, you will only receive your annual bonus if your control chart(s) show out-of-control situations AT MOST one percent (1%) of the time. Dr. Kleinert then tells you that you are free to implement the TQM initiative (and create the necessary control charts) however you wish. You head back to your office and start thinking.

Your plant is a very simple plant with two processes: a process that produces the pistons and another process that involves the arranging of office supplies\*. The process that creates pistons has – for the last three years – been running with out-of-control situations approximately 25% of the time. The process that arranges the office supplies has – not surprisingly – been running with no (0%) out-of-control situations. If you create control chart(s) that measure the piston-producing process, you won't receive your bonus. If you create control charts that measure the office-supply-arranging process, you will receive your bonus. If you choose the second option, however, there is a 10% chance that Dr. Kleinert will find out what you have done. In that case, not only you don't get your bonus, but you get fired.

Which process (producing pistons or arranging office supplies) do you measure with control charts? Justify your actions using information from Chapters 9 (Management of Quality) & 10 (Quality Control) with a brief (maximum 10-sentence) response.

\*The process of arranging office supplies was selected due to its low importance

(The textbook in question is Stevenson, W.J. *Operations Management*, 10<sup>th</sup> edition, 2009 [8, p. 404-485]).

The results obtained from 30 students who participated in this study are summarized in the table below:

	Which process would the student measure?			
	Pistons	Office Supplies	Both	Neither
Percent of students	70.0	6.7	16.7	6.7
(number of students)	(21)	(2)	(5)	(2)

The students who chose to measure only the process that produces pistons (we believe) felt they were making an ethical decision. If anything, the students who chose to measure both processes

were being more ethical than the students who chose to measure just the piston process: Dr. Kleinert (the CEO) would see the results of both processes (making pistons and arranging office supplies) and, thus, would base the plant manager's bonus on how well both processes were operating – the plant manager would not be “hiding” anything, let alone the piston process. The two students who would measure neither process didn't understand the question, so these two students' answers should be removed from the results. The two students who would measure only the process of arranging the office supplies, were putting the potential for increased income above the ethical need to “...do the right thing.”

The useable data, then, have 26 “ethical” responses and 2 “unethical” responses. This is a fairly remarkable result, since these students – all undergraduates – had not had a business ethics course to date. In fact, the brief (two-paragraph) mention of the combination of quality and ethics (in the chapter on “Management of Quality”) was not mentioned by the instructor in class. One wonders if the students in this class are representative of students in business courses everywhere – and if the nearly 7% of the students who gave “unethical responses” are the ones whose unethical behavior leads them to high-ranking positions in the business world where they are responsible for the behavior we all abhor.

We use the usable data, mentioned above, to statistically test the proposition that, generally speaking, business students would tend to be more inclined to behave in an ethical manner, in making their choice under the proposed scenario. Defining  $\pi$  as the proportion of students in the population who makes the ethically sound choice, the following null and alternative hypotheses are subjected to a  $t$ -test:

$$\begin{aligned}\pi &= 0.5 \\ \pi &> 0.5\end{aligned}$$

The results of the test clearly show that at the 1% level of significance, the null hypothesis cannot be accepted. In other words, our sample data indicate that a majority of business students do tend to choose the ethical decision, in the context of the experimental situation.

## SUMMARY AND CONCLUSION

So what have we learned from this exercise? It is clear that there is a consistent need for business managers in organizations, who act in a more ethical manner. We have also learned that introducing students in business classes to ethical dilemmas involving quality decisions can yield interesting results – results that appear to show that the majority of students tend to make what an impartial observer might classify as ethically sound decisions.

Future work in this area should include the development of more involved and complex cases where the ethically sound choice is not clear-cut, but more muddled. Such work could also include having incoming business school freshmen – before their first class – respond to such a scenario, and then match the results with responses to a similar scenario from graduating seniors. It would then be possible to evaluate if the propensity to make ethically sound decisions increases or decreases over the course of an undergraduate business school education.

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## **Ethics, ESI and the Future of Electronic Discovery**

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Litigation involving electronically stored information (ESI) has become exceedingly complex in recent years as a result of the advance of technology and the nature of the civil discovery process as well as changes in the Federal Rules of Civil Procedure. Courts, lawyers, and litigants have been challenged by the requirements for the production of information in response to discovery requests. One of the underlying requirements of the rules relating to electronic discovery is that litigants act in good faith, cooperate, and come prepared to disclose electronically stored information, its location and formats at a meetd andd confer session with opposing parties soon after the commencement of the civil action.

Several important questions arise as a direct result of the changes to the rules governing electronic discovery. For example, do ethical standards now require lawyers to be competent in this highly technical area, including how information is stored, collected and produced? Further, what happens if the opposing party requests outdated methods, makes incomplete requests, or displays a lack of basic understanding of technical or procedural aspects of electronic discovery? With the underlying understanding that opposing attorneys must cooperate in the discovery process, must attorneys guide and educate opposing attorneys who may be less competent in these matters?

In a celebrated American case, it was clear to a litigant and his expert that the opposing party's expert failed to search the servers and to examine unallocated space on the hard drive in question. Given the

emphasis on cooperation among lawyers required by the Rules of Civil Procedure and in case decisions, did the lawyer have an ethical obligation to continue to preserve this data and potential evidence, and more importantly, did a requirement exist to notify the opposing party of its mistakes? This paper explores the possible and perhaps likely direction of ethical standards in the civil litigation discovery process where extensive ESI is involved.

# **THE MODERATING INFLUENCE OF CULTURE IN ERP SYSTEM IMPLEMENTATION**

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## **ABSTRACT**

This study develops and tests a research model that examines the influence of culture on enterprise resource planning (ERP) system implementations. The research model is tested using survey data drawn from a sample of 203 production firms in India. The findings overall suggest that ERP systems positively influence changes in performance, and that organizational and national culture differentially moderate the relationship between ERP systems and performance.

## **ERP, Culture, Performance**

## **INTRODUCTION**

ERP system deployments enable firms to streamline and integrate their information and process flows (Hitt et al., 2002; Hendricks et al., 2007). Past studies indicate that ERP system deployments result in improvements in firm performance (Hitt et al., 2002; Cotteleer, 2006). Though, firms generally reported success in their ERP system deployments, there were many failures or near failures in implementing these systems (Hong and Kim, 2001). Firms faced difficulties in completing their implementations and achieving effective integration mainly due to their failure to institute cultural changes in tandem with the implementation of their ERP systems (Sia et al., 2002; Dezdar and Sulaiman, 2009).

Hitt et al. (2002) and Bendoly and Jacobs (2005) indicate that ERP system modules comprise of a group of subsystems that support various intra and inter-firm activities. Sia et al. (2002), and Ke and Wei (2008), indicate that significant performance benefits accrue to firms that focus on cultural changes while deploying their ERP systems. The above suggests that a culture-based systems implementation approach would enable firms to reap enhanced benefits from their ERP systems. In this study, we seek to advance this stream of research by considering the following research questions: Is there a relationship between ERP system implementations and changes in performance? Does culture influence the relationship between ERP system implementations and changes in performance?



## **THEORETICAL BACKGROUND**

Galbraith (1977) organizational information processing theory suggests that when firms face low uncertainty, they use four mechanisms to resolve it: hierarchies, rules and procedures, planning and goals, and narrow span of control. When firms face high uncertainty that cannot be handled by these four mechanisms, they must either reduce the need for information processing (through environmental management, slack resources, self-contained tasks) or increase the capacity to process information (through information systems, and lateral relations). In this study the focus primarily is on the use of Galbraith's IS option to manage uncertainty, both in reducing the need for information processing as well as increasing the capacity of firms to process information. Such systems differ along four dimensions – decision frequency, scope of the database, degree of formalization, decision mechanism capacity (Galbraith, 1977).

The first dimension, decision frequency, refers to the length of time between decisions. As the cost of processing information at planning time in ERP systems is low, this is much cheaper for firms than using slack or creating self-contained units. The second dimension, scope of the database refers to the use of local or global databases by firms. ERP systems use a single, integrated, and comprehensive database to consolidate enterprise-wide data and provide local and global information for effective decision-making. The third dimension refers to the degree of formality of the collection and reporting processes. The implementation of ERP systems results in standardization of business processes and hence fewer resources are consumed in the transmission of information. The fourth dimension refers to the capacity of the decision mechanism to process information and select alternatives. ERP systems are characterized by a continuous flow of local and global data and man-machine involvement in decision-making.

A synthesis of the discussion in the above paragraphs indicates that Galbraith's organizational information processing approach serves as an appropriate framework to evaluate ERP system implementations. We have focused on IS as a strategic design choice to handle uncertainty as it fits in neatly with the systemic ERP concept and also because recent advances in IS indicate that all other Galbraith's options have IS underpinnings. In the ensuing section we discuss the systemic concept that underlies ERP implementations and tie the discussion with Galbraith's approach to come up with a research model and testable hypotheses.

## **RESEARCH MODEL**

Hofstede (1980) suggests that national and organizational cultures are fundamentally different, while the former is about values, the latter is about practices. His study represents national culture in terms of five dimensions: power distance (unequal distribution of power), individualism/collectivism (integration of individuals into groups), masculinity/femininity (assertive and competitive versus modest and caring), uncertainty avoidance (intolerance for uncertainty), and long-term orientation (thrift and perseverance). Hofstede and Peterson (2000) suggest that organizational and national culture do not decompose into the same dimensional categories, and that constructs meaningful for countries are less meaningful for firms and vice versa. Based on Hofstede et al's (1990) study, they suggest that the distinguishing features of organizational culture can be represented by six dimensions: process-oriented vs. results-oriented, employee-oriented vs. job-oriented, parochial vs.

professional, open system vs. closed system, loose control vs. tight control, and normative vs. pragmatic.

As noted earlier, although firms have generally found success with their ERP system deployment efforts, there have been many failures. One reason for the inability to successfully deploy an ERP system is the inability to institute cultural changes that complement the ERP system deployment (Motwani et al., 2002; 2005). Past research (Krumbholz and Maiden, 2001; Dezdar and Sulaiman, 2009) suggests that significant performance benefits accrue to firms that focus on culture while deploying their ERP systems. Galbraith's (Galbraith, 1994; 2000; Galbraith, 2002) and Mohrman et al.'s (1998) studies also suggest that the technical implementation of IS in organizations should be accompanied in parallel by appropriate cultural changes. The findings of these studies, in the context of this research study's objectives, suggest that:

*H1: The implementation status of ERP subsystems contributes to changes in performance.*

*H2: Culture moderates the relationship between the implementation status of ERP subsystems and changes in performance.*

## METHODOLOGY

This study used a cross-sectional field survey to obtain data from production firms in India. The initial questionnaire was developed from a synthesis of ERP and other relevant system literature. The questionnaire development involved a three-step process – inputs from focus groups of academicians and practitioners, a pre-test in a graduate ERP class, and a pilot study in a production firm that had implemented ERP. The final questionnaire collected information pertaining to business unit characteristics, respondent characteristics, implementation status of ERP modules, and benefits obtained from the ERP deployment.

### Operational Definitions

A synthesis of different types of methodological studies (descriptive, case, survey, simulation and modeling) and major ERP global vendors' websites yielded 14 modules commonly cited by researchers as comprising the ERP system (Appelrath and Ritter, 2000; Mabert et al., 2000; Yusuf et al, 2004; www.sap.com; www.oracle.com). The fourteen modules identified are financials, controlling, plant maintenance, materials management, production planning, project management, sales and distribution, general logistics, quality management, human resources, supply chain management (SCM), customer relationship management (CRM), electronic-commerce (E-Commerce), and advanced planner optimizer/advanced planner scheduler (APO/APS).

The scales used to gather data on each of the modules in this study were drawn and adapted from the White and Prybutok (1999), and Chong et al. (2001) studies. Each of the fourteen ERP system modules in this study formed an item to collect information on the implementation status of the ERP system. The data for these items were obtained using an ordinal scale consisting of the following ranges of implementation status: not implemented (NI), implementation started within the last year (0 to < 1 year), implementation started 1 or more but less than 3 years ago (1 to < 3 years), implementation started 3 or more but less than 5 years ago (3 to < 5), and implementation started 5 or more years ago (5+).

A synthesis of different types of methodological studies yielded ten performance measures commonly cited by researchers as used to evaluate the performance of ERP systems (Hong and Kim, 2001; Teltumbde et al., 2002; Stratman and Roth, 2002). The performance measures are a mix of operational, technical, and organizational components: inventory management, information availability, information quality, standardization, on-time delivery, profitability, return on investment (ROI), user satisfaction, customer satisfaction, and competitive advantage. The data for each of the performance measures were obtained using a 7-point Likert type scale ranging from 1 (disagree) to 7 (agree).

As noted earlier, Hofstede et al. (1990) identified six dimensions of organizational culture. The six organizational culture dimensions were measured using items from ERP system (Sia et al, 2002; Krumbholz and Maiden, 2001) as well as Hofstede et al.'s study. The data for each of the organizational culture measures were obtained using a 7-point Likert type scale ranging from 1 (disagree) to 7 (agree). As noted earlier, Hofstede et al. (1990) identified five dimensions of national culture. These five national culture dimensions were measured using items from ERP system (Sia et al., 2002; Krumbholz and Maiden, 2001) as well as Hofstede et al.'s study. The data for each of the national culture measures were obtained using a 7-point Likert type scale ranging from 1 (disagree) to 7 (agree).

### **Data Collection**

To obtain data on the implementation of ERP systems, 900 production firms that formed part of the Confederation of Indian Industry (CII) member directory was identified as the population for this study. The questionnaire was mailed out in two waves and a total of 231 responses were returned for a response rate of 25.67% (231/900). Fifteen questionnaires with incomplete data and 13 questionnaires pertaining to service firms were discarded. The effective sample used for analysis was 203 firms (203/900 – response rate of 22.56%). The data were examined and no non-response and common method biases were detected.

## **ANALYSIS & RESULTS**

The results indicate that the sample is a good representation of the Indian production sector comprising of firms of different sizes and operating in various industries. A majority of the companies (67%) fell into one of 10 major industry groups. SAP is the dominant ERP system implemented (29.6%) with the rest being distributed among numerous ERP vendors. The largest number of responses (41.4%) came from companies with over 1000 employees, with an additional 24.6% coming from firms with between 500 and 999 employees. A significant number (86.2%) of the respondents work in the information technology/information systems (IT/IS) area.

### **Factor Analysis**

To create scales for organizational and national culture, the data were first examined and their suitability for conducting factor analysis established. Five items belonging to the organizational culture variable emerged as one factor (factor loadings ranged from .653 to .830; scale reliability being .755) and one item formed a second factor (which was dropped).

Five items belonging to the national culture variable emerged as one factor (factor loadings ranged from .462 to .745; scale reliability being .648)

## Regression Models

The data were examined and their suitability for conducting regression analyses was established. A test for hypothesis H1 – ERP subsystem implementation status contributes to changes in performance – was conducted by running standard linear regression analyses and developing separate regression models to analyze each of the ten performance measures. The results of the regression analysis are presented in Table 1.

**Table 1**  
**Testing Hypothesis H1**  
**Significant Relationships between ERP Subsystems and Performance**

Implementation Status of ERP System	Changes in Performance														
	Inventory Management			Information Quality			On-time Delivery			Standardization			Profitability		
	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F
Financials Subsystem	.168*	.028	5.833*	.203**	.041	8.663**				.162*	.026	5.417	.147*	.022	4.440*
Logistics Subsystem	.217**	.047	9.949*	.198**	.039	8.236**	.178*	.032	6.540*	.199**	.040	8.307**	.212**	.045	9.452**
Extensions Subsystem													.187**	.035	7.264**

Implementation Status of ERP System	Changes in Performance														
	Return on Investment			Information Availability			User Satisfaction			Customer Satisfaction			Competitive Advantage		
	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F	$\beta$	R <sup>2</sup>	F
Financials Subsystem	.270***	.073	15.774***	.181**	.033	6.802**	.178*	.032	6.598*	.173*	.030	6.179*	.179*	.032	6.657*
Logistics Subsystem	.342***	.117	26.567***	.215**	.046	9.715**	.220**	.048	10.175**	.199**	.039	8.246*	.214**	.046	9.688**
Human Resources Subsystem	.151*	.023	4.684*												
Extensions Subsystem	.157*	.025	5.090*							.165*	.027	.613*	.175*	.030	6.319*

A test for hypothesis H2 was conducted by developing separate regression models to analyze the moderator effects of organizational and national culture measures. The results of the regression analysis are presented in Table 2.

**Table 2**  
**Testing Hypothesis H2**  
**Moderating Influence of Culture on the Relationship between ERP Subsystems and Performance**

ERP System	Changes in Performance														
	Inventory Management			Information Quality			On-time Delivery			Standardization			Profitability		
	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$
Financials Subsystem															
x Organizational Culture													.569***	.041	11.925***
x National Culture	-.298*	.028	6.030*	-.354*	.020	4.532*	-.287*	.025	5.411**	-.370**	.042	9.608**			
Logistics Subsystem															
x Organizational Culture													.565*	.017	4.829*
x National Culture	-.317*	.020	4.392*				-.337*	.027	5.991*	-.386**	.040	9.416*			
Human Resources Subsystem															
x Organizational Culture													.544*	.015	4.335*

ERP System	Changes in Performance														
	Return on Investment			Information Availability			User Satisfaction			Customer Satisfaction			Competitive Advantage		
	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$	$\beta$	$\Delta R^2$	$\Delta F$
Financials Subsystem															
x National Culture				-.289*	.034	7.748*	-.376**	.029	6.716**	-.358*	.027	6.114*			
Logistics Subsystem															
x National Culture				-.302*	.029	6.344*	-.384*	.018	4.197*						
Human Resources Subsystem															
x Organizational Culture	.500*	.017	4.634*	.400**	.030	7.092**									

## **DISCUSSION**

The first hypothesis H1 was partially supported by the results of the regression analyses. Significant differences were found in the regression model for the logistics subsystem with all ten performance measures. The high means for the implementation status of the modules forming part of the logistic subsystem could be a reason for the strong relationships between the logistic subsystem and various performance measures. Past studies indicate that firms are early implementers of the financials subsystem. The high means for the implementation status for these two modules lends supports to the above findings. The extension subsystem and various performance measures indicate significant relationships with four performance measures. The low means for the implementation status of these modules could account for the low performance gains from these modules. The human resources subsystem was significant only for the ROI measure; this suggests that there is under-utilization of module capabilities such as employee lifecycle management, self-service options, and workforce deployment.

The organizational culture measure has significant interaction relationships with three of the subsystems on profitability. The findings suggest that a socio-technical approach in deploying ERP system positively impacts the firms' profitability. The organizational culture measure interacts with the human resources subsystem to positively impact three performance measures. An intriguing finding is that, in the test for H1, the human resources subsystem did not exhibit any relationship with profitability and information availability; however, in the test for H2, interaction of the human resources subsystem with the organizational culture measure positively influences these two performance measures. Significant interactions were found between the national culture measure and two of the subsystems, namely, financials and logistics. These associations were, however, negative suggesting that performance declines as the interaction between national culture elements and the financials and the logistics subsystems increases. The high implementation status of the financials and the logistics subsystems could be the reason why they were the most affected by negative interactions with the national culture measure.

## **CONCLUSION**

In this study, a research model was developed to examine the influence of culture on ERP system implementations. The results indicate that different ERP system implementation statuses result in differential performance benefits accruing to firms; and culture influences the relationship between ERP system implementation status and changes in performance. Future research should consider the influence of both national and organizational culture in a more fine-grained manner. Some caution should be exercised when interpreting the results of this study. This study examined ERP system implementations in a production environment. Service firms may place a different emphasis on various ERP subsystems, culture and performance measures; therefore, the generalizability of the study's findings may not be fully applicable to them.

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“References available upon request from Arun Madapusi.”

## **IMPACT OF INVENTORY HOLDING COST IN CPFR COLLABORATION STRATEGY**

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### **ABSTRACT**

Discrete-event simulation is used to investigate the impact of different inventory holding costs in Collaborative Planning, Forecasting and Replenishment (CPFR) strategy on total inventory management cost for both the manufacturer and retailer. Generally, when calculating the cycle stock inventory or safety stock inventory, the inventory holding cost of the product is usually not considered. Based on the supply chain considered in this study, the results suggest that when inventory holding cost is high, it is important to focus on increasing production capacity and customer service level and also reducing delivery lead time to gain maximum benefits of CPFR collaboration strategy for both the manufacturer and the retailer.

**Keywords:** Inventory Holding Costs, CPFR Collaboration Strategy, Simulation Modeling

### **BRIEF INTRODUCTION**

Inventory is a significant and often one of the largest assets for most companies. To manage demand variability in supply chain, many manufacturers, distributors and retailers maintain high level of safety stock inventory which increases overall cost of inventory management. The recent Annual State of Logistics Report, reports that over \$1 trillion is spent annually on logistics, with 33 percent being attributed to inventory holding cost [1]. Also in 1996, approximately \$700 billion of the \$2.3 trillion retail supply chain was in safety stock inventory [2]. So in recent years, many academic researchers and practitioners have emphasized that information sharing between supply chain members can significantly reduce inventory levels and improve service levels in the supply chain. In order to encourage retailers to share information with manufacturers, collaboration strategies like Vendor Managed Inventory (VMI) and Collaborative Planning, Forecasting and Replenishment (CPFR) have been developed and implemented in many industries with mixed results [3], [4].

Many research studies have shown the benefits of demand information sharing in the supply chain [5], [6] [7]. Most of these studies consider demand information sharing and typically assume one set of inventory holding costs or a fixed customer service levels to determine the benefits of information sharing. However, in a collaboration strategy like CPFR, the retailer shares more information like forecast, sales and inventory information with the manufacturer. Also, when calculating the cycle stock inventory or the safety stock inventory, the inventory holding cost of the product is usually not considered. However, the inventory holding cost of the product can have a significant impact on the total cost of inventory management in any supply chain collaboration strategy. Generally, the inventory holding cost for different products varies and this can impact the total inventory management costs and the overall benefits of CPFR collaboration strategy for both the manufacturer and the retailer.

There are no studies that consider the impact of different inventory holding costs on the benefits of CPFR collaboration strategy for both the manufacturer and retailer in a variable demand environment. So this study uses discrete-event simulation to develop a CPFR collaboration model where forecast, sales and inventory level information is shared between a retailer and a manufacturer. Using this simulation model, we investigate the impact of different inventory holding costs, customer service levels, production capacities and delivery lead times on the total cost of inventory management in CPFR collaboration strategy for both the manufacturer and retailer in a variable demand environment.

## **CONCEPTUAL MODEL**

The conceptual model for this study is a two-echelon production-inventory system with a make-to-stock manufacturer (plant and warehouse) and a retailer. The information shared and decisions made in the CPFR collaboration strategy is shown in Figure 1. All decisions by the retailer and manufacturer are made at the beginning of each period, where review period is one week. Demand forecast for the retailer is developed using exponential smoothing forecast technique and this information is shared with the manufacturer. Periodic review order-up-to inventory policy is used to determine the order quantity for retailer and production quantity for the manufacturer during each period. The retailer demand, order quantity and the production quantity are non-negative. The order quantity and the production quantity during each period is the difference between order-up-to level and current inventory position at their respective locations. The safety stock for both the retailer and manufacturer is calculated using customer service level, standard deviation of forecast error and the lead time. The manufacturer has a production lead time of one period and has capacity constraints. If the production quantity needed is more than available production capacity, only the maximum available quantity is produced during that period. Delivery lead time from the plant to the warehouse is assumed to be negligible. Both the retailer and the manufacturer fulfill their demands from their available inventory, and any demand not met is backordered with a backorder penalty cost to be fulfilled during the next period.

### **Sequence of Events in CPFR Strategy**

In CPFR strategy, the retailer shares forecast, sales and inventory level information with the manufacturer as shown in Figure 1. Manufacturer does not forecast and uses this information to determine their production quantity during each period. All decisions for the manufacturer and retailer are made at the beginning of each period. The sequence of events is as follows. Beginning of each period, the retailer receives shipments (if any) from the manufacturer's warehouse, and the customer demand (plus any backorder) is fulfilled from the available inventory. Similarly, the manufacturer's warehouse receives shipments (if any) from the plant, and the retailer order (plus any backorder) is fulfilled from the available inventory. Any unfulfilled demand for both the retailer and manufacturer is backordered with a backorder penalty cost. Next, both the retailer and manufacturer use the forecast and their inventory level information to calculate their target order up-to inventory level to determine the order quantity (by retailer) and production quantity (by manufacturer). The manufacturer follows an echelon-based inventory policy in their production planning and inventory replenishment decisions. Under echelon-based inventory policy, the manufacturer considers their own inventory level plus inventory level of retailer and any backorder quantity to determine their production quantity [8].



The manufacturer has a production lead time of one period and has capacity constraints. If the production quantity needed is more than available production capacity, only the maximum available quantity is produced during that period. Finally, the inventory level and backorder quantity at the end of each period is tracked, to determine the retailer inventory costs and the manufacturer inventory costs during each period.

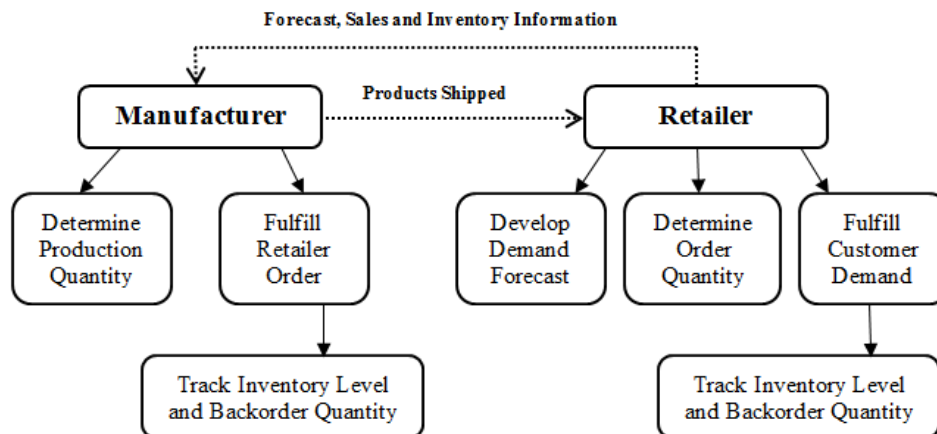


Figure 1: Decisions Made and Information Shared in CPFR Collaboration Strategy

## Experimental Design

The purpose of an experimental design is to develop a methodology to track changes in the performance measures by varying the control variables during simulation runs. According to Law and Kelton [9], “One of the principal goals of experimental design is to estimate how changes in input factors affect the results or responses of the experiment.” Generally, a variety of experimental designs can be used in the simulation experiments when the objective is to explore the reactions of a system (response variables) to changes in factors (control variables) affecting the system. Some of the relevant experimental designs include the full factorial, fractional factorial and response surface designs. A factorial experiment is one in which the effects of all factors and factor combinations in the design are investigated simultaneously. Each combination of factor levels are used the same number of times during the experimental runs. This study employs a full factorial design to gain insight on the impact of the control variables on the performance measures.

A total of five control variables as shown in Table 1, and two performance measures as shown in Table 2, are considered in this study. Demand variability and inventory holding costs are environmental factors which are generally not in the control of supply chain members. In addition, production capacity, customer service levels and delivery lead time all play an important role in inventory management and supply chain collaboration. Different types of demand patterns have been used in information sharing and supply chain collaboration studies. Many studies in information sharing have used auto-correlated demand type. Lee et al. examined weekly sales data of 150 products at a major supermarket in United States over a two year period and found that sales pattern is significantly auto-correlated [10].

This study considers the auto-correlated demand pattern with three levels of demand variability. Auto-correlated demand is generated for each period using the following formula

$$D_t = d + \rho D_{t-1} + \varepsilon_t \quad (1)$$

$d$  = initial mean,  $\rho$  = the correlation factor and  $\varepsilon_t$  = i.i.d. normally distributed with mean zero and standard deviation  $\sigma$ . The correlation factor is 0.5 and three levels of demand variability are generated by varying  $\sigma$  in the above equation. The average customer demand for the retailer is 100 units per period.

Retailer cost and manufacturer cost are used as the performance measures and are calculated based on the inventory level and backorder quantity at the end of each period. Three levels of inventory holding cost of \$1.5, \$2.5, and \$3.5 per unit per period is used for the manufacturer. A fixed backorder penalty cost of \$25 per unit is used for the manufacturer. Inventory holding cost and backorder penalty cost for retailer is assumed 1.5 times that of the manufacturer. The customer demand, forecast demand, order-up-to inventory level, the order quantity and production quantity is updated during each period of the simulation run. To facilitate valid comparison and to determine the impact of the control variables on the performance measures, the inventory policy and production policy remain the same for all factor combinations.

Table 1: Control Variables for the Experimental Design

Control Variables	Details for Variables	Other Details
Demand Variability (DVR)	Low Demand Variability, $\sigma = 10$ Med Demand Variability, $\sigma = 20$ High Demand Variability, $\sigma = 30$	Average Demand is 100 units per period
Production Capacity (PC)	Low Production Capacity, 1.20 Med Production Capacity, 1.35 High Production Capacity, 1.50	Average Demand is 100 units per period
Inventory Holding Cost (IHC)	Low Inventory Holding Cost, \$1.5 Med Inventory Holding Cost, \$2.5 High Inventory Holding Cost, \$3.5	Holding Cost is per unit per period
Customer Service Level (CSL)	Low Customer Service Level, 90% Med Customer Service Level, 95% High Customer Service Level 98%	Service Level is for the Safety Stock
Delivery Lead Time (DLT)	Low Delivery Lead Time, 1.0 High Delivery Lead Time, 2.0	Lead Time is number of Review Period

Table 2: Performance Measures for the Experimental Design

Performance Measures	Performance Measure Details
Retailer Cost per Period	Inventory Holding Cost for Retailer plus Backorder Cost for the Retailer
Manufacturer Cost per Period	Inventory Holding Cost for Manufacturer plus Backorder Cost for Manufacturer

The output data (i.e. performance measures) from the simulation model is used to determine the impact of different inventory holding cost along with other control variables in CPFR collaboration strategy. To reduce the impact of random variations of input data (i.e. customer demand), the same random number sequence is utilized to generate the same customer demand for all factor combinations. A sample size of 30 (number of replications) is selected for simulation run. The simulation model is run for a total of 1150 periods, with the first 150 periods considered as warm-up to initialize the system and the remaining 1000 periods is used for the analysis. The statistical software ‘Minitab 16’ is used for the analysis.

## RESULTS AND DISCUSSIONS

The output data from the simulation model is analyzed to determine the impact of different inventory holding costs, customer service levels; production capacity and delivery lead time in CPFR collaboration strategy in a variable demand environment. First, the impact of different inventory holding costs for both the manufacturer and retailer in CPFR strategy is determined. Next, the impact of different inventory holding costs along with other factors in CPFR strategy for both the manufacturer and retailer is determined. Some of the main results of this research study are shown below.

### Impact of Different Inventory Holding Cost in CPFR Strategy

The impact of different holding cost on inventory management cost for both the manufacturer and retailer in CPFR collaboration strategy are shown in **Figure 2**. As the inventory holding cost increases, the average total cost of inventory management in CPFR strategy for both the manufacturer and the retailer increases, and this is as expected. As inventory holding cost increases, the cost of managing the inventory for both the manufacturer and the retailer increases. Next, we investigate the impact of different inventory holding cost along with demand variability, production capacity; customer service level and delivery lead time on the total cost of inventory management in CPFR collaboration strategy for both the manufacturer and the retailer.

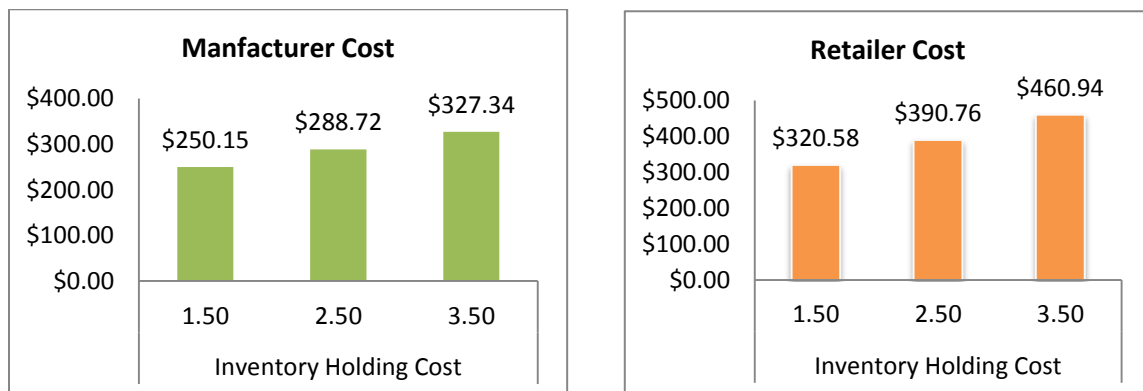


Figure 2: Impact of Inventory Holding Cost in CPFR Collaboration Strategy

### Impact of Different Inventory Holding Cost and Demand Variability

The impact of different holding cost and demand variability on inventory management cost for both the retailer and manufacturer in CPFR collaboration strategy are shown in **Figure 3**. As expected, when demand variability is high, the total inventory costs are higher for both the manufacturer and the retailer. As inventory holding cost per unit per period increases, the total inventory costs also increases. For the supply chain considered in this study, when demand variability is low ( $\sigma = 10$ ) and inventory holding cost is changed from \$1.5 to \$3.5 per unit per period, total inventory cost increases by \$50.44 for the manufacturer and \$82.41 for the retailer. When demand variability is high ( $\sigma = 30$ ) and inventory holding cost is changed from \$1.5 to \$3.5 per unit per period, the total inventory cost increases by \$99.37 for the manufacturer and \$191.64 for the retailer. This suggests that there is a significant impact of inventory holding cost in CPFR collaboration strategy in a variable demand environment. When demand variability is higher, the impact of increased inventory holding cost is significantly higher for both the manufacturer and the retailer. This is due to the fact that in higher demand variability, there is significantly higher safety stock inventory for both the manufacturer and the retailer. So even in CPFR collaboration strategy where information is shared, the impact is more significant for both the manufacturer and retailer when demand variability is high and inventory holding cost is high.

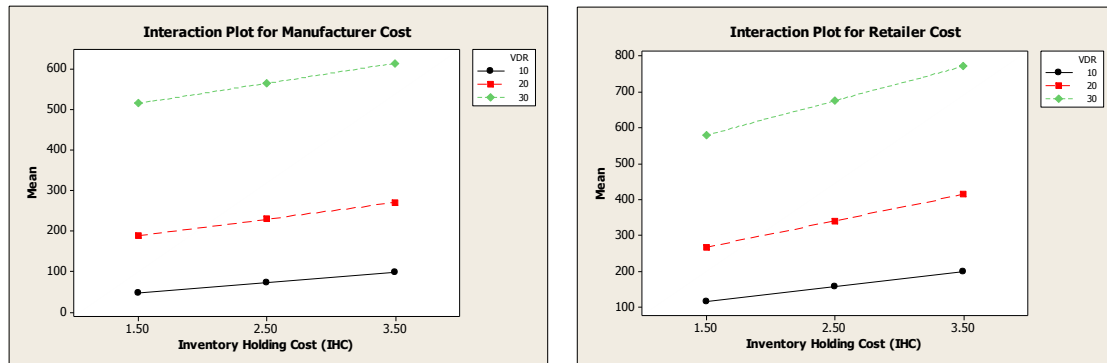


Figure 3: Impact of Inventory Holding Cost and Demand Variability

### Impact of Different Inventory Holding Cost and Production Capacity

The impact of different holding cost and the production capacity on inventory management cost for both the retailer and manufacturer in CPFR collaboration strategy are shown in **Figure 4**. It can be seen that when production capacity increases, the total inventory costs decreases for both the manufacturer and retailer. The total inventory cost is significantly higher for both the manufacturer and retailer when production capacity is low. When production capacity is low, the manufacturer cannot produce the required quantity to meet the retailer demand increasing the backorder costs, which in turn will significantly increase the total inventory costs for both the manufacturer and the retailer. When inventory holding cost is \$3.5 per unit per period, the average cost reduction is 90.1% for the manufacturer and 49.1% for the retailer if production capacity is increased from 1.20 to 1.35 and further increase in production capacity has minimal gains. So when inventory holding cost is higher, increasing the production capacity will have a significant impact on reducing the total inventory costs in CPFR strategy for both the manufacturer and the retailer.

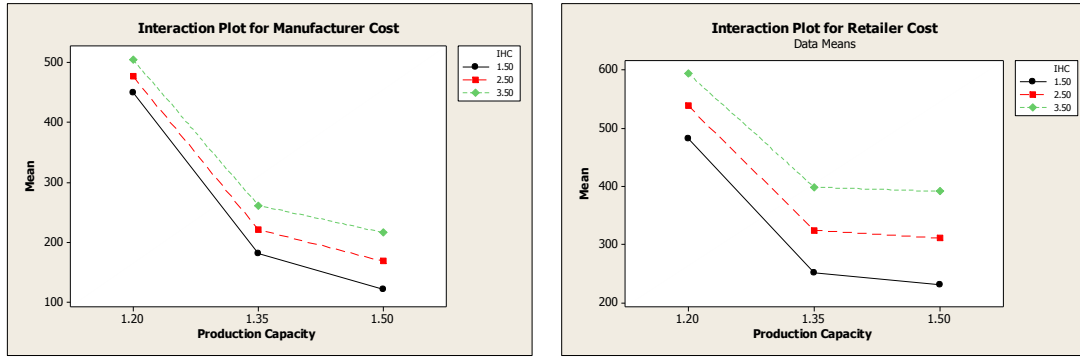


Figure 4: Impact of Inventory Holding Cost and Production Capacity

### Impact of Different Inventory Holding Cost and Customer Service Level

The impact of different holding cost and customer service level on inventory management cost for both the retailer and manufacturer in CPFR collaboration strategy are shown in **Figure 5**. It can be seen that as customer service level increases, the total inventory costs for both the manufacturer and the retailer decreases. This is due to the fact that increased service levels helps to increase the safety stock inventory reducing the backorder penalty costs for both the manufacturer and the retailer. Also, when customer service level is increased the total inventory cost is reduced for all inventory holding costs. When inventory holding cost is \$3.5 per unit per period, the average cost reduction is 15.5% for the manufacturer and 29.1% for the retailer if customer service level is increased from 90% to 98%. So it can be seen that when service level is increased, the total inventory cost is reduced for both the manufacturer and retailer, with the retailer gaining higher cost reduction.

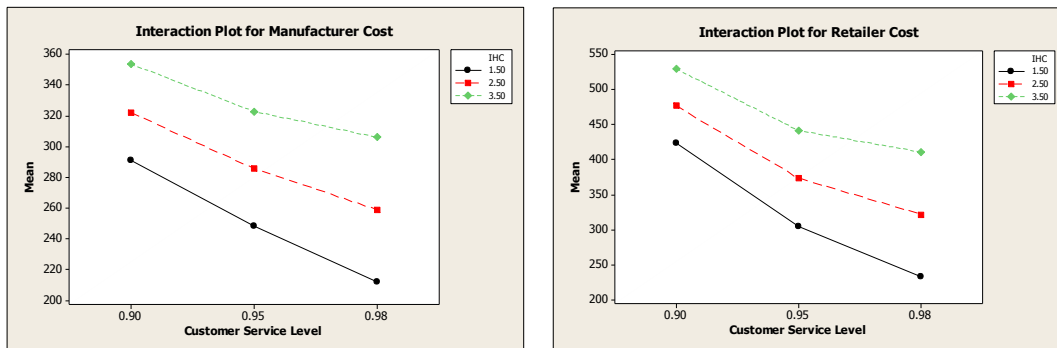


Figure 5: Impact of Inventory Holding Cost and Customer Service Level

### Impact of Different Inventory Holding Cost and Delivery Lead Time

The impact of different holding cost and delivery lead time on inventory management cost for both the retailer and manufacturer in CPFR collaboration strategy are shown in **Figure 6**. When inventory holding cost is \$1.5 per unit per period, the average total inventory cost reduction is 9.7% for manufacturer and average cost increase is 34.1% for the retailer. When inventory holding cost is \$3.5 per unit per period, the average cost reduction is 7.1% for manufacturer and average cost increase is 39.6% for the retailer. So it is interesting to see that as the delivery lead time is increased

from one period to two periods, the total inventory costs for the manufacturer is reduced, whereas the total inventory costs for the retailer is increased. This is due to the fact that when delivery lead time is increased, the retailer has to plan for two periods and maintain higher safety stock and on the other hand the increase in delivery lead time gives the manufacturer a better chance to fulfill the retailers demand by reducing their backorder penalty costs. So generally, lower delivery lead time is better for the retailer to reduce their total inventory costs under all inventory holding costs.

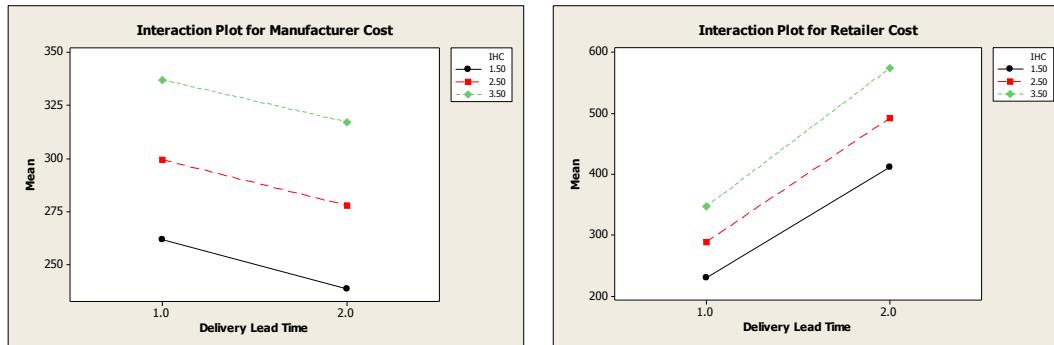


Figure 6: Impact of Inventory Holding Cost and Delivery Lead Time

## CONCLUSIONS

This research study investigated the impact of different inventory holding costs, production capacity, customer service levels and delivery lead time on the total inventory costs in CPFR collaboration strategy for both the manufacturer and the retailer in a variable demand environment. Generally, different products have different inventory holding cost which does impact the amount of safety stock and total cost of inventory management. Based on the supply chain considered in this study, the results suggest that when inventory holding cost increases, the total inventory cost increases for both the manufacturer and the retailer. When inventory holding cost is high, there is a bigger impact on total inventory costs in high variable demand environment. When inventory holding cost is high, increasing the production capacity significantly helps in reducing the total inventory costs for both supply chain partners. When customer service level is increased, the total inventory cost is reduced for both the manufacturer and retailer, with the retailer gaining higher cost reduction. Also when delivery lead time is increased from one period to two periods, the total inventory costs for the manufacturer is reduced, whereas the total inventory costs for the retailer is increased in all inventory holding costs. So in conclusion, when inventory holding cost is high, then higher production capacity, higher customer service level and lower delivery lead time greatly helps in reducing the total inventory costs for both the manufacturer and retailer which in turn helps to gain the maximum benefits of CPFR collaboration strategy.

## Recommendations for Future Research

Although valuable insights can be gained from this research study to understand the impact of inventory holding costs and other supply chain parameters in CPFR collaboration Strategy, however it is recognized that the conclusions provided here is limited to the supply chain setting considered in this study. In this research, a single retailer and a single manufacturer develop collaborative relationships with no incentive or conflicts with other supply chain partners. Periodic review

order-up-to level policy (R, S) is used to determine the order quantity for retailer and production quantity for the manufacturer during each period. Fixed production lead time of one period for manufacturer and fixed delivery lead time to retailer are considered in this study. Future studies can investigate the impact on manufacturer cost and retailer cost by considering other inventory management policies like (s, S) and (R, Q) policies. Also, stochastic production lead-times and stochastic delivery lead times can be used to expand this research study. In addition, this research can be expanded to include multiple retailers. Another area of future research to consider is the cost of information sharing for supply chain partners. Generally, information sharing in collaboration strategies is not free, as there are implementation and operational costs involved for both supply chain partners. So this research can be further extended to include implementation and operational costs to determine cost benefits of VMI and CPFR strategies for both the manufacturer and retailer.

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## **BENFORD'S LAW AND IMPUTATION OF MISSING DATA**

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### **ABSTRACT**

Benford's Law and its generalizations are a set of rules which describe the distribution of digits in numbers for many types of data sets. It is often used to help detect data that are fraudulently created. We investigate whether adding a subset of randomized values to a data set will alter its distribution of digits as analyzed through various Benford tests. We consider two sets of data – Medicare charges and Medicare payments for thousands of hospitals – and analyze them using various Benford tests. In addition, we remove 20% of the observations for each set and replace them with uniform random values, and examine the differences.

Keywords Benford's Law, Missing Data, Imputation, Healthcare Data

### **BACKGROUND**

Benford's Law describes the non-uniform distribution of digits in data values that many types of processes generate, such as financial data, values from some naturally occurring events and numbers that are produced which span several orders of magnitude. It is often used to help detect fraud in forensic accounting, health insurance and various other fields where data are expected to follow Benford's Law [2],[3],[4],[8],[9]. If deviations from the Law exist, then the implication is that the data might be fraudulent or artificially generated, as opposed to being a result of an open, ordinary process.

This interesting distribution of the digits 0 to 9 was first discovered in 1881 by an American astronomer, Simon Newcomb, who observed, "That the ten digits do not occur with equal frequency must be evident to any one making much use of logarithmic tables, and noticing how much faster the first pages wear out than the last ones." [7, p. 39]. These would be the pages where the numbers began with the digit 1. It was rediscovered in 1938 by Frank Benford, a physicist, who investigated the distribution of digits for various sets of scientific data and other types of values: "It has been observed that the first pages of a table of common logarithms show more wear than do the last pages, indicating that more used numbers begin with the digit 1 than with the digit 9. A compilation of some 20,000 first digits taken from widely divergent sources shows that there is a logarithmic distribution of first digits when the numbers are composed of four or more digits." [1]

Mark Nigrini also studied the distributions of the digits. In his studies of Benford's Law, he provides formulas for obtaining the probability distributions of the digits, and discusses several tests for whether or not a data set follows the distributions suggested by Benford's Law. Nigrini divides the tests into the Primary Tests and the Advanced Tests. The Primary Tests include the distribution of the first digits, the second digits and the first-two digits (also known as the first-



order test). The Advanced tests include the second-order test and the summation test. The second-order test considers the distribution of the first-two digits of the differences between consecutive numbers in the data set when it is sorted in ascending order. In the summation test, the sum of all the values beginning with each of the first-two digits (10, 11, ..., 98, 99) is divided by the grand sum of all the values in the data set, and each fraction (of the total sum) is compared to the theoretical Benford proportions. We give the formulas for the primary tests below:

First Digit probabilities:

$$P(D_1 = d_1) = \log_{10} \left( 1 + \frac{1}{d_1} \right) \text{ where } d_1 \in \{1, 2, \dots, 9\}$$

Second Digit probabilities:

$$P(D_2 = d_2) = \sum_{d_1=1}^9 \log_{10} \left( 1 + \frac{1}{d_1 d_2} \right) \text{ where } d_2 \in \{0, 1, \dots, 9\}$$

First-Two Digits probabilities:

$$P(D_1 D_2 = d_1 d_2) = \log_{10} \left( 1 + \frac{1}{d_1 d_2} \right) \text{ where } d_1 d_2 \in \{10, 11, \dots, 99\}$$

These formulas are used to obtain the proportion of times a given digit appears in a given position. For example, the estimated probability or frequency of a number beginning with the digit 1 is:

$$P(D_1 = 1) = \log_{10} \left( 1 + \frac{1}{1} \right) = \log_{10}(2) \cong 0.30103.$$

These calculations for the probabilities or frequency distributions of the digits can be represented in tabular form. Calculations for the probabilities of the digits 0 to 9 as they should appear in the first, second and third places of data which are expected to follow Benford's Law, are provided below in Table 1 [8], [9].

Two observations can be made about these distributions, which are presented for the first three digit positions in Table 1. We note first that in all places, as the digits increase in order, they occur with decreasing probabilities. However, the lower the order of the digit (for example, the third place digit or fourth place digit), the more uniform the distribution becomes.

Digit Position in Number			
Digit	First	Second	Third
0		.11968	.10178
1	.30103	.11389	.10138
2	.17609	.10882	.10097
3	.12494	.10433	.10057
4	.09691	.10031	.10018
5	.07918	.09668	.09979
6	.06695	.09337	.09940
7	.05799	.09035	.09902
8	.05115	.08757	.09864
9	.04576	.08500	.09827

Table 1 Proportions for the First, Second and Third Positions of Digits in Numbers from Benford's Law

A common problem in data analysis is that there are missing values in many data sets. This can be due to a variety of reasons, based on the nature of the study. It could be intentional, such as the case with census data, where participants might refuse to divulge information that they consider sensitive, or with certain college admissions data, like SAT and ACT scores, which might not be provided to schools if they are score-optional institutions. The data could also be missing because of unforeseen circumstances, as when instruments fail, like an anemometer measuring wind speed at a weather station. No matter what the reasons for the missing data, a decision has to be made to either leave the records out of the analysis or to use an imputation method to fill in the gaps. In one approach to dealing with missing data when applying Benford's Law, Lu and Boritz provide an algorithm which offers a modified set of Benford frequencies which take into account the fact that there are missing values [3].

## **METHODOLOGY**

Our intention in this paper is to investigate what happens when missing data are replaced by imputed values. More specifically, we are interested if replacing missing data by imputed values alters the relationship of a data set to Benford's Law. This is important for data sets that follow Benford's Law as well as for those that do not. If there is a large percentage of missing data that is replaced by these imputed values, does it alter the distribution of digits so that it no longer follows Benford's Law? Changes in relationship to Benford's Law might inadvertently lead to allegations that non-fraudulent data are fraudulent and vice-versa.

To investigate how imputation affects the distribution of data, we will use two variables defined below, one that follows Benford's Law and one that does not. We will remove 20% of the observations in both variables at random and replace these missing values using two types of imputation. First, we will use the most common imputation method of replacing missing values with the mean. We will also impute missing values with uniform random numbers since it is possible that fraudulent entries might include the use of uniform random numbers.

Then we will test the modified data sets to see how they conform to the distribution of digits specified by Benford's Law. We will utilize Microsoft Excel to perform our analysis [6]. SAS<sup>TM</sup> has also been used to test whether data follow Benford's Law [11]. However, Excel is very easy to implement, particularly when used in conjunction with a template developed by Nigrini [10]. Finally, we will present our results graphically.

## **DATA**

The two variables used to investigate their conformance to Benford's Law are a subset of the healthcare dataset, "Medicare Provider Charge Data: Inpatient," provided by the Centers for Medicare and Medicaid Services. The variables are Average Covered Charges (Charges) and Average Total Payments (Payments). More specifically, the charges consisted of "hospital-specific charges for the more than 3,000 U.S. hospitals that receive Medicare Inpatient Prospective Payment System (IPPS) payments for the top 100 most frequently billed discharges, paid under Medicare based on a rate per discharge using the Medicare Severity Diagnosis Related Group (MS-DRG) for Fiscal Year (FY) 2011. These DRGs represent almost 7 million discharges or 60 percent of total Medicare IPPS discharges. Hospitals determine what they will charge for items and services provided to patients and these charges are the amount the hospital

bills for an item or service.” Meanwhile, the payments are the “average of Medicare payments to the provider for the DRG including the DRG amount, teaching, disproportionate share, capital, and outlier payments for all cases. Also included in Total Payments are co-payment and deductible amounts that the patient is responsible for and payments by third parties for coordination of benefits.” There are 163,065 observations for each variable [5].

It was thought that the average covered charges, which are the hospital bills, might follow Benford’s law. On the other hand, since the payments by Medicare are according to a schedule, with specific limits, we suspected that these average payments would not likely follow Benford’s law.

## RESULTS

The distributions of the variables Charges and Payments are both positively skewed, but more so for the Charges. This can be observed in the graphs of these variables which are represented in Figures 1 and 2 below.

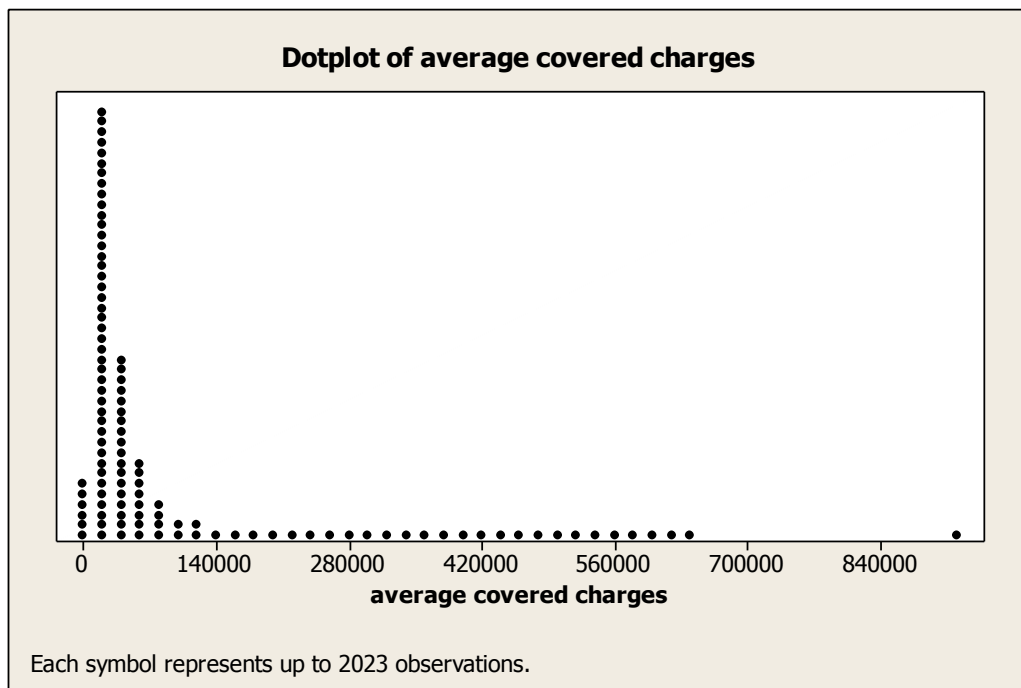


Figure 1: Dotplot of Charges

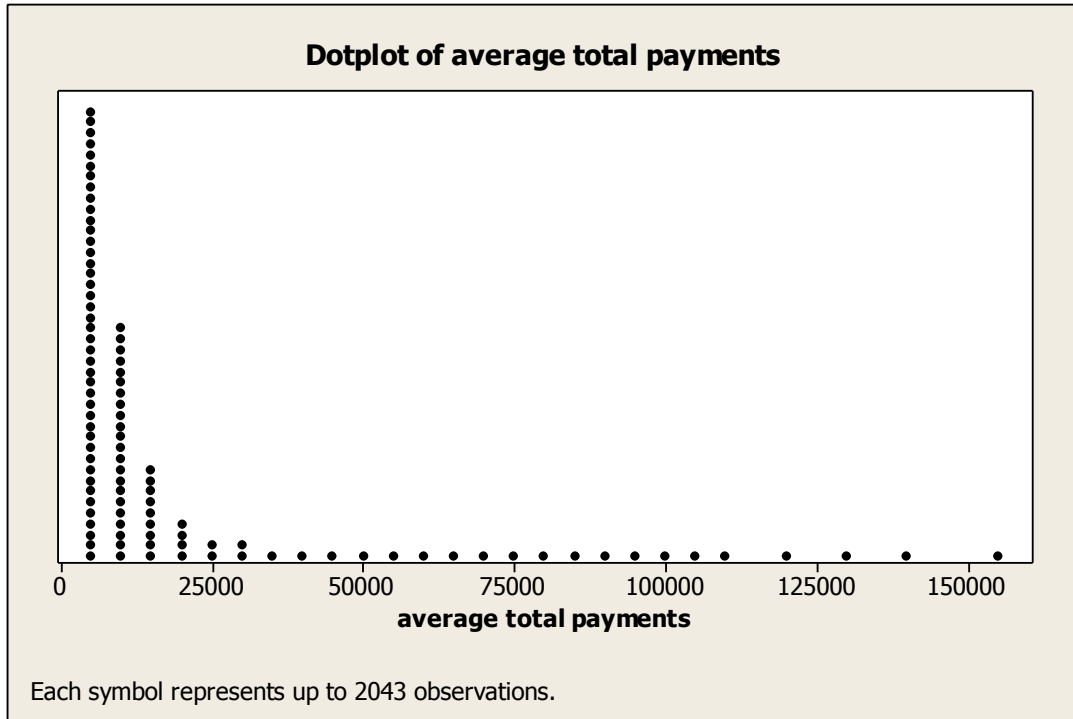


Figure 2: Dotplot of Payments

As expected, the Charges with a mean value \$36,134 (s.d. = \$35,065) are much higher than Payments with a mean of \$9,707 (s.d. = \$7,665). We were a little surprised at the magnitude of the difference although we expected that Payments would only cover a portion of the Charges. In fact, the minimum Charge is \$2,459 and the maximum is \$929,119 whereas the Payments had a minimum of \$2,673 and a maximum of only \$156,158.

Having examined the data, we now test whether our expectations of Charges fitting Benford's Law and Payments not fitting are justified. The plots presented below were obtained using Nigrini's Excel template [10]. We have included graphs for the first digit test, the first-two digits test, the second-order test, and the summation test for Charges (Figures 3 to 6), and Payments (Figures 7 to 10).

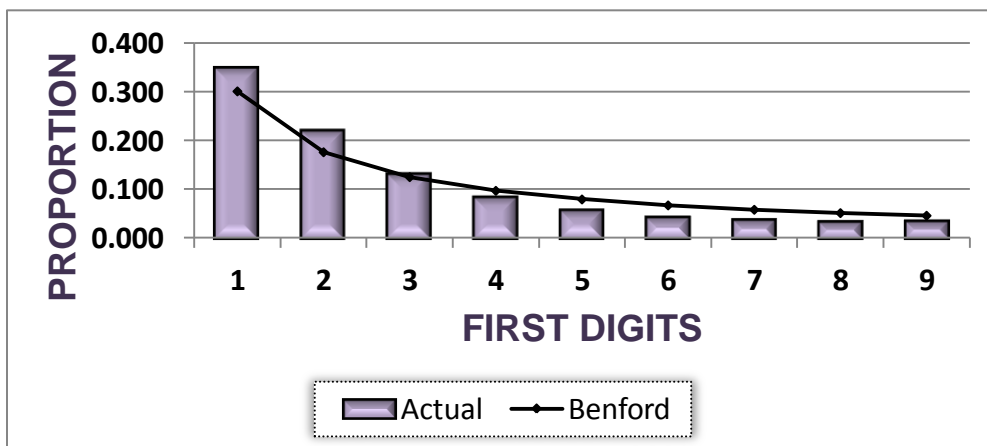


Figure 3: Charges: First Digit Test

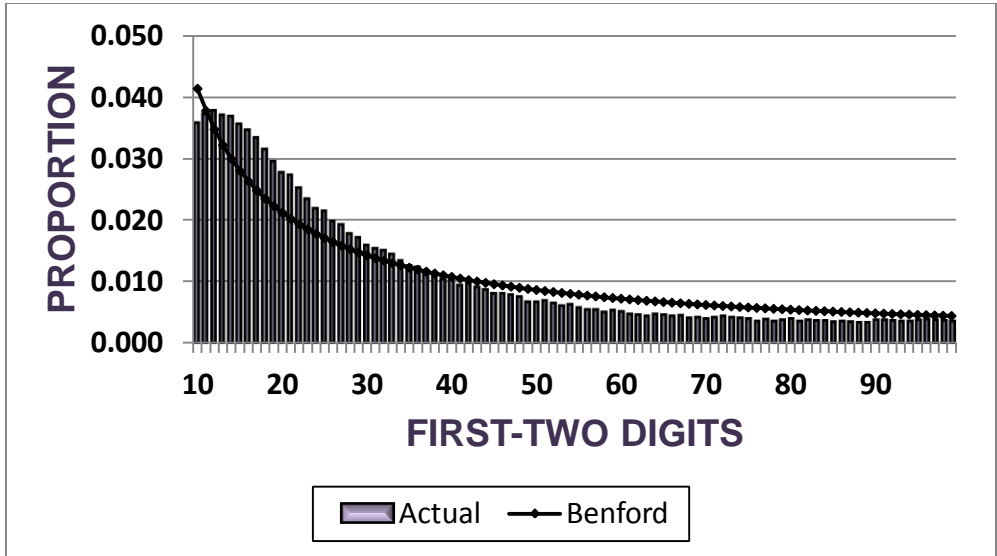


Figure 4: Charges: First-Two Digits

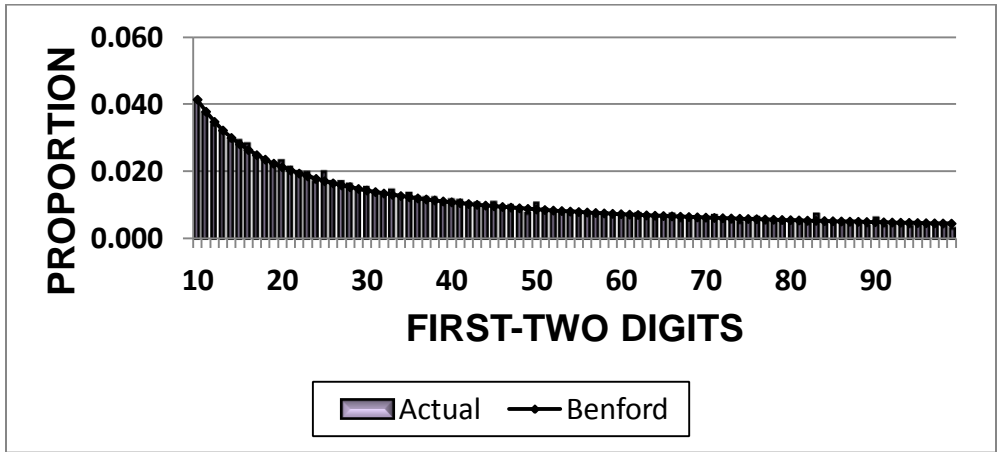


Figure 5: Charges: Second-Order Test

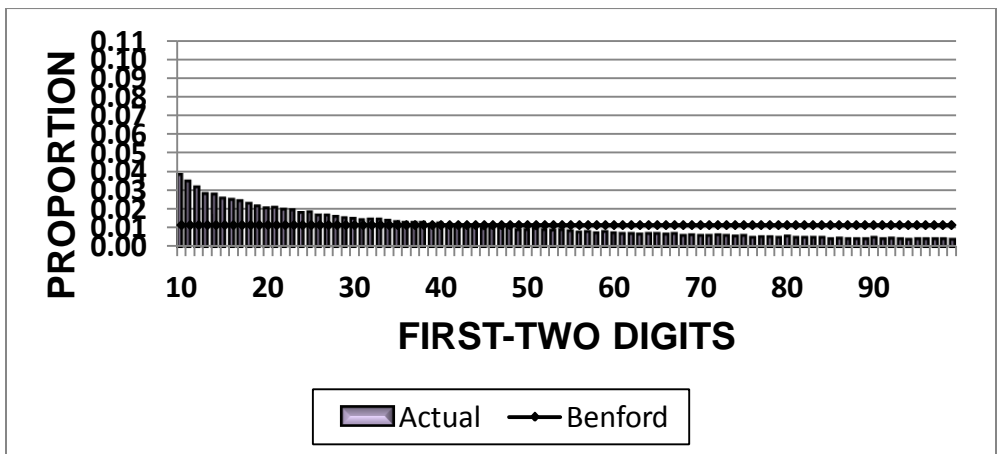


Figure 6: Charges: Summation Test

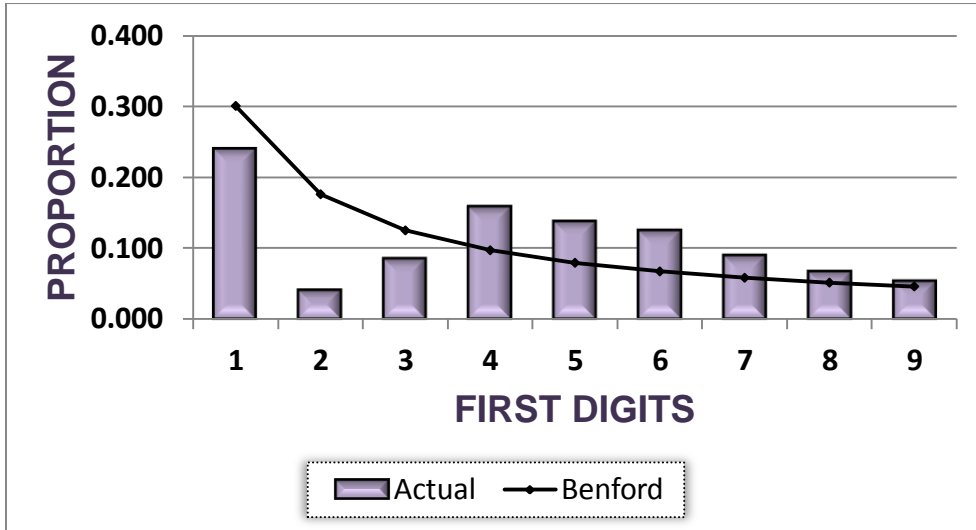


Figure 7: Payments: First Digit Test

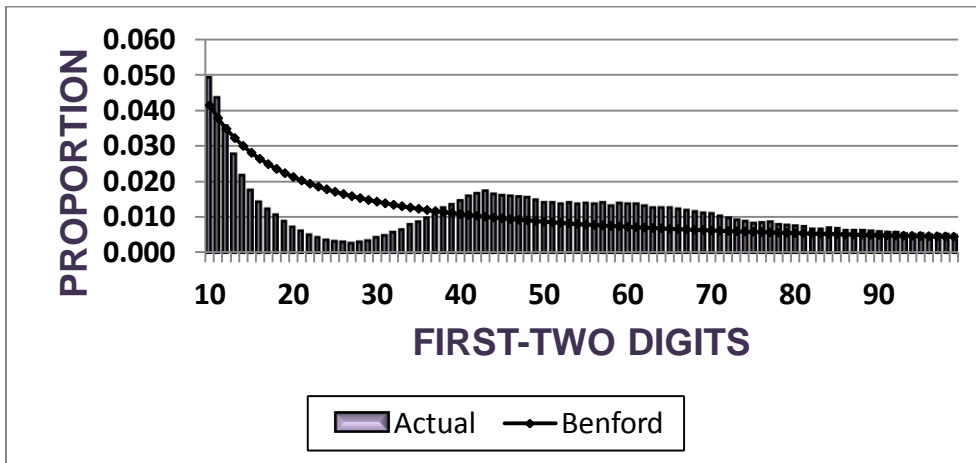


Figure 8: Payments: First-Two Digits Test

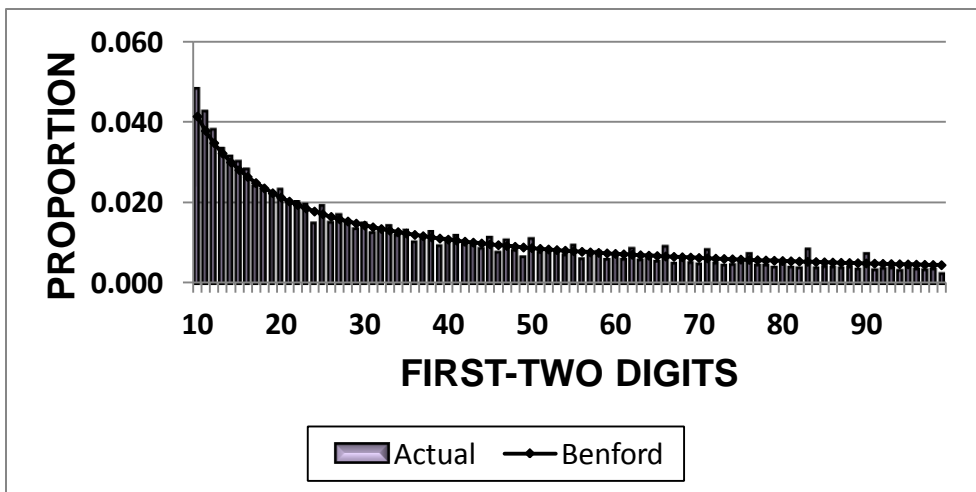


Figure 9: Payments: Second-Order Test

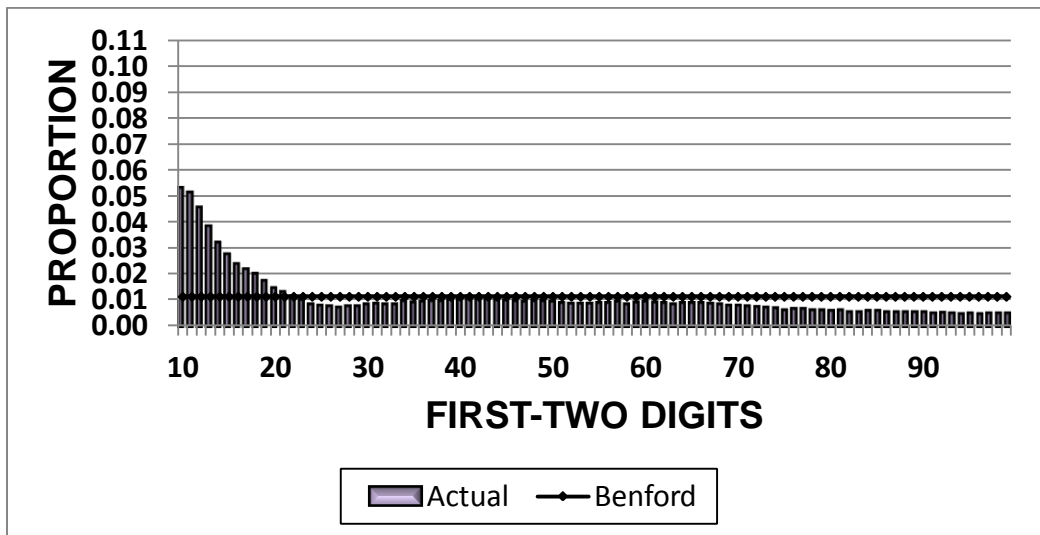


Figure 10: Payments Summation Test

With reference to the first digit test (Figure 3) and first-two digits test (Figure 4), it seems to be true that the Charges do in fact follow Benford’s Law fairly closely. The Payments, however, do not appear to follow Benford’s Law. For both the first digit test (Figure 7) and the first-two digits test (Figure 8) for the Payments, there is clearly a dip around the 2-3 or 20-30 digits. This coincides with our expectation since Payments are structured around the DRG procedures, with specified payment limits and thus are not expected to follow Benford’s Law.

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The second-order test, which is represented in Figures 5 (Charges) and 9 (Payments), analyzes the first-two digits of the numbers resulting from taking the differences in successive values when the data are sorted in ascending order. For this test, both Charges and Payments follow the predicted Benford proportions pretty closely. The final test represented is the summation test where the sum of values beginning with each first-two digits (10, 11, ..., 99) is divided by the total sum of all values in the data set. Each first-two digit proportion then is the fraction of the grand total contained in the values starting with those two digits. Deviations from the expected Benford line, which is each first-two digits should have the same fraction of the total sum (1/99 or 0.0111), could indicate possible outliers or extremely large values. Both the Charges and Payments (figures 6 and 10) do not strictly adhere to Benford, since in both cases, larger proportions of the sum are contained in the lower first-two digits.

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For the mean imputation, we have only included one plot (Figure 11) since it fully represents the distortion of the distribution caused by replacing 20% of the missing values with one constant. As can be seen in Figure 11, mean imputation clearly changes the distribution of the data for the average charges. Therefore, it would no longer satisfy Benford's Law. The spike in the plot at the mean is very evident and appears in the plots for all scenarios for both Charges and Payments.

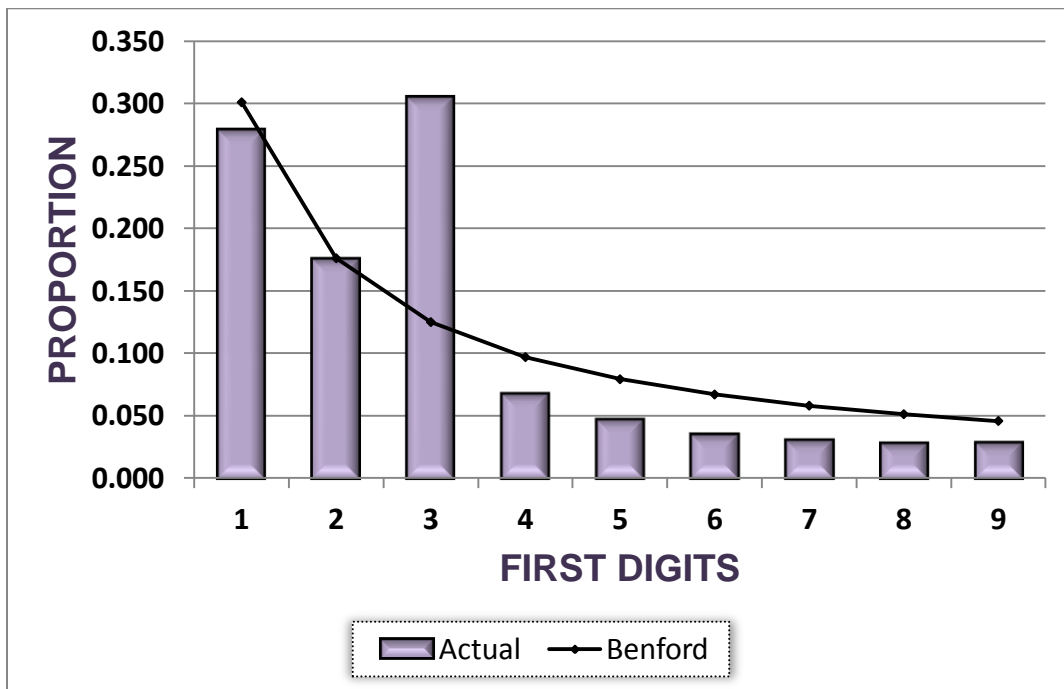


Figure 11: Charges: Mean Imputation First Digit Test

All four tests were then run with Uniform Random Imputation for Charges (Figures 12 to 15) and Payments (Figures 16 to 19). There were some interesting results when the random uniform imputation was applied to the Charges data set. For example, though the original Charges data were a fairly good fit for Benford's for the first digit and first-two digits tests (Figures 3 and 4), there were generally slightly higher proportions of the lower digits and lower proportions of the higher digits than Benford's expected fractions. When 20% of the values were replaced by random uniform values, the first digits and first-two digits became more spread out which adjusted these fractions of the digits, so that the imputed data set actually looks like a better fit (Figures 12 and 13) than the original. In other words, if we were to consider the first digits and first-two digits, we could be fooled if the imputed data were actually fraudulent. However, this is not the case with the second-order test. In this instance, the first-two digits for the original set (Figure 5) follow the expected theoretical Benford proportions very closely. The same test for the imputed charges data set (Figure 14) also generally follows the Benford proportions with one important exception, there are prominent spikes when the second digit is 0 (i.e., at 10, 20, ...,



90). This could be due to rounding of the random uniform values. Nigrini points out, “A pattern of spikes at the prime first-two digits 10, 20, ..., 90 will occur if these differences are drawn from data from a discrete distribution.” [9, p. 99]. The final test, the summation test, showed similar results as the first digit and second digit tests, where the imputed Charges set more closely followed the Benford’s proportions because the values were more evenly spread out.

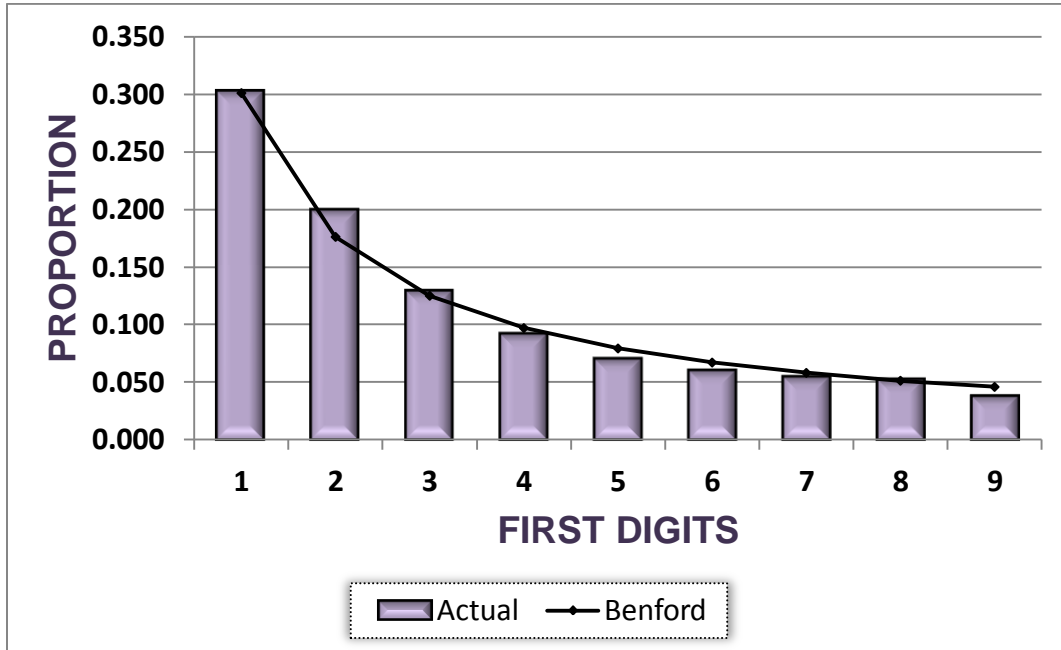


Figure 12: Charges: Random Uniform Imputation First Digit Test

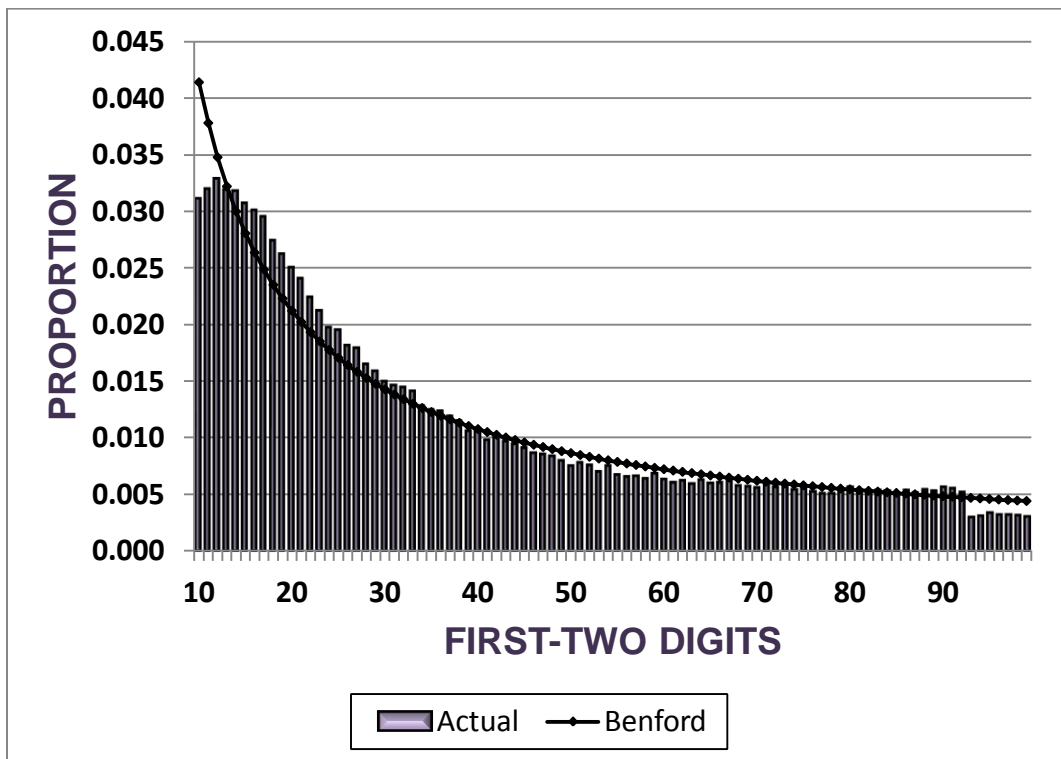


Figure 13: Charges: Random Uniform Imputation First-Two Digit Test

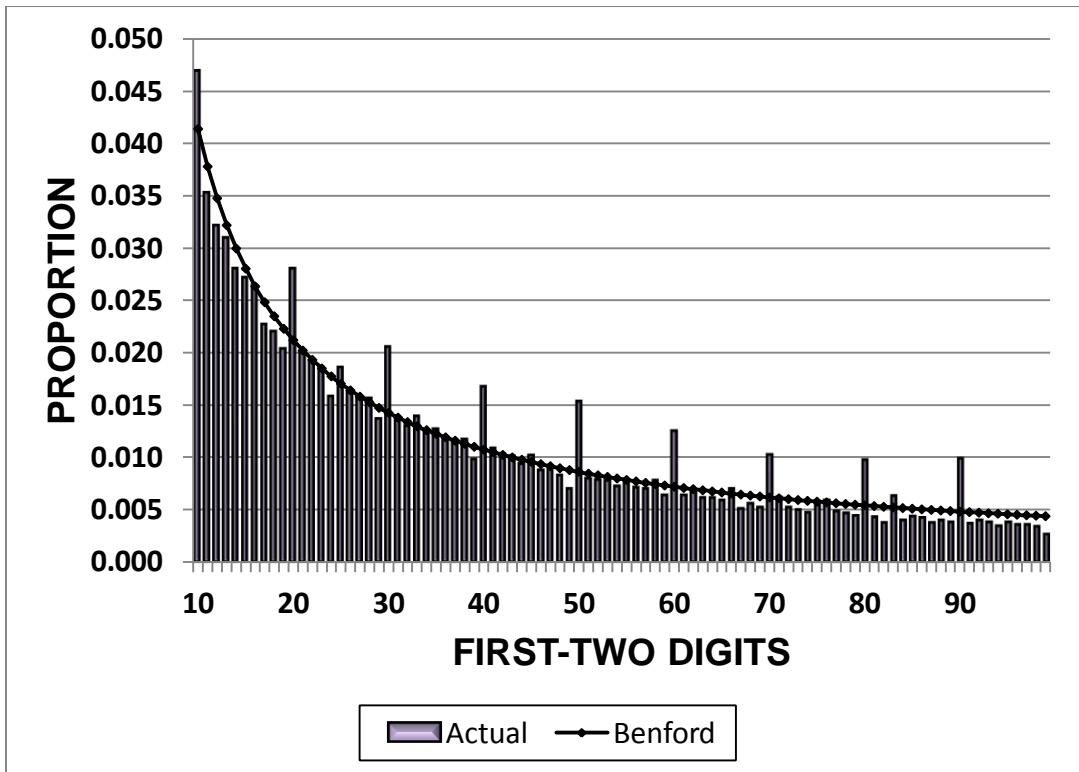


Figure 14: Charges: Random Uniform Imputation Second-Order Test

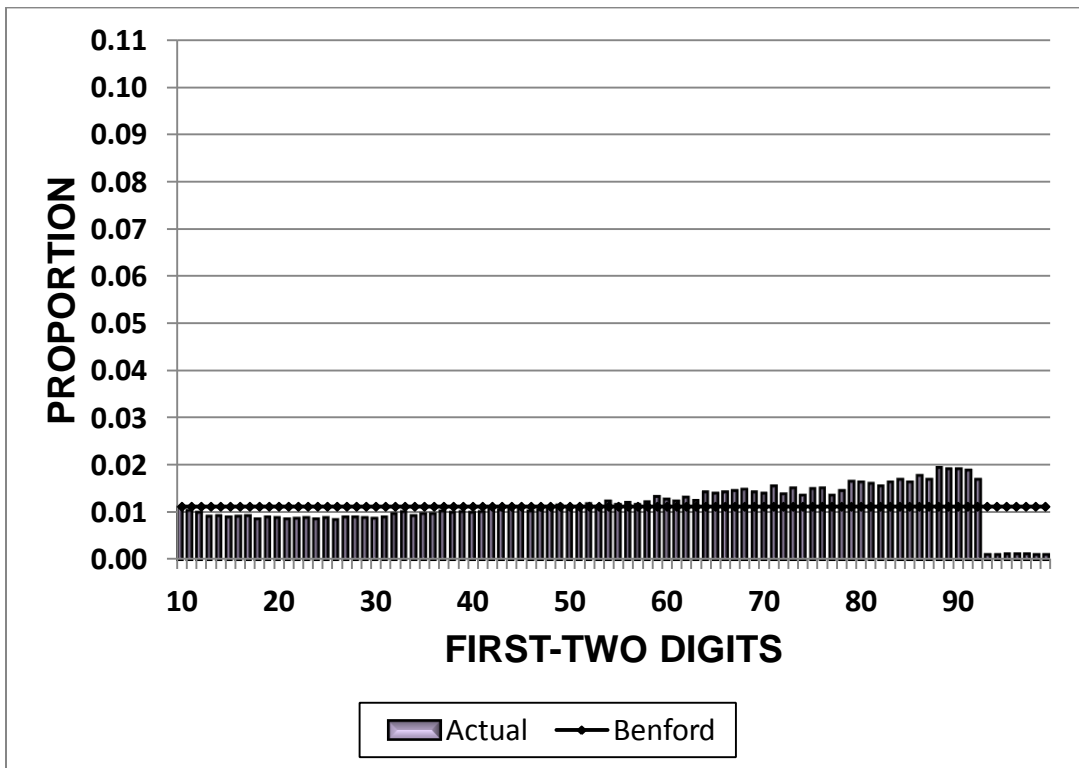


Figure 15: Charges: Random Uniform Imputation Summation Test

For the original Payments data set, only the second-order test indicated any similarity to Benford's (Figure 9) but that doesn't necessarily signify much. Non-Benford sets, like many uniform density distributions, can match Benford's with the second-order (differencing) test [9, p. 99]. With Payments being non-Benford, it might have seemed that replacing 20% of the data with uniform random values would have spread out the data (help fill the gap in digits mentioned above) and made the set more Benford-like. However, the imputed first digit and first-two digits tests (Figures 16 and 17) closely resemble the corresponding graphs for the full Payments (Figures 7 and 8). The imputed second-order test (Figure 18) has similar spikes to what occurred with the imputed Charges (Figure 14). The final imputed Payments graph (Figure 19), for the summation test, indicates that a very large sum of values begins with the first-two digits from 10 to 15.

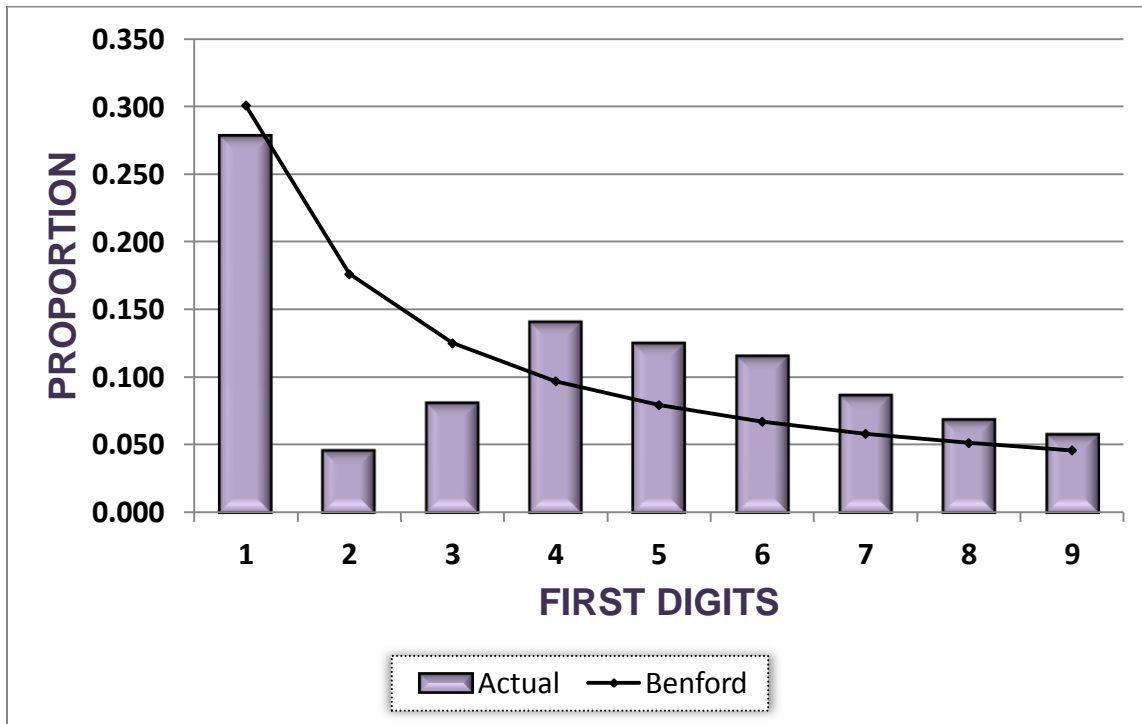


Figure 16: Payments: Random Uniform Imputation First Digit Test

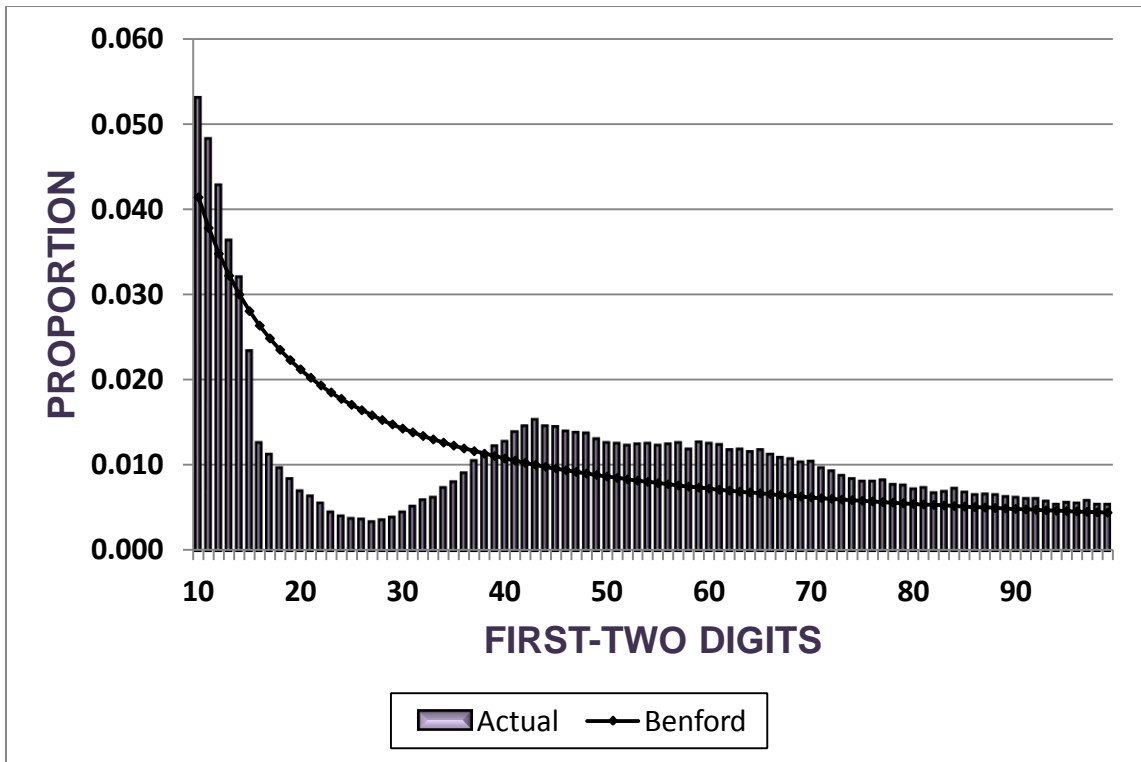


Figure 17: Payments: Random Uniform Imputation First-Two Digit Test

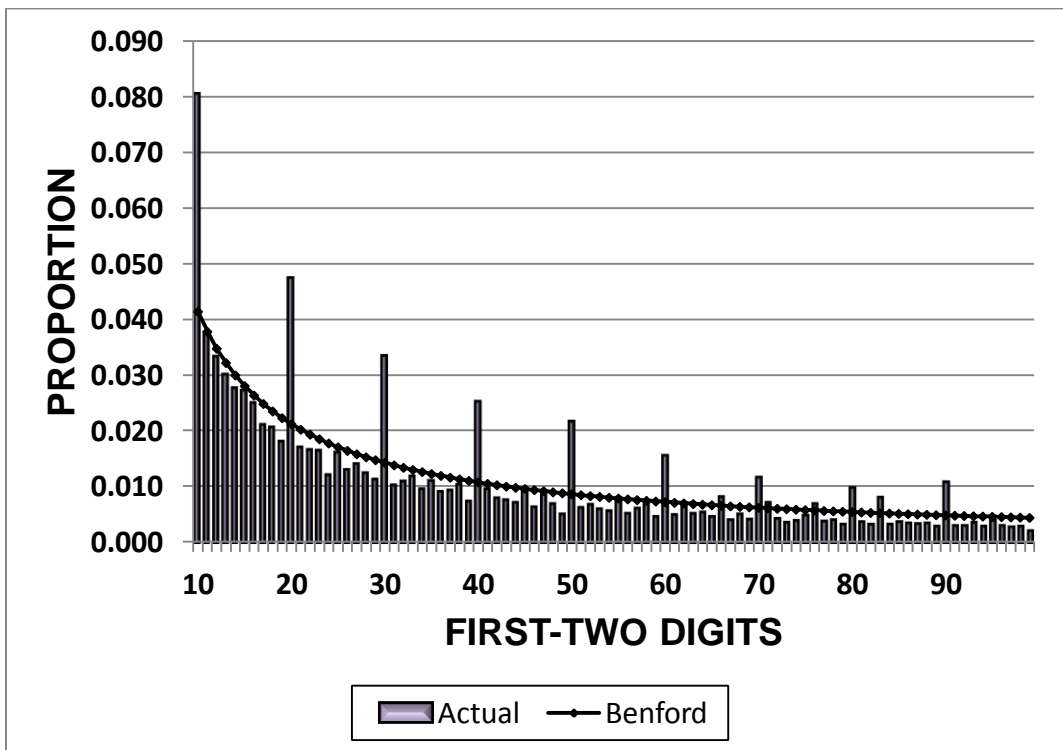


Figure 18: Payments: Random Uniform Imputation Second-Order Test

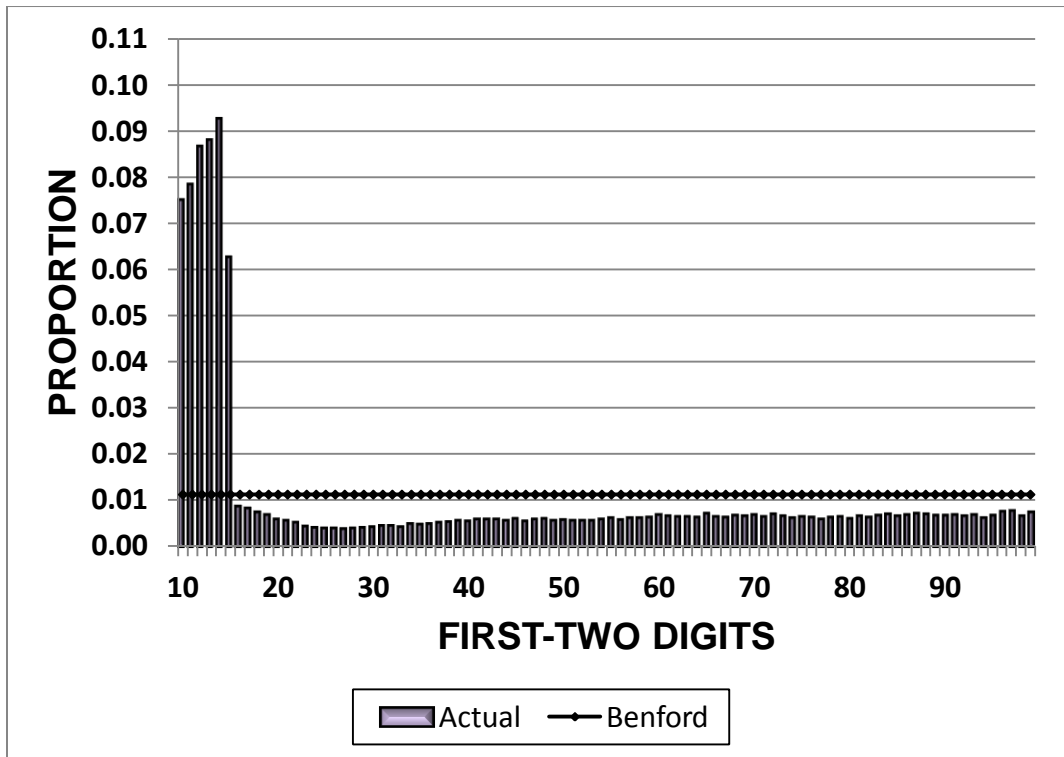


Figure 19: Payments: Random Uniform Imputation Summation Test

## CONCLUSIONS

We investigated two different sets of data with three Benford Primary tests and two Advanced tests. We determined that the Average Hospital Medicare Charges is approximately a Benford Set while the Average Hospital Medicare Payments is not. We then investigated what happens if 20% of the observations are replaced with imputed values, to decide whether it significantly affected the distribution of digits. One common method of imputation is to use the mean value of the data. This resulted in an expected spike in the First Digit test since we were replacing 20% of the data with one constant. We didn't proceed any further with that analysis. We then tried a different imputation method, in which we replaced 20% of the observations with uniform random values, with the idea that people tend to randomize numbers when asked to make up values. The results were mixed in that the Average Charges imputed data were as close or closer to the Benford proportions for three tests (First Digit, First-Two Digits and Summation) than the original data set. As such, based on the graphs, it could be easy to disguise the fact that 20% of the data were artificially generated. On the other hand, the imputed values for the Average Payments set did not seem to have much effect based on the Benford analysis. There was a gap in the original data with numbers beginning with a 2 or 3, and that did not change much when 20% of the values were replaced. That is, the imputed set was also non-Benford.

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# Controlling Type I Errors using Simultaneous Confidence Intervals to Identify Handwritten Digits

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## **Abstract.**

This paper investigates statistical methodology for the automated recognition of handwritten digits. A handwritten digit, 0 through 9, was obtained from 42,000 participants' writing samples. These handwriting samples were digitally scanned and stored in an image database. The objective of the analysis is to create a statistical testing procedure that can be easily automated by the computer to recognize which digit was written. The testing procedure is designed to be sensitive to Type I errors and will control an overall measure of these errors through a Bonferroni correction. The procedure was constructed based off of a training portion of the data set, then applied and validated on the remaining testing portion of the data.

**Keywords:** *Digit Recognition, Familywise Error Rate, Multiple Testing, Type I Errors*

## **1. Introduction**

Automatic handwriting recognition is the technique by which a computer system can recognize characters and other symbols written by hand in one's natural handwriting. The role of automatic handwriting recognition, of both alphabetic characters and numeric digits, is increasingly important as today's technologies continue to improve. There are an enormous amount of applications of handwriting recognition, including the automatic scanning of personal checks at an ATM to be deposited into a bank account and handwriting recognition on devices such as PDA's and tablet PC's where a stylus-pen is used to write on a screen, after which the computer turns the handwriting into digital text.

Another noteworthy application of handwriting recognition is signature verification. This is important because every year, millions of dollars are lost to fraudulent credit card charges, which could be prevented by more stringent signature verification policies. For example, many store clerks do not routinely check the signature of a customer against that of his/her credit card. Even if signature verification was regularly conducted, the clerk's knowledge of handwriting forgery would probably be limited, and thus the verification would be superficial. Signature verification, if done by specialized computer software, could do a much better analysis of the signature than any human specialist could ever do and might lessen the burden on the criminal justice system, which frequently investigates accusations of signature forgery (Huber and Headrick, 1999).

Previously studied statistical handwriting identification models include hidden Markov models (Nag, et. al. 1986), neural network models (Morasso, et. al. 1993), maximum likelihood estimators (Sas and Kurzynski, 2007), and template elastic matching models (Tappert, 1982). Many of these techniques were successfully developed with the priority to have high accuracy rate. This paper introduces a handwriting recognition technique, applied to the 10 numeric digits, that focuses on the *error rate*, instead of the *accuracy rate*. In many applications, such as the criminal justice system's investigation of handwriting forgery, the error rate should be tightly controlled when accusing someone of fraud. The United States' criminal justice system is based on the notion "innocent until proven guilty," so any handwriting recognition software used in this application must be very cautious when making *errors*, or, in other words, identifying a handwriting sample as fraudulent (guilty), when in fact it is not (innocent).

This paper is organized as follows. In Section 2, we identify the source and describe the format of the handwriting digit dataset. Section 3 provides a background in statistical errors as they occur in hypothesis testing and interval estimation as well as outlines our error-controlling procedure used to identify handwritten digits. Section 4 shows the results of the procedure applied to a testing portion of the data set, and finally, a discussion and conclusion of this work can be found in Section 5.

## **2. Data Description**

The dataset used in this paper consists of 42,000 handwritten digits, ranging from 0-9, and were obtained from the Modified National Institute of Standards and Technology (MNIST). Each digit was handwritten by an individual, scanned into the computer, and stored in an image database. The resolution of each scanned image is 28 pixels by 28 pixels, yielding 784 pixels in total. The handwritten digits have been size-normalized and centered in the 28x28 pixel grid. At each pixel in an image, the lightness or darkness of the individual's handwriting is numerically represented by a number between 0 and 255. A darkness value of zero means that no markings were made at that particular pixel (white pixel), while higher numbers on this scale represent very dark markings (dark gray or black) at the particular pixel. (LeCun, Cortes, and Burges)

## **3. Statistical Methodology**

### **3.1 Background of Statistical Errors in Hypothesis Testing and Confidence Intervals**

Testing a single hypothesis typically involves making a choice between two complementary statements about a population parameter, referred to as the null and alternative hypotheses. The decision to "reject" or "fail to reject" the null hypothesis is based on the information gathered from a sample, which is a subset of the population. Since information from the entire population is infeasible, it is possible that the data can lead to erroneous decisions regarding the null and alternative. A similar error in statistical inference occurs when confidence intervals fail to include their corresponding population parameters.

Recent statistical testing ideas have been developed with the idea of controlling the specific error called a 'false-discovery.' A false discovery transpires when the hypothesis is erroneously rejected or



'discovered'. This is known to statisticians as a Type I error. Conversely, a Type II error occurs when the test fails to reject a false null hypothesis. For example, suppose we are interesting in deciding whether a particular handwritten digit is a five, see Figure 1. The null and alternative hypotheses could be written as:  $H_0$ : The digit is a 5 vs.  $H_a$ : The digit is not a 5.

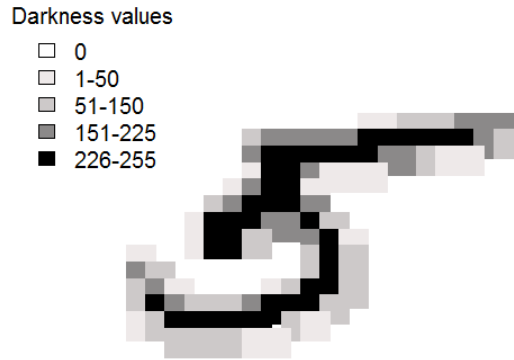


Figure 1: An example of a handwritten digit from the MNIST dataset.

Then, a Type I error would be a conclusion that the digit is not a 5, when in fact, the digit was written to be a 5. A Type II error would be the conclusion that the digit could be a 5, when in truth it was not written as a 5. See Table 1 for a visual display of these errors. Controlling Type I errors is extremely important, especially in the application of signature verification where one might be interested in testing:  $H_0$ : The digit is a *forged* 5 vs.  $H_a$ : The digit is not a *forged* 5. In this scenario, rejecting the null is a strong accusation and Type I errors should be avoided.

		Decision	
		<i>Fail to Reject Null</i>	<i>Reject Null</i>
Truth	<i>Null True</i>	Correct	Type I error
	<i>Alternative True</i>	Type II error	Correct

Table 1: Outcomes from testing a single set of hypotheses

When testing several hypotheses simultaneously, Type I errors can compound. This is referred to as the multiplicity effect. For example, if one hypothesis test is performed at the 5% level of significance, there is only a 5% chance of incorrectly rejecting the null hypothesis if the null hypothesis is true. However, for 100 independent hypothesis tests where all null hypotheses are true, the probability of at least one incorrect rejection is 99.4%! Similarly, this problem can be described in terms of confidence intervals. Suppose a single confidence interval was constructed to have a 95% coverage probability level. If one considers 100 independent confidence intervals simultaneously, each with 95% coverage probability, the probability that at least one interval does not contain the population parameter is 99.4%! One would expect that there would be 5 such non-covering intervals out of the 100 constructed.

Due to the multiplicity effect, it is desirable to control an overall measure of Type I errors across all hypotheses being tested or confidence intervals constructed, rather than individual control. One of the most commonly used measures of overall Type I error is called the Familywise Error Rate (FWER). The FWER is the probability of making one or more Type I errors. In other words, let  $n$  be the number of hypotheses being simultaneously tested, and let  $V$  be the number of Type I errors made out of  $n$  decisions (note:  $V$  is an unknown quantity). Then  $\text{FWER} = \text{Prob}\{V > 0\}$ . In multiple hypothesis testing or simultaneous confidence interval estimation, the FWER should be controlled at a desired overall level (say  $\alpha$ ).

### 3.2 Using the Bonferroni Correction to Control Overall an overall Error Rate

The Bonferroni Procedure is one of the most frequently used adjustments used by researchers dealing with multiplicity because it is easy to use and it controls the FWER. The Bonferroni correction is a single step procedure, meaning all hypotheses use the same threshold for every hypothesis tested (or same confidence coefficient for every interval created). In terms of hypothesis testing, the  $i^{\text{th}}$  null hypothesis (say  $H_i$ ) is rejected if the corresponding p-value ( $P_i$ ) is less than  $\alpha/n$ , where  $\alpha$  is the desired overall significance level, and  $n$  is the number of hypotheses being simultaneously tested. On the other hand, the Bonferroni correction for  $n$  simultaneous confidence intervals, then each individual confidence interval should be constructed at the  $1 - \alpha/n$  coverage probability level. Although this correction gives wide and less precise intervals, it can guarantee FWER control at level  $\alpha$ , which is important in some applications. (Hochberg and Tamhane; 1987)

### 3.3 Application of Simultaneous Confidence Intervals to Recognize Handwritten Digits

In the present analysis of handwritten digits, we created simultaneous confidence intervals using data from every pixel in the image, in attempt to recognize the digit in question. Since confidence intervals are analogous to hypothesis testing, we are choosing to describe our method in terms of simultaneous confidence intervals (for visual appeal and ease of interpretation) rather than multiple hypothesis testing. Note that the procedure can easily be reworded in terms of multiple hypothesis testing, if preferred. All graphics and analysis were done in the R software.

To start, the dataset was divided into a training set and testing set. We randomly selected 10,000 handwritten digit images to be used for testing. The remaining 32,000 digit images were used for training in order to estimate the pixel-wise simultaneous confidence intervals for each of the ten digits. The number of images for each digit was approximately equally distributed in the training dataset (approximately 3,200 images of each digit).

As described in section 2, each image is 28 x 28 in size, or a total of  $n = 784$  pixels each with a numeric value representing the darkness of the writing sample. Separately for each of the 10 digits, the mean and standard deviation was calculated at every pixel. Importantly, if nothing was written in a particular pixel (i.e. darkness = 0), then this was treated as missing data and not factored into the mean or standard deviation. Missing values occurred most frequently at the edges of the images. The mean and standard deviation was then used to create a confidence interval for every pixel using a  $1 - \alpha/n$  confidence level. For the present analysis, we selected  $\alpha = 0.05$ , yielding an individual confidence level

of  $1 - 0.05/784 = 0.9999362$ . Recall, having such high individual confidence levels will ensure that the overall measure of Type I errors (FWER) is controlled at level  $\alpha = 0.05$ .

Next, the individual pixel-wise confidence intervals are merged back into a 28 x 28 image format and a 3-dimensional surface mesh is constructed by using coordinate-wise linear interpolations. The 3-dimensional surface allows one to envision the confidence 'region' for each of the 10 digits. The region, or 3-dimensional surface, represents the merged simultaneous confidence intervals for the particular digit. See Figure 2 for the confidence region for the 6- digit. By the way we've constructed them, the confidence region will have 95% coverage probability 'new' digits of the same value. In other words, 95% of the time, a 6- digit will fit inside the constructed confidence region of Figure 2.

#### 4. Results

Using the means and standard deviations calculated from the training data set, confidence intervals were constructed at every pixel using the Bonferroni correction factor. Each digit's individual pixel confidence intervals were then merged back into a 28 x 28 grid format to make a 3-D surface of the digit, which we refer to as a confidence region. An example of the rotated confidence region for the 6- digit can be seen in Figure 2. Note that Figure 2 displays only the upper bound of the confidence region, for visual appeal. This is because the lower bounds were often found to be negative numbers, which we capped at zero since the darkness scale is 0-255.

The confidence regions for most of the digits are jagged, especially around the edges. This is due to the enormous amount of missing values (0 darkness) that took place at the edges of the images. These pixels are then influenced more heavily by the handful of participants that wrote near the edges.

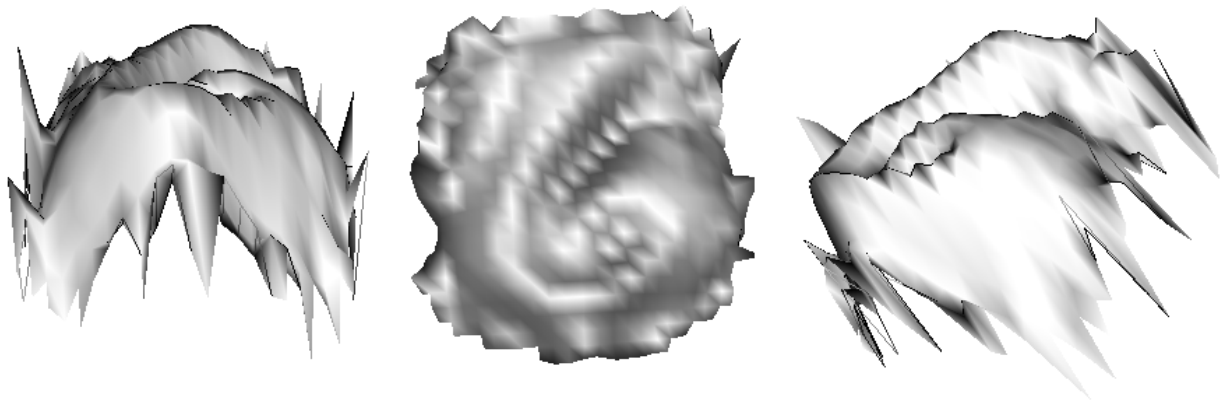


Figure 2: The upper bound of the confidence region for the 6-digit, rotated at several angles.

After constructing the confidence regions for every digit using the training data, the testing data was used to validate the procedure. Recall, the goal of creating 95% confidence regions to recognize digits

was to have control over the Familywise Error Rate at the 5% level of significance. To confirm the reliability of our procedure with respect to Type I errors, we estimated the Familywise Error Rate for each digit by counting the number of Type I errors that occurred out of the total number of images for a particular digit. The results are displayed in Table 2. Noticeably, the estimated Familywise Error Rate for each digit is less than 0.05, as desired.

	Number of Images in testing dataset	Number of Type I errors (FWER)
<b>0-digit</b>	991	7 (0.007)
<b>1-digit</b>	1115	14 (0.013)
<b>2-digit</b>	985	32 (0.032)
<b>3-digit</b>	1022	25 (0.024)
<b>4-digit</b>	954	31 (0.032)
<b>5-digit</b>	882	38 (0.043)
<b>6-digit</b>	991	21 (0.021)
<b>7-digit</b>	1072	12 (0.011)
<b>8-digit</b>	1027	20 (0.019)
<b>9-digit</b>	961	36 (0.037)

Table 2: Results, per digit, using simultaneous confidence intervals.

Visually, one can see how our procedure works by examining Figure 3. The top of Figure 3 (in gray) is the 3-dimensional surface of the 95% confidence regions for the 9-digit. In red, a new 'test' digit (1-digit) is tested to see if it fits under this confidence region. One can see that the test digit does not fit inside the confidence region in many of the pixels, as expected.

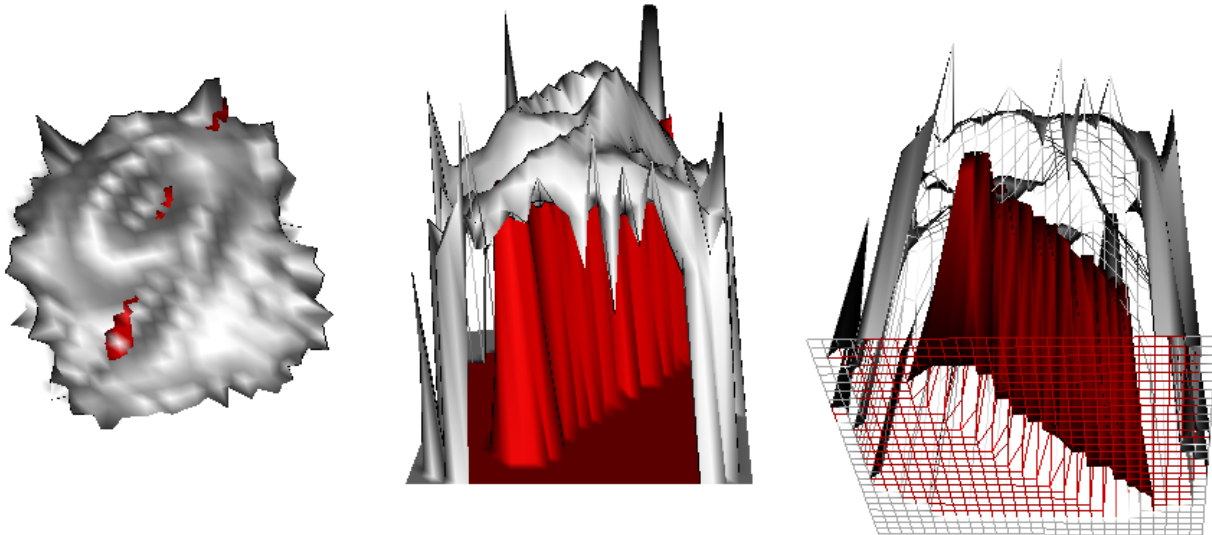


Figure 3: The confidence region for the 9-digit (grayscale), with a 'new' 1-digit (red). One can visually see that many of the 1-digit's pixels are not contained in the 9-digit's confidence region

## 5. Discussion and Conclusion

In attempt to create an innovative statistical procedure to recognize handwritten digits while controlling the Type I error rate, this paper suggests to create simultaneous confidence intervals using data from every pixel in the image to recognize a new digit in question. After dividing the MNIST dataset into a training and testing portions, we estimated the pixel-wise simultaneous confidence intervals for each of the ten digits using Bonferroni corrections to control the Familywise Error Rate (FWER). The pixel-wise intervals were then brought back together to form a 3-dimensional surface, called a confidence region for all digits. The confidence regions have 95% coverage probability 'new' digits of the same value.

The testing portion of the dataset was then used to validate the procedure by seeing if 'new' digits were contained within the constructed 95% confidence region. The estimated FWER was calculated by counting the number of Type I errors that occurred for each digit, and dividing by the number of images for that digit. We found that the estimated Familywise Error rate was less than the desired level (0.05) for each of the 10 digits.

As discussed earlier, many previously studied statistical handwriting identification techniques focus on the accuracy rate of the procedure. In other words, many procedures want to correctly identify as many digits or characters as possible, which is analogous to a high *specificity* rate. Our procedure focuses on having tight control over the error rate, specifically Type I errors. Meaning, the goal of our simultaneous confidence interval procedure is to be *sensitive* and not have more than 5% false oversights of the digit in its correct region. This is procedure can be applied in many applications that have such similar goals, such as signature verification, where it is costly and unfair to accuse someone of forgery when in fact no forged crime was committed (a Type I error in the criminal justice system).

However, a limitation of our procedure is evident due to the inverse relationship between Type I and Type II errors in statistical testing. Since our goal is to control Type I errors, our procedure naturally makes a lot of Type II errors because it is impossible to minimize both errors simultaneously with a fixed sample size. For example, Type II errors occurred when testing a new 3-digit in the 8-digit confidence region. Because of the similar shape of the 3 and the 8, many of the 3-digits in the testing data set fit into the 8-digit 95% confidence region (a Type II error). However, rarely did a 3-digit not fit into its own 3-digit confidence region (Type I error).

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# **SEX TRAFFICKING IN THE ERA OF GLOBALIZATION**

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## **ABSTRACT**

Every day, several anonymous persons who lack the economic wherewithal to support themselves in their country of origin move across borders in search of a better life, real or imagined. In this discussion, we offer that these individuals constitute the new generation of global merchandise seldom spoken of, albeit growing in numbers in the globalization age. These migrants are the victims of a global economy in search of goods and services that can be obtained at the cheapest price, regardless of the cost to those offering these services. This reflection contributes to the discussion pertaining to sexual trafficking as a growing global human and economic issue, one developed nations can no longer continue to ignore.

Keywords: Sex trafficking, debt bondage, crimes against migrants, globalization

## INTRODUCTION

When thinking of globalization images that come to our minds often are glamorous and happy: We think of *i-pones* and other electronic gadgets Technology rendered borderless. It is difficult to fathom globalization created a different kind of culture as well: The dynamics of consumer culture which demands product offerings at reduced cost has indirectly supported a criminal world of sexual servitude, forced labor, and unimaginable working conditions for adults and children in impoverished countries. With poverty a global problem, many people increasingly leave their respective homes in search of better living conditions, fleeing towards lands in which resources are plentiful and health facilities are the normal way of life. The USA, especially, is one targeted land which is the most favored destination, and thus the breeding ground for this special type of crime. The numbers are staggering: The United States Secretary States was reporting in 2008, there were about 175 million migrants in the world [6] [4]. Furthermore, the International Labor Organizations (ILO) estimated there were upwards of 12.3 million unidentified migrants held worldwide within the system of servitude in places including Eastern and Western Europe, North Korea, Africa, India and North America [3]

## PURPOSE

In this discussion, we are offering the US hands-off approach regarding enslaved migrants, individuals who are inhumanely treated for the benefits of companies receiving products at the lowest rate possible can no longer continue [6]. Historically, slave merchants in the late sixteenth until the nineteenth centuries successfully made possible the enslavement of roughly 12 million inexpensive African laborers with the idea of producing goods to be sold which also contributed in building a nation we now call North America [6]. Once slavery was abolished inexpensive labor still needed to be obtained and so was continued a more sophisticated form of enslavement [3]. Today, with poverty a global epidemic the colors of slavery have included persons of all nations; these migrants come from different countries with the promises of a better lifestyle to include better developed medical facilities, foodstuff, employment and schooling opportunities; however what they encounter sometimes in North America and other developed countries surely is far away from what they were promised: unabashedly success with filthy means [9] [7].

## RATIONALE

With so many persons trying to improve their quality of life the result is a group of individuals falling prey to false promises, causing these victims to illegally try and cross the borders of better developed countries to seek better employment, housing, medical facilities and education. However, along the route to freedom many dreams are shattered as migrants' security is immediately disrupted while they fall victim to abusive tactics of torture and threats of violence trying to be smuggled. Many are immediately kidnapped by organized criminal organizations and mishandled from place to place with little to no food, small inadequate living quarters being told they must work for food while simultaneously working off their transportation and housing [6].



## RESEARCH QUESTION

The question one must ask is whether human trafficking in the age of globalization continues as a result of the belief some people are less than humans, or just because of sheer love of money. The remaining of this discussion expounds on this point. The definition, [2] ramifications of human trafficking, including sexual exploitation [1] [4] [7], will be discussed in the full version of this work. The benefits developed nations reap [5] [8] from this traffic will be examined as well, and Implications drawn from the points assessed will conclude this review.

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# **The Use of Simulation and Cases to Teach Real World Decision Making: Applied Example for Health Care Management Graduate Programs**

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## **Abstract**

Many pedagogy methods use real world scenarios and simulations to teach students how to apply decision analysis concepts to specific fields of study. The presentation examines the effectiveness of using real world scenarios, simulations, and cases in graduate learning to effectively teach appropriate decision-making and evaluation. An example in healthcare management is presented. Students in a graduate healthcare management program participated in a simulation presented by the quality team of a local hospital system. Students were asked to evaluate the scenario and make decision about improving patient quality and wait times.

Bloom's taxonomy outlines the higher components of learning as follows: application, analysis, synthesis and application. In the hierarchy of the taxonomy these components appear in order of difficulty to achieve. For any graduate student to be well prepared for success in his/her field of study, higher levels of learning must be achieved. As professors of higher education, we strive to facilitate this type of applied learning.

Although, there are several pedagogical methods, which may assist in the achievement of these levels of learning, real world scenario application and simulation are extremely effective. This presentation will examine the effectiveness of using simulation and real-world scenario application in the classroom at the graduate level. The authors will explore the literature, survey

professors at their institution to assess the frequency and effectiveness of the methods employed, and will provide an example of a simulation used to teach graduate healthcare management students about health operations and wait times. Learning outcomes and achievements of this simulation will be discussed.

**New Strategies for United States' Pharmaceutical MNCs:  
Why Should They Utilize Economic Analysis When They  
Decide to Develop New Drugs?**

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## ABSTRACT

Health care costs in the United States are on the rise, propelled in part by the high costs of pharmaceuticals used by the aging national population. Attempts to control these spiraling costs have led to increasingly restrictive reimbursement policies, which has clear consequences for American pharmaceutical multinational companies' revenues. Here we discuss existing strategies in decision-making models, ideas for improving pharmaceutical MNC decision-making models for these MNCs, and specifically the benefits of taking into account the changing nature of reimbursements in deciding which medical products and services to develop, produce, and offer. Future research directions are also discussed.

### Keywords

Health care costs, economic analysis, pharmaceutical industry, rationing

## 1 INTRODUCTION

Health care costs in the United States are on the rise to the extent that they are spiraling out of control. In 2003, the United States spent 15.3% of its GDP on health care, that share rose to 18% in 2010 and will reach 26% of GDP by 2030. In the long run, this rate of growth is patently unsustainable. Consequently, the United States must contain these rising costs, which requires all components of its health care system become efficient and cost effective; pharmaceutical companies are by no means an exception. Since the US population is aging at an unprecedented rate, and older individuals consume far more drugs than younger persons, pharmaceutical MNC are particularly vulnerable to efforts to contain costs. Pharmaceutical companies' pre-market drug testing efforts have historically focused on human safety and drug effectiveness. Changes in reimbursement policies on the part of insurance companies and governmental organizations suggests that this testing paradigm that precedes the release of drugs should evolve to include the utilization of marginal analysis of new drug developments that takes into consideration cost minimizing efforts, while utilizing marginal cost and marginal benefits of drug development, and to take these factors into account at an earlier stage in the decision-making model. While the calculation of marginal cost should take into consideration the additional costs of various resources used in the development of each new drug, benefits of those medications should be calculated in terms of quality-adjusted life-years measurement – essentially a standardized means of determining life-extension and overall health benefit in a combined metric. This type of marginal analysis, typically used by economists, that also considers cost minimization efforts, would rule out new but expensive drugs that cannot provide much value to the users of these new drugs, who, for the most part, will consist of the elderly.

Organizations that actually make and implement reimbursement decisions could benefit from a similar decision model (Wirtz et al., 2005).

## 2 DRUG DECISION-MAKING MODELS

In nations outside of the United States, especially those with nationalized health care systems, a common means of determining reimbursement of new drugs, is by means of cost effectiveness analysis. This analysis helps determine whether paying for a new drug is worth additional cost, in terms of life extension and quality-of-life enhancement, as compared with similar drugs on the market, and is expressed in terms of a quality-adjusted life years measurement ranging from 0 (the least healthy) to 1 (the most healthy) scale that enables of the comparison of benefits across different age and disease groups. To illustrate the utilization of this metric, decision-makers reimburse conditions with higher cost per quality-adjusted life years score (for example, treatment of AIDS would have a higher score than treatment for asthma). An accompanying component to economic decision-making for reimbursing organizations is a willingness-to-pay threshold. In other words, below a certain ratio of cost-to-life years/quality benefit, organizations will deem intervention not worth reimbursing, and recommend alternative courses of treatment (Shiroiwa et al., 2010).

Within the United States, a widespread call to reduce health care spending (along with more limited reimbursements by Medicare, Medicaid, and other organizations to be created by recent healthcare reform legislation), places additional demands on pharmaceutical companies to introduce medicines with increased effectiveness, and that treat seriously impairing diseases that have few competitor drugs, but also to prepare to receive less reimbursement-based compensations for what they bring to market. Even outside the United States, governments are



beginning to require (or introducing more restrictive standards on companies) to show empirical evidence that drugs are not only therapeutically effective, but cost-effective. Many governments utilize an incremental cost-effectiveness ratio-driven decision model, based on the ratio of the increased cost of a particular therapy, as compared to existing medicinal therapies, to the change in quality adjusted life-years.

### 3 CHANGING PRODUCTION DECISION MODELS

Across the pharmaceutical industry, companies generally involves obtaining a drug license, at which point phase III trials are completed and drug outcomes can be analyzed effectively, and then analyzing reimbursements. It is proposed that pharmaceutical companies can benefit from first determining cost-effectiveness during Phases I and II of clinical trials, before drug licensing is obtained, by projecting cost and effectiveness using data on effectiveness of similar chemical compounds and similar interventions and studies on the disease (Hall et al, 2010). It is hypothesized that the projected cost-benefit analysis can guide the conducting of Phase III trials, in terms of decisions regarding how to allocate funding (as a function of revenue expectations based on projected reimbursements). Of course, this model would have to take into account exceptional cases, such as when interventions that would be considered cost-ineffective by normal standards, treats a debilitating disease that cannot be treated otherwise, or in the cases of drugs that are perceived as “vanity” treatments, or treat diseases afflicting a non-priority subset of patients, or simply a too-small subset of patients.

Thus, other factors besides simple cost-effectiveness must be incorporated into the ideal decision-making model, including therapeutic value, the size of the population that could potentially benefit from the drug, strong outcomes (above existing averages) in clinical trials,

and how burdensome the disease is to society as a whole, as well as the individually-stricken patient. Yet another factor is encapsulated by the Pareto principle, which states that a socially optimal therapy is one that does no harm to anyone, and leaves one or more subsets of the population better off.

#### 4 CURRENT AND FUTURE RESEARCH

Given the fevered pitch at which lawmakers and those in the health care industry are clamoring for reform, the development and testing of decision-making models is particularly ripe for empirical research. One particularly attractive direction is a detailed computational analysis of how changing reimbursement practices, introduced by Obama's recently-passed Health Care Reform bill, will affect the optimal decision model described above for pharmaceutical companies, as well as the existing decision-making model. Besides the aforementioned complex factors, beyond simple cost-effectiveness, an ideal decision-making model should be taken into account. Of particular interest to the author is the effects of age-based health care rationing – i.e., disproportionately weighting interventions that help young people versus treating people above a certain age (even beyond any such weighting that is implicit in the quality-adjusted life years metric), to bolster arguments in ethical debates about health care rationing proposed solutions in the United States and beyond, with expected profit projections from the United States and other countries.

#### **What is to be done?**

The nation's increasing gross domestic product (GDP) spending in healthcare has caused many healthcare industries to search for cost-effective alternatives of providing their products and services. Pharmaceutical MNCs, being one of these healthcare industries, are faced with

having to conduct their clinical trials with more than just studying safety and efficacy of their medicinal products, as it had been traditionally practiced. By incorporating cost-effectiveness analysis into clinical trials prior to acquiring drug marketing license agreements, pharmaceutical companies will be able to make better informed drug funding decisions earlier in the drug development process. Reimbursement agencies also benefit and use the cost-effectiveness analysis report to make well-informed reimbursement decisions for their country. While cost-effectiveness analysis serves as a useful tool, it is important to consider the other factors that influence reimbursement agencies' decisions.

Many non-US government-based reimbursement and rationing decisions use a cost-effectiveness analysis (CEA) to analyze if a new medicinal product provides sufficient economic value to its incremental costs in comparison to products already marketed in their countries. A CEA provides a ratio that compares the difference in marginal costs and healthcare benefits of a new medicinal product with a comparator marketed product. The cost of a new medicinal product versus marketed products is compared to the benefit of a new medicinal product versus the marketed product. Benefits are measured using the standardized units established by using the quality-adjusted life years (QALYs) (Vernon et al., 2009; 799). QALYs provide measurable values for quality of life that permits comparison across different disease groups. A QALY value can range anywhere from 0 to 1 where a QALY value of 0 is equivalent to being dead while a QALY value of 1 is equivalent to being in perfect health. By implementing different health interventions and incorporating QALYs into health outcome measures, analysis illustrating the cost-benefit of implementing of a particular health intervention can serve useful for funding allocation decisions (Marra et al., 2007; 616-617).

Many non-US countries recommend the use of QALYs into their CEA for reimbursement consideration. According to the international standard of most private and government-run health insurance plans worldwide (including the United States), a year of human life is worth on average, approximately \$50,000. Based on this standard, pharmaceutical companies are required to illustrate how their medicinal products can improve quality of life by reducing \$50,000 worth of healthcare costs per person per year using their new medicinal product (Vernon et al., 2009; 799). It's important to note that the \$50,000 approximate average standard varies in different countries and is a number that encompasses most age groups and disease conditions. When considered the benefit of a particular medicinal product with the disease condition, the benchmark cost of a year of human life will vary greatly. Consider the costs and possible QALY score for someone with mild hypertension versus chronic renal failure. In order to obtain an optimal score on the QALY, more healthcare costs would incur for a patient with chronic renal failure than for a patient with mild hypertension. Therefore, each incremental score on the QALY for someone with chronic renal failure would cost more than for each incremental score on the QALY for someone with mild hypertension. A medicinal product that would treat the mild hypertension is expected to receive less reimbursement from government agencies due to the reduced costs for improvements in QALY score versus a treatment for chronic renal failure whose cost per QALY score increase is much greater. Even if a medicinal product is not expected to bring a QALY score of someone with renal failure to a score of someone treated with mild hypertension, more is still expected to be reimbursed for the treatment of chronic renal failure than mild hypertension. The more a medicinal product will reduce healthcare interventions required for a disease condition, the higher the reimbursement the medicinal product is expected to have.

All governmental agencies of various countries also face important economic decisions when establishing their willingness to pay (WTP) thresholds. A threshold “refers to the level of costs and effects that an intervention must achieve to be acceptable in a given healthcare system” (Eichler et al., 2004; 519). The threshold implies that a ratio between the monetary value and a measure of health gain exists. Setting a WTP value below economic value of health will reduce innovation incentives to below social optimal levels while setting a WTP value above economic value will prevent creation of medicinal products that could have some economic benefits (Eichler et al., 2004; 519-520).

A medicinal product is likely to be covered under the country’s national health plan if the cost-effectiveness analysis stay below or reach the threshold established by the reimbursement agency for that country. By surpassing the threshold, reimbursement agencies in these countries are likely to reject compensating for the medicinal products. In the United States, governmental forces encouraging reduction of the nation’s GDP in healthcare spending have guided reimbursement agencies to be more moderately selective than in the past. This imposes more pressure on pharmaceutical companies to not only create a medicinal product that proves to be more effective than current marketed products but to reduce their expected reimbursement compensation for their medicinal products. Approximately \$1.1 billion of President Obama’s stimulus package was allocated between the National Institutes of Health, the Department of Health and Human Services, and the Agency for Healthcare Research and Quality to oversee and propose a mechanism to evaluate the clinical benefit and cost effectiveness of medicinal products and assign a reimbursement guide for Medicare, Medicaid, and new government entities created under the new healthcare legislation (Vernon et al, 2009; 798-800).

Most pharmaceutical companies that develop new medicinal products hope to market them in various countries, with each reimbursement agencies having different WTP thresholds. As pharmaceutical companies develop new medicinal products, economic evaluation is required to assess the health benefit of a product with an assigned monetary value. The monetary value of a drug is affected by various factors. One of these factors consists of the drug competition for the same scarce resources. Another factor is a drug's therapeutic value, which consists of a drug's safety and efficacy in relation to other marketed drugs. Many countries outside the United States require empirical evidence of cost-effectiveness of a medicinal product to be assigned a reimbursement price by regulatory agencies (Cohen, 2008; 226). A cost-effectiveness assessment is vital especially when attempting to maximize the health of a population while working under the constraints of a fixed public healthcare budget (Hall et al, 2010; 2674-2675).

The decision-analytic model illustrates how a medicinal product's efficacy, long-term survival, resources used, costs, quality of life, and toxicity are considered into the decision model and is evaluated by measuring the incremental cost effectiveness ratio (ICER). This incremental cost effectiveness ratio is calculated by noting the changes in cost and dividing it by the change in quality adjusted life years (QALYS). Determining the ICER allows for a cost-effective comparison between current marketed drugs and the new medicinal product (Hall et al, 2010; 2675).

Current practice in the pharmaceutical industry involves gathering evidence to make a reimbursement decision only after drug licensing is obtained. This is usually the case since after completion of phase III trials, a sufficient amount of data from the sample size (to represent the population the medicinal product is designed to treat) has been obtained and health outcomes analysis can be generated. Hall et al. suggest gathering evidence to evaluate for cost-

effectiveness prior to phase III trials so that delay in reimbursement decisions do not occur after a drug is licensed on the market (Hall et al, 2010; 2676). Using research from other studies conducted on the targeted disease and similar compounds together with data gathered from the first two clinical trial phases, a projector cost-effectiveness analysis can be generated. This information can then be used while conducting phase III trials to assist with better allocation of resources and emphasizing certain expected outcomes in phase III trials that will better prepare a cost-effectiveness analysis for once phase III trials have completed and licensing arrangements have been made.

While most countries rely heavily on cost-effective analysis to make reimbursement decisions, other factors such as the government's budget and the burden of the disease being treated are also taken into consideration. The following are some exceptions to what would be expected from their cost-effectiveness analysis. Beta interferon, used in most countries to treat patients with multiple sclerosis, is cost ineffective but because it assists a very rare disease, it managed to receive reimbursement in many countries. Other drugs, like sildenafil to help with erectile dysfunction, while shown to be cost-effective, was not approved for reimbursement in some countries simply because the government for those countries decided not to budget for a narrow subgroup of patients (Cohen, 2008; 230).

The exceptions noted previously illustrate that at times, other factors besides showing cost-effectiveness in medicinal product will impact reimbursement decisions. Many drug reimbursement decisions also take into considerations the medicinal product's therapeutic value and the burden of the disease the medicinal product is noted to treat. An increasing in marginal opportunity costs with consideration of a medicinal product's cost-effectiveness will impact reimbursement decisions. The size of the patient population plays a crucial role. The

combination of cost saving and impacting a larger population in comparison to medicinal substitutes favors a positive reimbursement decision. Newer medicinal products, especially new marketed compounds, carry a higher degree of uncertainty in observational therapeutic response than already marketed drugs. In light of a presumed societal risk aversion, these new medicinal products must show evidence of above average outcomes to compensate for the uncertainty. It's important to note that a lightened budgetary constraint places reimbursement agencies towards the risk seeking end of the spectrum while a tight budgetary constraint places reimbursement agencies in the risk aversion end of the spectrum. Lastly, the burden of a disease is considered prior to a reimbursement decision is made. When cost ineffective medications assist in treating burdensome diseases, reimbursement agencies have to consider the opportunity cost of funding the high-cost medicinal product instead of funding other medicinal products that could have been more cost-effective at treating not-so-burden illnesses. The Pareto principle also plays a role in affecting drug reimbursement decisions (Cohen et al., 2008; 232-234). This principle implies that “if a policy change leaves at least one group better off and no group worse off, social welfare is said to increase” (Cohen et al., 2008; 236). Medicinal products offering treatments for unexplored illnesses might receive acceptance of reimbursement as oppose to a medicinal product contributing to treatment of an illness that already has several different compounds treating the condition. This shows, how at times, cost-effectiveness might be no match for reducing variance in health gains (Cohen et al., 2008; 232-234).

## **5 CONCLUSION**

In conclusion, research has shown the benefits of providing cost-effectiveness analysis while conducting clinical trials to not only to meet requirements for some non-US governmental reimbursement agencies but also to effectively allocate resources for products showing more



beneficial outcomes. The earlier the cost-effectiveness analysis is conducted (preferably after phase II trials), the more prepared a pharmaceutical company will be at conducting a more effective phase III trials that focus on obtaining data to strengthen the analysis. It is important to note while a cost-effectiveness analysis serves as useful tool that impacts many non-US governmental reimbursement agencies' decisions, one must also consider the country's budget situation, current substitutes available in the market, the severity of the illness the medicinal product is aimed to treat, and the targeted population the medicinal product is aimed to treat. A decrease in a nation's budget, other marketed substitutes for one's product, a medicinal product that targets a mild illness, and targeting a small population, will all negatively impact reimbursement agencies' decisions, even if a cost-effectiveness analysis seems promising.

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**Towards the Development of a Maturity Model for Business Intelligence Services: An Exploratory Study of Architecture Enablers and Barriers.**

Business Intelligence (BI) has received a large amount of industry and academic coverage in recent years. The concept is hardly new: the use of information technologies, tools, and data analytics to extract useful business process information for managers. From a protodefinition of BI (Luhn 1958) to the most-often quoted definition incorporating modern, recognizable technologies (Dresner 1989), BI has evolved dramatically to take center stage today.

Academic research on BI generally focuses on three categories: technology, product, and management (Chee et al. 2009). Technology-focused research concentrates on the tools which enable the gathering, storage, access, and analysis of data to produce insight into business processes. Product-centered research investigate the development, deployment, and application of user-facing tools which help managers discover hidden patterns in data, and BI management research explores the processes surrounding the capabilities enabled by technology and tools, from the creation of data through the dissemination of insight obtained via analysis.

This paper seeks to add to the existing body of knowledge on BI by exploring architectural enablers of, and barriers to, the use of BI by organizations. Zachman's (1987) seminal work on architecture introduced a framework to help firms develop systems to help them achieve strategic objectives. The framework is primarily aimed at software development activities and brings to our attention the necessary lack of a consistent definition of architecture by stating its heavy contextual dependence. Researchers have described management mechanisms (Boh & Yellin 2006) and maturity stages (Ross 2003) for IT architecture which help organizations better manage their IT resources and offer increasingly higher levels of IT capability, respectively. This research will explore technology and governance issues surrounding BI architecture to develop a maturity model for providing well-managed BI services. The model will be empirically tested for further refinement and fit.

# **Factors contributing to Business Intelligence Success: The impact of Dynamic Capabilities**

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## **Abstract:**

Business Intelligence (BI) has become one of the highest priorities of CIOs today and a significant investment for many organizations. While there are a few models that are emerging to provide guidance as to factors that support successful BI, how BI systems are used has not been extensively studied relative to the benefits realized. We propose a model that would account for the nature of BI system use on BI benefits, incorporating direct measures of those benefits.

## **Introduction:**

Business intelligence (BI)/analytics has been the largest IT investment area for CIOs over the past five years, and in the top two for nine out of the last ten years (Kappelman et al. 2013). Stories about “big data” and analytics have moved beyond a few technical publications to be featured in mainstream media on a regular basis. Given all the stories about the use or value of BI and the level of expenditures on it, one would expect that organizations are realizing significant value from these systems. While there are success stories regarding BI (Olszak 2013; Wixom et al. 2011), many organizations have yet to see value from their investments. In fact, a recent study found that only about “30% of potential users in an organization adopt CIO-sponsored analytic tools” (Kanth 2013).

Given the amount of money spent on BI, it is important to understand how to assure that the money being spent is providing benefits, or that it is successful. How to determine the success of an information system has been studied extensively. The major models developed have used characteristics of the technological artifact itself, such as information quality or system quality (Gable et al. 2003; Goslar 1986) or whether the resulting information system was used by its intended users (DeLone 1988; Ein-Dor et al. 1981; Raymond 1985; Raymond 1990; Sabherwal et al. 2006). The level of user satisfaction with the resulting system was found to be another important measure (Gallagher 1974; Ives et al. 1983; Kaye 1990; Melone 1990; Raymond 1985; Raymond 1990; Sabherwal et al. 2006), while outcomes such as impact on the organization using financial or operational measures was also found to be significant (Ahituv 1980; Dedrick et al. 2003; DeLone 1988; Gallagher 1974; Kwon et al. 2006; Meier 1995; Melville et al. 2004; Mirani et al. 1998; Oh et al. 2007; Ross et al. 1996; Wang et al. 2008).

All of the models of IS success include a measure of “user satisfaction” and “use” as antecedents of perceived net benefits, which is another way to say systems success (DeLone et al. 1992; DeLone et al. 2003). While it is reasonable to assume that if users use a system and are satisfied with it that it will generate benefits for most categories of operational information systems, BI systems are different. Just using and being satisfied with such systems are not sufficient to assure success. The outputs of BI systems consist of reports, graphs, and/or recommendations that must be followed for those systems to have benefits. In other words, just generating the outputs is not sufficient to realize benefits; the actions that users take relative to those outputs has an impact on whether benefits are realized. Therefore, it is important to include some measure of how BI outputs are used when trying to evaluate whether such systems are successful.

Even if the outputs of these systems are used effectively, the quality of the process by which the outputs were generated can impact whether they are making the appropriate recommendations. In other words, how models are built and applied using BI systems can impact whether the resulting outputs have value. As such, it is important to understand the nature of the use of those elements of these systems when evaluating their success and this must also be accounted for in our model.

Due to the unique nature of BI solutions in the mechanisms by which they deliver benefits, a model that explains how organizations can realize benefits from BI needs to be different from generalized models of information systems benefits. We hope to fill that gap through this research effort. We will develop a comprehensive model that considers antecedents to effective BI use and will evaluate the relationship between those antecedents and the real benefits realized by organizations implementing BI.

### **Theoretical Background:**

In order to develop our proposed model, we begin with a view of the factors that have been recognized as contributing to BI success. A number of authors have proposed models that specifically address antecedents to BI success (Hartono et al. 2007; Hawking et al. 2010; Schieder et al. 2011; Wixom et al. 2011; Wixom et al. 2013; Yeoh et al. 2010). These models address the data used by such systems, the models or modeling tools used their linkage to business strategy, and overall organizational governance as leading to increased usage and therefore increased net benefits. All of these models incorporate the Resource Based View of a firm (Wade et al. 2004) at some level, which suggests that a firm's resources are an important factor in how that firm retains their competitive position.

A specific resource-based model of BI benefits was recently proposed as consisting of Business Strategy, Data, and Business Analysis tools as leading to use which then leads to business value (Wixom et al. 2013). They also include overall BI governance structure as another factor that is important for supporting effective BI. They identified several factors that could help improve the

pervasiveness of use of BI tools in an organization and which would improve the “speed to insight” from those tools (Wixom et al. 2013). Still, their model doesn’t directly address the impact of how the system is used in generating business benefits. It still assumes that the use of such systems leads to organizational benefits. As such, while all of these models can provide insight to our proposed model, additional factors must be identified that would allow us to account for the nature of the use of these systems and to directly consider benefits realized through such use.

Research has been done that addresses the impact of information system use on the impact of information systems. Soh and Markus (1995) found that in order for an organization to realize benefits from IT investments, not only must the associated system be used, but it must be used “appropriately” and effectively. The authors observe that “user skill – what users actually know how to do with their applications and infrastructure – is also a critical IT asset, since “without user skill, the potential of the portfolio and the infrastructure can never be realized” (Soh et al. 1995). Another way to define this concept of user skill is competence. If the way a BI system is used can be an important aspect as to whether the desired benefits are realized, effective use is influenced by user competence. Thus, we must find a way to include this element in our model to fully understand how BI benefits are realized (Chasalow et al. 2012).

In rapidly changing markets, resources by themselves are not enough to explain an organizations competitive positioning. A term that has been used to describe the way that organizations deal with changing markets is “dynamic capabilities.” Dynamic capabilities have been defined “as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece et al. 1997). The use of BI in organizations can be seen as a dynamic capability in that the outputs of such systems are used by organizations to react to changing competitive environments. As such, there should be a way to consider how the dynamic nature of BI tools impacts their effective use.

Dynamic capability theory has been specifically used to understand how information resources can impact benefits realized from information systems (Mithas et al. 2011; Vitari et al. 2012). One of the dynamic capabilities of BI systems by which they add value is the way that they generate new information from existing data. This process of newly generated data has been referred to as “digital data genesis” (Vitari et al. 2012). In their work on digital data genesis, Vitari et. al. (2012) tested a model that identified significant relationships between organizational processes, firm history, and a firm’s assets and the presence of digital data genesis dynamic capabilities. In their model they include measures that relate to the processes by which data is generated, how BI models are built, and outputs generated. This model of information systems resources and their relationship to the dynamic capability of digital data genesis can provide a core to understand the processes by which BI provides organizational benefits.

While dynamic capabilities represent a logical set of antecedents to BI benefits, we also seek to understand whether they actually contribute to the realization of those benefits. In order to do that, we must have a model to measure the effect of BI on firm performance. Such a model was proposed by Elbashir et. al. (2008). They identified specific measures of “Customers Intelligence,” Supplier Relations,” and “Internal Efficiency” that were found to have a significant relationship with organizational performance. As part of their research they developed an instrument to measure each of the elements that contribute to BI’s impact on firm performance (Elbashir et al. 2008). Their model and instrument provide a tool by which we can evaluate not just whether a BI system has been used, but specifically the impact of such use on the organization.

**Research Model:**

Combining the digital data genesis model with the BI performance measures gives us a theoretical model of BI impact on firm performance as shown in Figure 1 below:



Figure 1. Research Model of BI dynamic capabilities on firm performance

This model contains factors that measure the organizational capabilities that have consistently been considered to be antecedents to BI use. It also contains elements that evaluate the dynamic capabilities of digital data genesis, which represent how these systems are used. Finally, it includes measures that represent the impact of effective use of BI on an organization's business success. This will allow us to extend existing models such that we don't have to assume organizational benefits based on systems being used, but we can determine if effective use actually leads to those benefits.

Teece et al. (1997) present a three construct classification of the sources of organizational dynamic capability. These constructs are organizational processes, a firm's assets, and firm history of capability. Following this framework, we posit that these constructs underpin the development of a firm's dynamic business intelligence capabilities. We will now detail the development of this research model.

### *Organizational Processes*

The organizational processes of sensing, learning, coordinating, and integrating can be the source of dynamic capability when the opportunity arises (Maritan 2007; Pavlou et al. 2006; Zahra et al. 2006). We argue that each of these processes has an impact on business intelligence dynamic capability. Organizational sensing is the organization's understanding of the environment and identifying market needs and opportunities, while organizational learning relates to an organization's developing new thinking and creating new knowledge to enhance existing resources. Organizational coordinating concerns an organization's allocating and mobilizing resources, organizing tasks and coordinating organizational activities. Finally, integrating relates to an organization's developing new patterns of interaction to respond to internal or external competitive changes and executing the resulting operational competency configurations. We hypothesize that companies with effective organizational processes in these areas will be better able to choose new business intelligence systems, integrate them, and manage the information the new systems produce. Thus,

H<sub>1</sub>: Organizational sensing process has a positive impact on business intelligence dynamic capability.

H<sub>2</sub>: Organizational learning process has a positive impact on business intelligence dynamic capability.

H<sub>3</sub>: Organizational coordinating process has a positive impact on business intelligence dynamic capability.

H<sub>4</sub>: Organizational integrating process has a positive impact on business intelligence dynamic capability.

### *Firm IT Assets*



There are several different types of assets that can be sources of new dynamic capabilities: technological; financial; structure; and market-based; among others (Teece et al., 1997). With respect to business intelligence, we posit that IT assets are the most significant type of asset antecedents of the business intelligence dynamic capability (Tanriverdi 2005). Business intelligence dynamic capability is based in IT-related and information-related processes of choosing and integrating business intelligence, managing the data, and reconfiguring in response. Thus, our focus on the firm's antecedents of business intelligence dynamic capability is solely based on the firm's IT assets.

There are two kinds of IT-based assets, IT infrastructure and information repositories (King et al. 1989; Piccoli et al. 2005). IT infrastructure is "the base foundation of the IT portfolio (including both technical and human assets), shared through the firm in the form of reliable services" (Broadbent et al. 1999) or functionalities (Fink et al. 2007; Pavlou et al. 2006). Business applications and services, such as those underpinning business intelligence can be built upon these infrastructures (Broadbent et al. 1997). As the extent of the infrastructure's internal and external connectivity increases, the infrastructure's ability to act as a source of dynamic capability increases (Broadbent et al. 1999). Similarly, as the scope of services the infrastructure can support increases, this ability to act as a dynamic capability source also increases. These aspects of the IT infrastructure influence the possibility and cost of integrating IT so as to integrate valuable business intelligence systems, and thus is an antecedent of business intelligence dynamic capability.

The second category of information technology assets is information repositories, which are "collections of logically related data, organized in a structured form, accessible and usable for decision-making purposes" (Piccoli et al. 2005). Business intelligence dynamic capabilities depend on organized data, and this data requires information repositories as antecedents. Thus, business intelligence dynamic capability is influenced directly by an organization's information repositories. A substantial accumulation of organizational IT assets would consist of an IT infrastructure capable of supporting business intelligence dynamic capability's technical requirements, including compatible generated business intelligence and existing infrastructure and data storage to effectively use the data. Therefore, we hypothesize:

H<sub>5</sub>: The organization's IT infrastructure has a positive impact on business intelligence dynamic capability.

H<sub>6</sub>: The organization's information repositories have a positive impact on business intelligence dynamic capability.

### *Firm History*

A firm's history outlines its existing strategic and operating position and its external relations with suppliers and complementors (Teece et al. 1997). This history will have an impact on

future opportunities for the firm, including the strategic alternatives available to it and potential returns on investment. A firm's current dynamic capabilities will depend on its existing ones, which subsequently will constrain newer options. This is due to organizational learning tending to be local and related to existing processes ((Teece et al. 1997; Zahra et al. 2006). Given that the antecedents of business intelligence dynamic capability are closely related to historically existing IT dynamic capabilities, we hypothesize that IT and information dynamic capabilities are the dynamic capabilities closest to the BI dynamic capability.

IT dynamic capability is the multi-dimensional and enterprise-wide dynamic capability to leverage IT (Bharadwaj et al. 1999). The historical dynamic capability to leverage IT will enhance an organization's IT personnel ability to recognize the potential of emerging or enabling IT to generate and capture business intelligence data. Information dynamic capability is defined as the capacity to disseminate (Mathews et al. 2007), to apply and manage (Yoon 2005), or to process information (Lin 2005). A historically developed information dynamic capability will enable a firm to manage data and take advantage of its ability to generate business intelligence. Overall, we hypothesize that:

H7: The historical IT dynamic capability has a positive impact on business intelligence dynamic capability.

H8: The historical information dynamic capability has a positive impact on business intelligence dynamic capability.

### *BI Dynamic Capability*

Business intelligence dynamic capability represents the ability of a firm to effectively gather and apply business intelligence data to enhance its competitive positioning, strategy, and operations. Business intelligence systems typically require specialized IT infrastructure in order to function effectively, including query, analysis, and reporting tools, and the underlying specialized databases (data marts and data warehouses). We define this capability as the organizational process to: 1) choose IT to generate business intelligence data; 2) integrate the business intelligence data into the appropriate business processes; and 3) managing the BR data produced so it is accessible, accurate, complete, and current (Vitari et al. 2012). The IT underpinning of a business intelligence initiative may be an emerging IT or enabling IT, either used by a firm in an innovative application.

The theory of business intelligence usage as a dynamic capability is based on two related suppositions. First, business intelligence consists of deploying "new configurations of operational competencies relative to the competition" (Pavlou et al. 2006). A firm with business intelligence dynamic capability can identify opportunities for business intelligence generation and for reconfiguring internal existing resources to adapt to changing environmental conditions. Second, the business intelligence dynamic capability includes the dynamic reconfiguring of

existing resource combinations for business intelligence generation (Pavlou et al. 2006). The degree to which and ineffective business intelligence process can be reconfigured into a more effective one that matches the environment more competitively than the competition determines the capabilities dynamic quality (Eisenhardt et al. 2000); therefore, the higher the degree of reconfigure ability, the more dynamic of the business intelligence dynamic capability is.

H<sub>9</sub>: Business intelligence dynamic capability positively impacts business process performance.

### *Business Process Performance*

Drawing upon prior research, we argue that IT helps organizations create business value through its direct impact on business processes (Armstrong et al. 1999; Barua et al. 2000; Ray et al. 2004; Ray et al. 2005; Subramani 2004; Tallon et al. 2000) as IT typically provides automated support to business processes and process linkages (Barua et al. 1995; Mukhopadhyay et al. 2002; Subramani 2004) Thus, investigating process level benefits demonstrates not only that value is created, but also how that value is provided (Barua et al. 2000; Davern et al. 2000; Elbashir et al. 2008).

Business intelligence dynamic capability is the underpinning of business intelligence process performance, including operational efficiency enhancement (cost reduction and productivity enhancement) and operational effectiveness, the benefits from using business intelligence to support value chain activities (Porter 1996; Porter 1985). Process performance benefits include business supplier/partner relations benefits, internal process efficiency benefits, and customer intelligence benefits.

### **Method:**

The best approach to measure dynamic capability is that the organizational process level (Li et al. 2009). Therefore, we targeted respondents who were business intelligence managers at their respective firms, or two had significant experience managing business intelligence processes. We developed a survey that measured the relationship between business intelligence dynamic capability, its antecedents, and business process performance. Measurement scales for all the constructs already exist and have been tested. Elbashir et al. (2008) developed a measure for the business process level performance impacts of business intelligence systems. We adopted these measures to form the survey. The survey instrument and literature source of the constructs are presented in Appendix A.

### **Preliminary Results:**

We are currently in the process of collecting data. This data will allow us to evaluate the hypotheses developed above.

### **Discussion:**

We expect the data to validate the concept that BI represents a dynamic capability of a firm and that such a capability will lead to measureable organizational benefits. Our model extends existing models of BI success by incorporating factors that represent the nature of the use of BI systems and that evaluate the benefits realized from such systems.

### **Conclusions:**

Empirical research into factors contributing to BI success is still somewhat sparse (Arnott et al. 2008). With this work we hope to provide additional evidence on which to build a stronger practical and theoretical foundation supporting the use and benefits of BI. Much of the research to date on BI success measures success by whether the system is used. There is an implied assumption that “use” leads to perceived benefits. We hope to provide evidence regarding how and if use directly impacts benefits realized from BI.

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## Appendix A: Survey Instrument

### Organizational Capabilities in Business Intelligence

We request that you answer the following questions keeping in mind that: (1) with the term 'department' we refer to the smallest organizational unit you work in that is an autonomous business unit in its own BI investment decisions; and (2) the term 'business intelligence' refers to the use of tools and associated data to prepare reports and analysis for managers at various levels of the organization to assess organizational performance and to make operational and strategic decisions.

Please rate your level of agreement with the following sentences, on a seven point scale ranging from 1 to 7, where 1 refers to 'not at all' and 7 refers to 'yes, to a very large extent'.\*

not at all (1) (2) (3) (4) (5) (6) yes, to a very large extent (7)

- Our personnel effectively look for new business opportunities.
- Our personnel effectively observe customers' preferences.
- Our personnel effectively gather feedback from our partners.
- Our personnel put effectively into practice their recently acquired knowledge.
- Our personnel are effective in applying the new knowledge.
- Our personnel effectively employ the new knowledge about our customers.
- Our personnel effectively coordinate their different work activities.
- Our personnel set up a well-coordinated team.
- Each member of the department effectively coordinates with the rest of the department.
- Each member of the department effectively integrates his job with others towards a collective result.
- Each member of the department promptly contributes in the collective solution of the department's problems.
- Each member of the department is proactive in contributing to the collective output of the department.

### *Firm IT assets*

We request that you answer the following questions keeping in mind that: (1) with the term 'department' we refer to the smallest organizational unit you work in that is an autonomous business unit in its own BI investment decisions; and (2) the term 'business intelligence' refers to the use of tools and associated data to prepare reports and analysis for managers at various levels of the organization to assess organizational performance and to make operational and strategic decisions.

Please rate your level of agreement with the following sentences, on a seven point scale ranging from 1 to 7, where 1 refers to 'not at all' and 7 refers to 'yes, to a very large extent'.\*

not at all (1) (2) (3) (4) (5) (6) yes, to a very large extent (7)

- The range of communication technologies (e.g. Web sites, call centers, telephony) we use have widened over time.
- The range of information technologies (e.g. applications, software, servers) we employ have widened over time.
- The range of our network technologies (e.g. broadband, Intranet, Extranet) have widened over time.
- Our data warehouses contain a long range of historical data.
- Our data warehouses cover a broad range of business subject areas.
- Our data warehouses have been in place for a long time.
- Adding data to our data warehouses is a priority when new operational systems or capabilities are developed.
- Our organization provides financial support for adding data to our data warehouses when new operational systems or capabilities are developed.

#### *Firm history*

We request that you answer the following questions keeping in mind that: (1) with the term 'department' we refer to the smallest organizational unit you work in that is an autonomous business unit in its own BI investment decisions; and (2) the term 'business intelligence' refers to the use of tools and associated data to prepare reports and analysis for managers at various levels of the organization to assess organizational performance and to make operational and strategic decisions.

Please rate your level of agreement with the following sentences, on a seven point scale ranging from 1 to 7, where 1 refers to 'not at all' and 7 refers to 'yes, to a very large extent'.\*

not at all (1) (2) (3) (4) (5) (6) yes, to a very large extent (7)

- In the recent past, our personnel have proven effective in processing information.
- In the recent past, our personnel have proven effective in exploiting information concerning our organizational performance.
- In the recent past, our personnel have proven effective in leveraging the information concerning our failures.
- In the recent past, our IT personnel have proven effective in developing IT applications.
- In the recent past, our IT personnel have proven effective in exploiting IT.

#### *BI dynamic capability*

We request that you answer the following questions keeping in mind that: (1) with the term 'department' we refer to the smallest organizational unit you work in that is an autonomous business unit in its own BI investment decisions; and (2) the term 'business intelligence' refers to the use of tools and associated data to prepare reports and analysis for managers at various levels of the organization to assess organizational performance and to make operational and strategic decisions.

Please rate your level of agreement with the following sentences, on a seven point scale ranging from 1 to 7, where 1 refers to 'not at all' and 7 refers to 'yes, to a very large extent'.\*

not at all (1) (2) (3) (4) (5) (6) yes, to a very large extent (7)

- Our personnel have effective methods for choosing business intelligence tools.
- Our personnel's choice of business intelligence tools supports organizational processes.
- Business intelligence is successfully integrated into our organizational processes.
- The integration of business intelligence into our organizational processes is effective.
- Our personnel effectively handle the digital data that they obtain.
- Our personnel effectively process the data that they obtain in digital form.
- Our personnel have effective methods for managing the digital data that they obtain.
- When our business intelligence must evolve, our personnel successfully steer its evolution.

Please rate your level of agreement with the following sentences, on a seven point scale ranging from 1 to 7, where 1 refers to 'not at all' and 7 refers to 'yes, to a very large extent'.\*

not at all (1) (2) (3) (4) (5) (6) yes, to a very large extent (7)

- When our business intelligence must evolve, our personnel effectively lead its reorganization.
- Our personnel have effective methods for choosing the appropriate business intelligence solutions for their business processes.
- The choices of business intelligence make their case for our decision process.
- Business intelligence is successfully integrated into our processes.
- The integration of business intelligence into our processes is effective.
- Our personnel have effective methods for managing the digital data that they obtain.
- When our business intelligence solutions must evolve, our personnel successfully steer its evolution.
- When our business intelligence solutions must evolve, our personnel effectively lead its reorganization.

*Business Process and Organizational Measures*

Since it first implemented business intelligence systems, the following business benefits have been achieved by my organization:\*

No basis for answering Strongly disagree Disagree Somewhat disagree Neutral  
Somewhat agree Agree Strongly agree

- Reduced time-to-market products/services.
- Increase staff productivity.
- Increased inventory turnover.
- Reduced customer return handling costs.
- Improved efficiency of internal processes.
- Reduced inventory levels.
- Reduced operational cost.
- Reduction in the cost of transactions with business partners.
- Reduction in the cost of effective decision-making.
- Improved responsiveness to/from suppliers.
- Reduced marketing costs.
- Improved coordination with business partners/suppliers.

#### **Information on the respondent**

Please indicate the industry you work in currently: [Open text box]

How many years of experience do you have with BI/Analytics? [Open text for reply]

Do you or have you lead an autonomous business unit in its own BI investment decisions? Y/N

If so, for how long?

## **The Millennial Accountant**

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## ABSTRACT

After the Enron scandal of 2001 and the financial meltdown of 2008, we have to reconsider how accountants should be taught to be ethical. What is needed is an approach that stresses a new role for accountants and auditors. This new approach should be one that emphasizes and incorporates servant and spiritual leadership qualities. In addition, the accountant has to understand the importance of honest record keeping for all stakeholders, not just executives. Many organizations now understand that a new kind of CEO is needed if an organization is to thrive in the long run. This CEO should not focus only on maximizing short term profits and shareholder value, but rather he or she is concerned with customer satisfaction and the needs of all stakeholders. The same is true of accountants and auditors. They have to be concerned with factors that affect the long-term viability of a company and the needs of all stakeholders and not simply make the financial statements look good in order to maximize the value of the company's stock.

## INTRODUCTION

We live in a world where integrity and character are no longer a luxury. The Great Recession of 2008 has made us all aware of what happens when leaders lack integrity. The recession also has made many educators realize that business schools were not doing a good job teaching ethics and morals. The financial crisis was without a doubt the worst debacle the United States has experienced in its history since the Great Depression. Millions of jobs were lost many permanently, and millions of Americans lost their homes. Trillions of dollars in market value were lost and income inequality worsened. Americans were not the only ones that suffered, the entire world suffered economic distress. What lessons can be learned from the financial debacle? One major lesson that should have been learned is that greed can have cataclysmic repercussions. Firms that do not behave in an ethically and socially responsible manner can put the entire financial system at risk. Another key lesson is that the accounting profession has a critical role to play in the viability of a company, as well as in the sustainability of the entire financial system. Accountants, who are indifferent to, or actually abet financial irregularities at a company, can place the entire firm at risk.

It is interesting to note that the financial meltdown of 2008 did not suddenly appear out of nowhere. The corporate world headed by some greedy CEOs was leading us down a dangerous path for many years. An early warning signal was the Savings and Loan disaster, in which 1,043 banks failed with a cost to U.S. taxpayers of about \$124 billion (Curry and Shibut, 2000). That

disaster took place between 1986 and 1995. A few years later came several colossal corporate scandals including Enron, Tyco International, Adelphia, Global Crossing WorldCom and many other major companies which filed for bankruptcy. These companies were found to have used dubious accounting practices or engaged in outright accounting fraud to deceive the public and enrich senior executives. In fact, the Sarbanes-Oxley Act of 2002 was enacted in order to prevent future financial disasters in large companies such as Enron.

Suskind (2008) reports that Alan Greenspan, Chairman of the Federal Reserve, was at a meeting on February 22, 2002 after the Enron debacle and was upset with what was happening in the corporate world. Mr. Greenspan noted how easy it was for CEOs to “craft” financial statements in ways that could deceive the public. He slapped the table and exclaimed: “There’s been too much gaming of the system. Capitalism is not working! There’s been a corrupting of the system of capitalism.” This was another warning sign that it was easy for unrestrained greed to harm the entire economy. Greenspan could just as easily have said: “The accounting industry is not doing its job. There’s been a corrupting of the system of accounting.” Without honest accounting, capitalism is doomed to failure.

### **Post-Enron**

Despite the Sarbanes-Oxley Act of 2002, Wall Street found new ways to make money for executives who were involved in taking on huge amounts of risk via toxic subprime mortgages and credit default swaps. What is astounding is that the auditors either did not see, or failed to disclose the kind of deceptions that was going on. These included:

- Providing NINJA (no income, no job, and no assets) mortgages.



- Providing ARMs (adjustable rate mortgages) to the public at very attractive rates (even 0%) for the first few years to entice the poor (low Income) to buy homes knowing very well that they would not be able to pay up once the new rates kicked in and skyrocketed.
- Selling collateralized debt obligations consisting of sub-prime mortgages of extremely dubious quality when it was clear the borrowers did not have the income to pay off the loans.
- Shorting (i.e., betting against) securities known to be of inferior quality which was sold to the issuers' own customers.
- The use by banks of - inaccurate, incomplete and flawed foreclosure documents to unjustifiably evict homeowners.

An example of risk taking and deception is what occurred at this company at A.I.G. Financial Products Division. This company at the time had a 377-person office, based in London that nearly destroyed this trillion dollar mother company, which had over 100,000 employees. This small London office found a way to make money by selling insurance (known as credit default swaps) to financial institutions holding very risky collateralized debt obligations. A.I.G. Financial Products made sure that its employees did very well financially. They earned \$3.56 billion during the period 2001-2007 before the firm imploded (Morgenson, 2008). When the financial crisis started, it became quite obvious that there was no way that A.I.G. had enough money to cover the credit default swaps. Without government intervention, A.I.G. would have gone bankrupt and it would have caused a devastating impact upon the global economy.

Another example of fraud and deception is the group of Chinese banks that are suing Morgan Stanley for selling collateralized debt obligations, consisting of the worst kind of sub-prime mortgages and then betting against them. Internally, people working at Morgan Stanley, referred to the securities as “Subprime Meltdown,” “Hitman,” “Nuclear Holocaust,” or in scatological terms as a “Bag of ----.” Clearly, the investment bankers were well aware that these securities (known as Stack 2006-1) were of dubious quality (Eisinger, 2013). What and where was the role of the auditors while all of this was going on?

The scandal involving Bernard Madoff, which has been called the largest Ponzi scheme ever, also serves to show the results of what can happen when a “greed is good” approach is used to run a business and the auditors are lax in doing their jobs or look the other way. Gandel (2008) notes that auditors at KPMG, PricewaterhouseCoopers, BDO Seidman, and McGladrey & Pullen all certified that all was well with the many feeder funds that had invested with Madoff. Clearly, auditors were not acting responsibly and the CEOs running these feeder funds did not take the concept of due diligence seriously. As long as large profits were being earned, senior executives were not concerned as to what was really going on. CEOs in the banking and insurance industries allowed their firms to take huge risks in order to increase their own personal bonuses. New types of mortgages were issued to individuals who were unable to afford the payments and were unable to repay their loans. This practice resulting in increased revenues to the firms as well as an increase in bonuses paid to CEOs and executives. Where were the auditors? Obviously, they were not doing their jobs.

The number of banks and financial institutions that have been sued for dishonest practices that

contributed to the financial crisis is staggering and inconsistent with an ethical society. Richard M. Bowen III, a former Citigroup executive, attempted to report that his firm was purchasing the riskiest subprime mortgages and then packaging them as “safe” investments in order to sell them to customers. Mr. Bowen whistle blowing resulted in being fired in January 2009 (Cohan, 2013). There are currently eight federal agencies investigating JPMorgan Chase alleged wrongdoing that involves everything from failure to alert authorities about suspicious activities involving Bernard Madoff, and not being honest with regulators about risky deals that ultimately cost the company \$6.2 billion (Silver-Greenberg and Protes, 2013).

What is ironic is that a significant number of CEOs, who led their firms to insolvency, or close to it, did quite well financially for themselves. One example is Richard Fuld, CEO of Lehman Brothers, who earned approximately half-a-billion dollars from 1993 to 2007, the year before Lehman Brothers sued for bankruptcy. Another example, is that of E. Stanley O’Neal, was CEO of Merrill Lynch, from 2003 to 2007, who presided over the firm’s catastrophically deteriorating capital position that led to its sale to Bank of America the year after his ouster O’Neil walked away from the shambles he had help to create with a severance package worth over \$161 million, in addition to the \$100 million he received in compensation in 2006 (Kristof, 2008). The outrageous salaries of the CEOs who helped destroy their own mega firms and undermined the very fabric of the national economy has served to reinforce the view that CEOs sole interest is their own enrichment with little concern for their firms, their employees and society at large. The biggest losers in the global financial crisis of 2008 were not the CEOs; but rather the employees, shareholders of the firms destroyed by ruthless and corrupt chief executives, as well as the taxpayers, whose money paid for the government bailouts that followed. Granted the

CEOs are chiefly to blame for the most recent economic meltdown, the fact remains that the accountants and auditors allowed it to happen and their failure to blow the whistle on the chief perpetrators must be noted and analyzed if future financial debacles are to be prevented.

## **New Scandals**

Financial scandals are unfortunately not a thing of the past. The Libor (London Interbank Offered Rate) scandal involving the rigging of one of the most important interest rates of finance has made it quite apparent that corruption is now the norm in the corporate world. This scandal shook the belief in the integrity of the banking system and begs the question of the role of bank auditors and their whereabouts as the scandal was transpiring. This has placed the accounting profession under further scrutiny. In the aftermath, banking executives now reportedly spend about fifty percent of their time dealing with legal matters and regulatory issues rather than focusing on business growth (“The Libor scandal”).

Hewlett-Packard shocked Wall Street by claiming it discovered “serious accounting improprieties” and “a willful effort by Autonomy [a computer software company] to mislead shareholders.” HP apparently paid a ridiculously inflated price – \$11 billion– for Autonomy. HP is alleging that Autonomy inflated revenue and gross margins and “was booking licensing revenue upfront before deals closed” (Gupta and Leske, 2012).

The number of major financial scandals we have seen during the last three decades is truly astonishing and they have made laughing stocks of concepts such as accounting ethics,

government ethics, and corporate ethics. One can find a long list of accounting scandals at the Wikipedia website ([http://en.wikipedia.org/wiki/Accounting\\_scandals](http://en.wikipedia.org/wiki/Accounting_scandals)). The ten largest bankruptcies in American history were: Lehman Brothers, Washington Mutual, Worldcom, General Motors, CIT, Enron, Consec, Chrysler, Thornburgh Mortgage, and Pacific Gas and Electric (CNNMoney.com, 2009). Accounting malfeasance played a significant role in at least three of these bankruptcies. Cantoria (2010) provides a list of 10 major accounting scandals that caused significant damage to the corporate world and states that “In the midst of all these accounting anomalies, the accountancy profession and the role it plays came into focus. Accountants helped in misleading the public by certifying that the financial reports of fraudulent companies were true and correct.”

It is as though we are seeing a race to the bottom by accounting firms, banks, Wall Street firms, and corporations all apparently trying to prove that they can bend the rules and get away with it. Given all of the enumerated scandals and the damage they caused, it should be obvious that maintaining high ethical standards and doing the right thing is the best long-term strategy for any company. Companies that do not have a moral compass are destined to find themselves out of business. Indeed, doing what is morally correct is the optimum strategic move in virtually all cases (Lennick and Kiel, 2011).

### **Importance of Integrity**

Values and integrity are extremely important in running an organization. Lennick and Kiel (2011: xxxii) state:

The integrity crises of the first decade of the 21st century have been devastating. But they have not yet convinced enough leaders

of the importance of morally intelligent leadership. How many wake-up calls do leaders need to get the message that their ultimate success depends on moral leadership? Will leaders get another chance to do the right thing? Given the precarious nature of today's global economy, we fear that this wake-up call to choose integrity over greed might very well be our last ... how can any leader afford to ignore the call to put moral values at the center of what they do?

What can be learned from the above crises, and in particular, the financial meltdown of 2008?

First, we should recognize that what we have experienced is not the breakdown of an economic system but rather primarily a meltdown in values of those who are in a position of leadership.

As Weinstein (2009) notes:

But there is one kind of problem the Obama Administration has yet to tackle, even though it may be the most pervasive one of all. It is a distressing issue about which everyone complains but no one has been able to address effectively: The widespread failure of our leaders—and the rest of us—to take ethics seriously.

Porter (2012) cites a study by the economists Paul Romer and George Akerlof that indicates that “the most lucrative strategy for executives at too-big-to-fail banks would be to loot them to pay themselves vast rewards — knowing full well that the government would save them from bankruptcy.” This is why we need someone other than a CEO to ensure that a company is being run with integrity. Corporate executives are more concerned with maximizing corporate and personal profits than behaving morally and ethically. A study by Zingales, Morse, and Dyck estimated that in any given year - 11% to 13% of large American companies were committing fraud (Porter, 2012).

## Teaching Ethics

What needs to be done to ensure that organizations are truly concerned about integrity?

Friedman, Friedman, and Kass-Shraibman (2008) assert that CEOs have to see their role in a new light. It can no longer merely be about maximizing shareholder wealth or maximizing the profits of the firm. CEOs today have the responsibility to ensure that firms behave in an ethical manner and do what is right for all stakeholders – customers, suppliers, employees, local communities, and the environment. They feel that CEOs have an obligation “to help humankind achieve its ultimate goal of creating a just and caring society.” The new model of the CEO, according to Sydney Finkelstein, an expert on failed leadership, is to search for a man or woman who has the “highest ethical standards, who can lead by example, and who can build a strong effective team around him or her... rather than the cowboy riding in to provide the magic answer for the company” (Tischler, 2007).

The same can be said of the accounting profession. Accountants and auditors have to see their role in a new light. Ethics courses taught in institutions of higher learning are not accomplishing what they should. Many of the individuals responsible for the financial crisis had MBAs and took the required ethics courses. It is not surprising that one study found that 56% of MBA students cheated on a regular basis in college, a percentage that is higher than those of students who cheated in any other areas of study (Holland, 2009). In fact, there is evidence that students who complete MBA programs are less ethical at the end of the educational program than when they started (Etzioni, 2002). On one hand, there is a growing body of evidence that suggests that we cannot teach students to be ethical using the current methods of instruction (Bowden & Smythe, 2008). On the other hand, there is an emerging consensus, that courses in business ethics can help students know themselves and their own moral values, improve their ethical

sensitivity and awareness, and attain confidence and courage in making ethical decisions that can provide them with the ability to question decisions that have ethical implications (Bowden & Smythe, 2008).

One reason that courses in ethics may have little impact is that their lessons are negated by other courses. The most powerful idea taught in a finance class is one that probably played a key role in causing the Great Recession of 2008, and that is the goal of the firm is to “maximize shareholder value.” Jack Welch, former CEO of GE, referred to this goal as the “dumbest idea in the world” (Denning, 2011). Mangan (2006) also feels that business schools inadvertently teach students that “greed is good” when they focus on shareholder profits rather than improving society. Whereas Mangan’s recommendation is utopian in any society and particularly so in capitalist society, recent history indicates that the key to long-term business prosperity is to focus on the goal of satisfying the needs of all stakeholders including society, and the maximizing of customer satisfaction.

But what are we actually teaching accounting students? Accounting students generally take courses in microeconomics and macroeconomics and are also being exposed to economic theories in many other courses. One pillar of mainstream economics is based on the famous statement of Adam Smith in his classic work, *The Wealth of Nations*: that “It is not from the benevolence of the butcher, the brewer or the baker that we expect our dinner, but from their regard to their own interest.” Smith demonstrated how self-interest and the “invisible hand” of the marketplace allocate scarce resources efficiently. Students are taught that “economic man” or *homo economicus* act with perfect rationality and is interested in maximizing his/her self-



interest. In other words, rational people are concerned only about their own needs (Friedman and Friedman, 2008). Despite the Great Recession of 2008, many accounting students believe that self interest, free markets and deregulation result in great prosperity for everyone. Howard (1997) uses the expression “tragedy of maximization” to describe the devastation that the philosophy of maximizing self-interest has wrought. Pitelis (2002) shows that “in the absence of restraint, efficiency and productivity can be the biggest foes of efficiency and productivity!” Unrestrained capitalism that is obsessed with self-interest and is unconcerned about the long-run, can lead to monopoly, inequitable distribution of income, unemployment, and environmental disaster (Pitelis, 2002). Considering how close the economy came to the abyss in 2008 we can add that unrestrained capitalism can also lead to the destruction of companies and demise of the entire economic system.

### **Special Role of Accounting**

What the corporate world desperately needs is a new kind of accountant “the millennial accountant”. One who is not motivated by greed and ambition to build a company where all stakeholders benefit. Accountants and auditors have to redefine their roles in an organization along the lines of the concept of servant leadership. This concept was first introduced by Robert K. Greenleaf in 1970 in an essay entitled “The Servant as Leader” (Spears, 2004). Much of Greenleaf ‘s notions of leadership may be found at The Greenleaf Center for Servant-Leadership website at: <http://www.greenleaf.org>. In addition, management, as well as the religious literature contains numerous books and articles on the concept of servant-leadership (Atruy 2001; Blanchard 2003; Greenleaf 1983). Servant leaders care for their employees and want them to succeed and to reach their potential. They empower others and are facilitators. They are not concerned with personal aggrandizement. The servant-leader is the antithesis of the autocratic,

authoritarian, leader who is primarily concerned with power and wealth. He cares about people and wants them all to be successful. Spears (2004) finds ten characteristics in the servant-leader:

1. Listening intently and receptively to what others say. This, of course, means that one has to be accessible.
2. Having empathy for others and trying to understand them.
3. Possessing the ability of healing the emotional hurts of others.
4. Possessing awareness and self-awareness.
5. Having the power of persuasion, influencing others by convincing them, not coercing them.
6. Possessing the knack of being able to conceptualize and to communicate ideas.
7. Having foresight; which also includes the ability to learn from the past and to have a vision of the future.
8. Seeing themselves as stewards, i.e., as individuals whose main job is to serve others.
9. Being firmly dedicated to the growth of every single employee.
10. A commitment to building community in the institutions where people work.

Accountants and auditors must to be taught that they have a key role to play in making the system work. Their job is to prevent CEOs from distorting the true picture of the financial health of a company. The job of the auditor is to ensure transparency. Whereas auditors may be paid by the companies they audit, they must understand that their work impacts the many stakeholders, as well as investors. Company employees have a huge stake in what the accountants and auditors do. By the company taking huge unjustifiable risks in order to enrich a few executives, it is jeopardizing the very existence of the company and hence the jobs of all its rank and file employees who will not be walking away with past profits and severance pay. As we know, many employees have lost their pensions as well, as their jobs, when companies went bankrupt.

## **Spiritual Leadership**

Lynch and Friedman (2013) discuss some of the problems with the construct of servant leadership. They state:

One of the shortcomings of the concept of servant leadership is that servant leaders might easily focus too much on the needs of followers rather than the needs of the organization. A servant leader might also be more concerned with the needs of followers without considering the needs of society. In fact, a servant leader might do what is best for his followers without necessarily considering the higher values of truth, justice, peace, compassion, and human dignity.

A servant leader who is obsessed with the needs of followers might not see any reason to be concerned about world poverty. One might even be able to rationalize dumping hazardous wastes into rivers and oceans in places where there is no regulation if it would allow a firm to provide bonuses for all employees and survive. One can easily argue that compassion has no place in a firm headed by a servant leader. Why should a firm go out of its way to hire, say, people with special needs or other handicaps if it will make other employees uncomfortable and not help the bottom line? What happens when a firm has the opportunity to add to everyone's bonuses but in order to do so must engage in legal, but immoral business practices? Google decided not to do business in China because of the way it treated its citizens. Of course, this kind of attitude can result in reduced bonuses for employees.

Servant leadership is not enough to ensure a successful organization. Another construct that is relevant to accounting is that of spiritual leadership. Workplace spirituality is not the same as religion and certainly does not have to be linked to any organized religion. Workplace spirituality has been defined as:

A framework of organizational values evidenced in the culture that promotes employees' experience of transcendence through the work process, facilitating their sense of being connected in a way that provides feelings of compassion and joy (Giacalone and Jurkiewicz, 2003: 13).

Many of today's students and professors are interested in spirituality. They are searching for meaning and purpose in life. Spirituality has become so important that Astin (2004) argues that

it deserves a central place in all liberal arts education. People want to feel that their job is meaningful and has a larger purpose than simply making a living. The idea that your work can help others and improve the world is part of being in a spiritual workplace. Their attitude to work changes when there is a feeling that the job is significant and valuable to others. There is a feeling of joy when people work with others in a way that benefits all. Rhodes (2006) avers:

Today's spiritual organization is deliberate in implementing a vision that is built around contributions to the betterment of mankind. It promotes work outside of the organization that contributes to and "gives back" to society through community and volunteer service. Spiritually aware managers and businesses consider themselves servants of employees, customers, and the community.

A spiritual leader ensures that there will be spirituality in the workplace (Stone, Russell, and Patterson, 2004; Fry, Matherly, Whittington, and Winston, 2007). Fry (2003) believes that a spiritual leader "must primarily motivate workers intrinsically through vision, hope/faith, and altruistic love, task involvement, and goal identification. He feels that workplace spirituality involves:

1. Creating a vision wherein organization members experience a sense of calling in that their life has meaning and makes a difference;
2. Establishing a social/organizational culture based on altruistic love whereby leaders and followers have genuine care, concern, and appreciation for both self and others, thereby producing a sense of membership and being understood and appreciated.

These twin concepts of servant leadership and spiritual leadership must be stressed in all advanced accounting courses. The accountant/auditor of the future has to see his/her role as someone whose job is to ensure the long-term viability of a firm while understanding the importance of improving the world. It is not simply about following the accounting principles

and rules. After all, it is quite easy for good accountants to find clever ways to manipulate the rules for the benefit of the CEO. Ethics courses are not enough. The role of the accountant has to be redefined if capitalism is to thrive. The new kind of accountant/auditor is a person who understands that his/her role is to be an honest protector of the rights of all stakeholders.

Accountants and auditors have a responsibility to all the stakeholders. They should not allow their companies to become another Enron. The auditor can work for the CEO to the detriment of the long-term viability of the company or work for all stakeholders. Numerous papers have been written about the problem of auditor independence and conflicts of interest (e.g., Moore, Tetlock, Tanlu, and Bazerman, 2006; Hilton, 2012). Auditors who feel that they are servant/spiritual leaders will be able to see quite clearly the immorality of serving only the interests of the CEO.

### **Conclusion**

There are very convincing reasons for educators to take accounting irregularities seriously. A COSO study based on 350 cases of financial fraud found a strong correlation between fraudulent financial reporting and subsequent bankruptcy and/or delisting from a stock exchange. This COSO study also found that in 90% of the cases, the CEO and/or CFO was implicated in the fraud (Accounting Today, 2010). Conflicts of interest of this type played a major role in the Great Recession of 2008 (Friedman and Friedman, 2008). A Pew Center survey shows that sixty-one major cities in the United States have a gap of approximately \$217 billion in unfunded pension and retiree healthcare liabilities (Pew, 2013). Recently, Detroit went bankrupt and the same could happen to many other cities over the next several years.

Trust in corporate America is declining rapidly. Indeed, 62% of Americans feel that corruption and dishonesty are widespread over corporate America. About 75% of Americans believe that corporate dishonesty has increased during the last three years. It is well known that capitalism cannot function without trust. As Nobel laureate Kenneth Arrow remarked: “Virtually every commercial transaction has within itself an element of trust” (Porter, 2012). If the accounting profession does not do its job, capitalism will find itself in deep trouble. It has become imperative for accountants to take a leadership role in ensuring that companies are run for the benefit of all stakeholders.

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# **DEALING WITH MENTAL HEALTH ISSUES ON CAMPUS: TECHNIQUES FOR FACULTY IN THE PROFESSIONAL SCHOOLS**

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## **ABSTRACT**

Members of the campus community are subject to a wide variety of stressors that can distract from or hinder teaching and learning activities, and could lead to emotional crises. The purpose of this paper is to introduce a training program and basic techniques for helping individuals in emotional crisis. Similar to Red Cross First Aid training for encountering physical emergencies, Mental Health First Aid training can help individuals understand signs of emotional distress in others and safely direct those in crisis to appropriate resources. Participation in the program can be a faculty development opportunity for those with no formal training or background in the area of mental health.

**Key words: emotional distress; faculty development; mental health; Mental Health First Aid training; stress**

## **I. INTRODUCTION**

The college campus is no longer, and may never have been, a quiet island of intellectual inquiry. Once romanticized as an ivory tower, pure, tall, and isolated from the world, the college campus is as affected as any other institution by pressures of the outside world. News stories belie the image of the campus as a sanctuary of calm and serenity, and in fact suggest that campuses can be stressful and even dangerous places.

Cable news coverage has shown that campuses can be crime scenes as well as centers of inquiry. Shootings on campus have repeatedly dominated cable network news coverage over the past years. As a result, students arrive at college aware of news stories about campus violence. Table 1 displays the growing number of shooting incidents on campus grounds for the years 2010-2013 [1].

Shooting incidents take place not only on college and university campuses, but even more frequently at primary and secondary schools, also illustrated in Table 1. Entering students are more likely than ever to begin college already traumatized by exposure to or threat of violence on their own campus.

While campus shootings command headlines, other significant crimes take place more quietly in ivory towers across the country. Significant crimes on campus are documented in the Clery Report, mandated for all federally funded institutions of higher learning, which discloses information concerning crime on and near campus. Incidents reported include murder/non-negligent manslaughter, negligent manslaughter, forcible and non-forcible sex offenses, robbery, aggravated assault, burglary, motor vehicle theft, and arson. These data, along with a data

analysis tool for those who want more specific information, are available at the Department of Education’s Office of Postsecondary Education website [2].

	Higher education campuses			Secondary & primary campuses		
	Incidents	Dead	Injured	Incidents	Dead	Injured
2013*	8	13	11	11	4	14
2012	2	7	7	10	9	10
2011	2	5	0	8	4	10
2010	2	4	3	6	4	8

Table 1, Shooting incidents on campus, 2010-2013  
\*through November 18, 2013

In addition to the threat of crime, financial stress affects all stakeholders in the university, especially the parents who support their children attending college. The average American is more financially stressed than ever, with unemployment remaining at nearly 8% in 2013 [3]. As a result, households may need to adjust their lifestyles, delay retirement, raise their credit balances, or jeopardize their children’s education funding. Home prices declined in value for six years in a row prior to the start of a recovery in 2013 [4], causing decreased mobility for homeowners and lower home equity to access for college funding and other expenses. In addition to placing more burden of college costs on the students, parental finances may be disruptive to the student, facilitating transfer to a less expensive institution or curtailing funding tuition altogether.

As a result of parental financial stress, students bear additional responsibility to pay for their educations. Student debt nearly tripled from 2004 to 2012, due to both an increase both in the number of borrowers and in their debt balances [5]. Concerns about incurring additional debt led students to work more during school, and in 2007, the most recent year for which data are available, the percent working between twenty and thirty four hours weekly increased to 21% [6].

Students and parents know that financial stress will not necessarily ease at graduation, as alumni(ae) face a difficult job market. In 2012, an AP study found that 53.6 percent of graduates of bachelor’s degree programs age 25 or under were evenly split between jobless and underemployed [7]. Not surprisingly then, nearly 33% of student loan borrowers in repayment are delinquent [5].

The desire for job placement increases pressure on current students to resume-build during their college years. In addition to earning good grades and extra course credits, and working part time, they may spend additional time interning, volunteering, joining clubs, taking leadership positions, and networking. Over-commitment of time can add to the stressors that students feel as they try to fit their study time with their other activities.

Students are subject to numerous stressors on campus in addition to financial and classroom obligations. Examples include bullying, identity struggles, independence issues, and eating disorders. Students may experience an onset or escalation of attention or learning disorders, psychosis, or addiction including intoxicants, sex, and technology.

Mental health issues can impact the learner's ability to function in the academic environment. Further, these issues can distract other learners, as well as faculty, from accomplishing learning objectives.

Faculty members are frequently on the front lines of identifying students in crisis. However, especially in the professional schools, faculty members have little background in clinical psychology and are rarely trained to safely assess the situation and to interact appropriately with individuals in crisis in order to avoid escalating a situation. While faculty members likely are aware of on-campus counseling centers or other resources where they can direct students, they may lack the skill to steer troubled students in that direction. Fear of reprisal by the individual discourages faculty members from interaction with the individual in crisis. Faculty is further discouraged from supporting others in crisis by fear of violating privacy laws, breaking confidentiality, and the potential resulting litigation. As a result, professional counselors on campus may be unaware of a student who has shown signs of crisis until the occurrence of an acute emergency.

Faculty, staff, and administrators are not immune to the stressors that are similar to those of their students. They are also exposed to economic pressures on the university and its faculty, accreditation demands, tenure requirements, as well as the usual workplace challenges.

The purpose of this paper is to introduce a training program and basic techniques for helping individuals, including students and colleagues, in emotional crisis in the academic setting. Similar to Red Cross First Aid training for encountering physical emergencies, Mental Health First Aid training can help individuals understand signs of emotional distress in others and safely direct those in crisis to appropriate resources. Participation in the program can be a faculty development opportunity for those with no formal training or background in the area of mental health. This program has been adopted in a variety of settings around the world, but little has been written to suggest that it has been adopted specifically on university campuses.

## **II. BACKGROUND**

Mental Health First Aid is a "public education program that helps the public identify, understand, and respond to signs of mental illnesses and substance use disorders" [8]. The purpose of the program is not to diagnose but rather to identify that there is an immediate mental health issue and to respond appropriately and safely. As a result of this training, participants are more likely to understand signs of emotional distress in others and be able to safely direct them to appropriate resources.

The program offers first aid training for mental health crises that include suicidal thoughts and behaviors, non-suicidal self-injury, panic attacks, response to traumatic events, acute psychosis, intoxicant abuse, and aggressive behavior. Additionally, participants learn about mental illness

and substance use disorders including anxiety, depression, psychosis, substance use, and eating disorders [8].

The remainder of this paper describes the Mental Health First Aid program and suggests how the tools and techniques of the program can be applied in the university community.

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**A STUDY OF DISABILITY FILM MEDIA  
AT A MAJOR METROPOLITAN UNIVERSITY**

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**ABSTRACT**

College curricula of computer science and engineering do not afford frequent engagement with individuals with disabilities. The authors of this research-in-progress study analyze the benefits of disability films for a forthcoming community film festival of computer science and engineering students and individuals with developmental and intellectual disabilities. The authors attempt to learn if disability film media enables discernable engagement and advocacy of the students for the rights of individuals with disabilities. The authors also attempt to learn if the disability film media facilitates engagement and self-advocacy of the individuals for themselves. This study will be beneficial to instructors in computer science and engineering, and instructors in liberal arts, evaluating film media as an exciting method for involving students with individuals with disabilities on projects of public service.

**Keywords:** Community Engagement, Computer Science and Engineering Curricula, Disability Film Media, Disabilities, Mainstream Film Media, Self-Advocacy, Public Service

**BACKGROUND OF PAPER**

“Disability is a natural part of life ... it is the barriers that [others without disabilities] erect that are the problem ... and it is time [the] media reflected this truth” (Levine, 2013).

Disability can be an alarming and even “frightening” consideration (Ross, 2013, p.1) for a college student without a disability. Disability covers different developmental and intellectual, physical, psychological, sensory and social impairments. Estimates denote a dimension of 49-54 million individuals with disabilities in this country (Riley II, 2005, p.15) – 19% of the population (United States Department of Commerce, 2008). Estimates denote a higher 650 million individuals with disabilities globally (International Labor Organization, 2013). The civil rights of individuals with disabilities in this country are covered in the Americans with Disabilities Act of 1990 (Riley II, 2005, p.7), but discrimination if not disempowerment is experienced frequently by them (Willis, 2012). The perception of others without disabilities of individuals

with developmental and intellectual disabilities as persons of potential is flavored by fear, focus on impairments and prejudice (European Commission, 2013, p.21), inevitably precluding them as contributors in fruitful positions in industry. This perception may be dissipated by the impact of film industry media representation of them as a diverse population. The reality is that the influence of mainstream film media is of marginalization - misrepresentation and underrepresentation - of individuals with disabilities in society.

The misrepresentation of individuals with disabilities in mainstream film media is clear if they are defined by identifiable impairments distanced from individuals or students without disabilities (Disability Planet, 2013, p.3). Inherent in the misrepresentation of individuals with developmental and intellectual disabilities is that they are devoid frequently of intricate but normal personalities as people distinct from other people or students in a social setting (Disability Planet, 2013, p.2). The limiting media notion of individuals with disabilities is a factor in negative perception of them. The perception may even be of pity, victimization or vulnerability (Special Olympics, 2013). Their underrepresentation in mainstream film media is manifest in the often representation of them by individuals without disabilities (Norden, 1994), further perpetuating misrepresentations of reality (National Institute for Disability and Rehabilitation, 2002, p.41).

This misrepresentation in mainstream media is evident in a history of misleading portrayals. For example, in the original *The Phantom of the Opera*, the phantom is negatively portrayed through his disability as a freak, not as a human through his mobility as a person, effectively isolating him from society. In the recent *I Am Sam*, Sam is negatively portrayed through his disability as an oddity and a problem for society, but is concurrently portrayed positively through his parenting sensitivity (Nelson, 2001), a dual portrayal, although he is still isolated from mainstream society. Though individuals with intellectual disabilities in the films *Forrest Gump* and *Rain Man* are portrayed positively as sanitized savants, they are represented as powerfully special in society, inevitably isolating or marginalizing them from others not of resemblance or special (Barnes, 1992). Individuals with disabilities in *Dumb and Dumber* and *There's Something About Mary* are portrayed in scenarios of snickering stereotyping (Carson, 1995) and in "r" (retarded) terminology in *Tropic Thunder* (Haller, 2010). The negative portrayals in the mainstream media are perpetuating stigmatization (Goffman, 1963). The persistence of the stigmatization is precluding recognition of the rights of individuals with disabilities to be equal with individuals and students without disabilities. Those with disabilities have often responded with disability film media as a model of potential positivity for those with disabilities in society.

The proper representation of individuals with disabilities in disability films is considered to be evident in disability film festival maturation (National Institute for Disability and Rehabilitation Research, 2002, p.4). Film festivals are frequently perceived to be positively portraying them, not through their impairments but through their diversity and fortitude (Grandin and Panek, 2013) as persons. For example, festivals are perceived to be focusing on individuals with disabilities in a manner of positively portraying them in *Getting Up*, *The Importance of Tying Your Own Shoes* and *Wampler's Ascent* of the Reelabilities Disabilities Film Festival, and in *Deedah* and *Finding Fred* of the Sprout Film Festival, through their functioning as normal

persons speaking for themselves (International Labor Organization, 2013, p. 27) in an ecosystem of society (Newman, 2013). The individuals with disabilities are the individuals with disabilities in the disability film festival media and in limited mainstream media, as for instance in *The King's Speech* and *The Station Agent*. The representation of them in the disability film festival media is not often perceived to be of the marginalizing and stereotyping stigmatization of the mainstream media (International Labor Organization, 2013, p.5).

The benefits of the disability film media are cited in the literature. The more individuals with disabilities are portraying in proper representations in film media, the more pride they may have as members of society. The more individuals and students without disabilities learn of individuals with disabilities through the disability film media, the more respect they may have of this marginalized population. The literature indicates the influence of positive stories on individuals and students without disabilities (Saito and Ishiyama, 2005). Not evident however is the extent of the features of the disability film media perceived to impact the individuals and students with and without disabilities positively, or even negatively. Might not disability film festival media focusing on individuals with disabilities portraying themselves be perceived to be marginalizing if not stigmatizing them? Might not disability media producers inadvertently infuse sanitized sensitive situations that might be perceived by individuals and students with disabilities to be misrepresenting or negatively stigmatizing them? (Wall, 2013, p.1). In this paper, the authors attempt to analyze the exact features and impacts of disability film media that influence perceptions of positivity.

## **INTRODUCTION TO PROJECT**

“[Individuals with disabilities] need to be present ... on screen ... to [enable] a paradigm shift in perception for [them]; a real change in attitudes by all members of society can then [be] a reality ...” (Council of Europe Disability Action Plan, 2006).

The authors of this study analyze the features of disability film media in a community engagement project for a Disability Film Festival at Pace University. The project consists of computer science and engineering students without disabilities of the Seidenberg School of Computer Science and Information Systems, and of PolyTech – New York University, a partnered school, evaluating disability film media from dominant film festivals – Reelabilites Disabilities Film Festival, Sprout Film Festival and Welcome Change Productions. The project concurrently consists of families, individuals with disabilities and staff from AHRC New York City, an organization for helping individuals with developmental and intellectual disabilities, partnered with the university, and evaluating the film festival media with the students. This project consists further of limited mainstream film media that includes individuals with disabilities. The essence of the project is in evaluating the features of the disability film festival, and limited mainstream media, for proper representation of the individuals that impact if not influence perceptions of positivity. The evaluation of the features and impacts is conceptually formulated from engagement and advocacy factors in earlier projects of the first author (Lawler and Li, 2005, & Lawler and Joseph, 2013). The goal of the project is furnishing the highest media of proper representation of the individuals in the film stories for the Disability Film



Festival at the university in spring 2014. The outcomes of the project are in increased knowledge of the capabilities and contributions of individuals with disabilities; and increased involvement in advocacy for proper representation of the individuals and in self-advocacy for disability rights.

The project consists of 36 computer science and engineering students for the fall 2013 – spring 2014 semesters. Each of the students has learned of individuals with disabilities in a community engagement course of the first author (Lawler and Joseph, 2013) and the third author, in which they partnered in media productions of storytelling (Klanten, Ehmann, and Schulze, 2011), a few of which were previewed at the Sprout Film Festival. The students have learned engagement and advocacy methods in proper representation of situations of individuals with disabilities, through the storytelling (Lawler and Joseph, 2013). Few of the engineering and science students learned of individuals with disabilities and disability issues in the curricula of the schools until they were in the community engagement course (Lawler and Joseph, 2013), with the individuals as mentor – mentee partners in the productions of the storytelling, and from the course the students were inherently motivated to be in the current project (Hoxmeier and Lenk, 2003). The project coincidentally consists of 22 families, higher-functioning individuals and staff from the non-profit organization, in the spring 2014 semester. There are 51 films or “flicks” from 3 – 21 minutes furnished by the film festivals and by extracted mainstream media, for condensing by 7 expert faculty and field professionals in disability studies at the schools to 23 films for evaluation by the families, individuals and staff and the students. The participants are definitely knowledgeable in disability issues, though the families, individuals with disabilities and the staff are more intimately knowledgeable in the issues than the students. Finally, the participants are led by the primary and secondary authors of this study, as to the features and the impacts that might or might not be the perceptions of positivity on the film media of the project.

Therefore, this study evaluates the features and the impacts of the disability film media, and the limited mainstream media, as to audience participant perceptions of positivity in the media, so that the film media of the project might be presentable at the Disability Film Festival at Pace University in 2014. The manner in which the media represents individuals with disabilities is important in the response to the film stories: How might the features of the storytelling impact engagement of the audience participants on the project?; Is the project impacting importance and satisfaction from the storytelling?; How might the features of the storytelling impact advocacy of the participants on the project?; and Is the project at the university impacting self-sufficiency and sociality from the storytelling? If the media of the project properly represents individuals with disabilities in the storytelling, the impacts of the integrity of the media might influence perceptions of positivity (Wall, 2013, p.2). Few scholarly studies evaluate the disability film media systemically.

### **FOCUS OF PAPER**

The authors attempt to evaluate the features and the impacts of the disability film festival media, by a focus on factors of engagement and advocacy of the audience participants of the project.

### **Engagement from Features of Media**

Importance – Extent of impact from which the participants perceive the generic features of the disability media in proper representations of individuals with disabilities; and

Satisfaction – Extent of impact from which the participants perceive the specific features of the media productions in furnishing satisfaction from proper representations of the individuals with disabilities in the media.

### **Advocacy from Features of Media**

Self-Efficacy – Extent of impact from which the participants perceive the storytelling of the disability film media in furnishing a foundation for them to be advocates for individuals with disabilities in society; and

Sociality – Extent of impact from which the participants perceive the storytelling of the media in influencing a motivation for them to be involved in other programs of public service with individuals with disabilities.

These factors are derived from earlier studies of the first author on movie productions of storytelling (Lawler and Joseph, 2013) and projects of public service with individuals with disabilities (Lawler and Li, 2005); and the features of the factors are determined from research sources (Riley II, 2005). The focus of the new study is on the benefits of disability film media as perceived by real individuals with disabilities and students without disabilities. The model may furnish for the disability film media, and the mainstream media, increased proper representations of individuals with disabilities in the dual media. The model of this research-in-progress study is in Table 1 of the Appendix.

## **METHODOLOGY OF PAPER**

The audience of this research-in-progress study consists of computer science and engineering faculty and students of the Seidenberg School of Computer Science and Information Systems of Pace University and of partnered PolyTech – New York City in New York City; and of families, individuals with disabilities and staff of partnered AHRC New York City. The methodology will cover the fall 2013 – spring 2014 semesters. The films of the disability film media, and of the limited mainstream media, will be evaluated by the participants and the authors in the following iterations:

- A checklist instrument, of 7 yes / no questions on characteristics of the participant students, 5 engagement Likert-like questions on generic features of importance of the media, 20 engagement Likert-like questions on specific features from satisfaction of the media, 7 advocacy Likert-like questions on the current impacts of self-efficacy from the media, and 9 advocacy Likert-like questions on the future potential impacts from sociality of the media, or 48 item questions, was evolved from interviews with the 7 expert faculty and field professionals in disability media studies and from research studies (Riley II, 2005);

- A choice of 51 films condensed to a manageable 23 films of 3 – 21 minutes, from mostly producers of the Reelabilities Disabilities Film Festival, Sprout Film Festival and Welcome Change Productions of individuals with different disabilities, was identified from interviews with the 7 expert faculty and professionals and by the second and first authors, for evaluation by the families, individuals and students;
- A design of 3 focus groups –22 families (8), individuals with disabilities (8) and staff (6) of the non-profit organization, 24 students without disabilities of Pace University and 12 students without disabilities at PolyTech – New York University, or 58 focus group members – will enable evaluations independently of the features and the impacts of the 23 chosen films from the checklist instrument of 48 item questions, moderated by the second and first authors;
- An evaluation of the 23 films by the 58 focus group members will be performed anonymously from the 7 questions of yes / no, and from the 41 engagement – importance and satisfaction – and advocacy – self-efficacy and sociality - questions on a Likert-like rating scale of 5 – very high in perceptions to 1 – very low in perceptions of the features and impacts of the films, with 0 – no perceptions, from the instrument, followed by a generic moderator participant review; and
- An interpretation of the resultant statistics will be performed by the fourth author of this study from the MAT LAB 7.10.0 Statistics Toolbox (Evans, 2014).

This methodology conforms generically to principles of critical and emancipatory participatory action research (Koshy, Koshy, and Waterman, 2011). The first, second and third authors will educate the focus groups on the evaluation questions of the checklist instrument, before the members look at the film media, and will be moderating the pre- and post- screenings of the sessions through principles of focus group research (Krueger and Casey, 2009). The fifth author of this study will evaluate the instrument before the evaluations, in the context of construct, content and face validity, including content validity measured in the context of sampling validity.

(The checklist instrument is modeled on Table I and will be furnished in the final study.)

## **ANALYSIS OF DATA AND DISCUSSION OF FINDINGS**

(A preliminary analysis and discussion of the data will be available by the conference date.)

## **IMPLICATIONS OF STUDY**

“It is not a competition ... [individuals with disabilities] ... do not have to earn or prove [their] place ... [they] have a right just because [they] are alive” (Mason, 2002).

An impact of this research-in-progress study is that future findings from the focus group data might confirm the benefits of disability film media in representing authentic and credible portraits of individuals with disabilities (Ross, 2013, p. 8). The film media in the study might disclose diverse experiences of the individuals like in the lives of individuals and students without disabilities (International Labor Organization, 2013, p. 21). The implication is that proper realities and representations in the disability film media might enable increased respect of individuals and students with disabilities.

Another impact is that future findings from the groups of engineering and science students without disabilities might disclose the benefits of engaging them on disability media projects. Even in colleges, few individuals or students without disabilities know others with disabilities. The more engineering and science students, and liberal arts students, without disabilities learn of others with disabilities, through proper realities and representations in the disability film media, the less they might be prejudiced and the more they might be proactive in disability rights of those unnoticed in mainstream society (Shapiro, 1994). Those with or without disabilities might leverage multimedia production technologies on projects of disability storytelling (Anspach, 2013). The implication is that storytelling in the disability film media might enable productive service skills of students with or without disabilities in higher institutions of learning.

Another impact is that future findings might disclose contrary depictions of improper but inadvertent misrepresentations in the disability film media of the study. The depictions might be perceived by families, fellow individuals with disabilities and staff in that focus group as negative sanitizing or stigmatizing of some of them. The implication is that storytelling in this maturing media might enable equally improper and proper realities and representations of individuals and students with disabilities that might not be filtered in existing producer standards.

A further impact is that future findings might divulge proper representations in Hollywood mainstream media. The inclusion of individuals with disabilities as the individuals with disabilities in the mainstream media might be a prerequisite (Ross, 2013, p.5). The inclusion of disability equality sensitivity in the mainstream media involving disability media organizations and non-profit organizations for disability rights might be a specification (European Commission, 2013, p. 13). The issue of marketing media portrayals of individuals with disabilities profitably (O'Shaughnessy, 1999) might nevertheless limit progress. The implication is that the model of proper realities and representations of individuals with disabilities in the disability film media might enable proper storytelling in the mainstream media.

The final impact is that future findings from the study might highlight the requisite of self-advocacy of those with disabilities to be not only in the disability media but in the mainstream media. From the perspective of disability media, they might be motivated to be not only disability or mainstream media performers, but even producers and technicians (European Commission, 2013, p. 27). The implication is that the disability media might be a visual storytelling success, but lacking more mainstream personnel of those with disabilities, the misrepresentations and repressions of individuals and students with disabilities in the mainstream media will not be a success.

## **LIMITATIONS AND OPPORTUNITIES**

The research-in-progress is a study at a few schools and at one organization, having a relatively limited participant sample. The sample of students is limited to a niche segregation of computer science and engineering students. The study is limited to the narrow subject of the disability media, not the broad subject of the mainstream media, in which misrepresentations of individuals with disabilities are more obvious than in the disability media. However, the disability film media might be a model for mainstream media producers on proper representations of a marginalized population, if producers are open to positive promotion (Carter-Long, 2013). Moreover, the opportunity for engineering and science schools, and liberal arts schools, in involving students in the fascinating field of film media for public service is a potential of this study, especially when the authors hold the Disability Film Festival at Pace University in spring 2014, a further opportunity for a new study.

## **CONCLUSION OF PAPER**

This research-in-progress study attempts to evaluate the features and the impacts of the disability film media for a film festival at a major metropolitan university. The authors attempt to learn if this media properly represents individuals with disabilities and their lives. Individuals with disabilities have lives like others without disabilities, but are not often perceived properly in the mainstream media. This study includes focus groups of individuals with disabilities and students without disabilities, in attempting to interpret media perceptions of representations. Students without disabilities, like most others without disabilities, have perceptions of individuals and students with disabilities largely through prejudiced mainstream media. They have inevitable perceptions that are not the proper realities of representations of those with disabilities and of issues of disability rights. In conclusion, this study might be a model for the mainstream media, and it will be helpful to instructors in engineering and science schools and liberal arts schools that hope more students might be participants on projects of public service involving visual storytelling technologies.

## **ACKNOWLEDGEMENTS**

The authors acknowledge funding of \$2,000 from the Undergraduate Student – Faculty Research Program of the Provost of Pace University.

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## APPENDIX

**Table 1: Model of Disability Film Festival Media Study**

<b>Disability Expert Faculty and Field Professionals</b>  AHRC New York City  Pace University	<b>Families, Individuals with Disabilities and Staff</b>  AHRC New York City	<b>Undergraduate Students</b>	
		<b>Pace University</b>	<b>Polytechnic/ New York University</b>

<b>Film Media Sample</b>  n=23 (51)
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Characteristics of Participants of Study(1)				Undergraduate Students	
				Pace University	Polytechnic/New York University
				n=24	n=12
Gender: Male Female					
Year: Freshman Sophomore Junior Senior					

I have been in a community engagement course at the university.	Perception Rating
I have been in a community engagement course at the university with client individuals with disabilities.	Perception Rating
I have been in a community action program or a non-profit organization servicing individuals with disabilities	Perception Rating
I have individuals with disabilities in my family.	Perception Rating
I have friends or met individuals with disabilities in a social setting or at the university.	Perception Rating
I have been at mainstream film media in which there were characters depicted as individuals with disabilities.	Perception Rating
I have been at disability film media in which there were characters depicted as individuals with disabilities.	Perception Rating



<b>Film Media Sample:</b> Name (n=23/51)
<b>Film Media Source:</b> Name

Factor Features of Study	Disability Expert Faculty and Field Professionals	Families, Individual with Disabilities and Staff	Undergraduate Students	
			Pace University	Polytechnic/New York University
	n=7	n=22	n=24	n=12
<b>Engagement Factor – Importance (2)</b> <b>Generic Features of Film Media Sample of Study (3)</b>				
Character Portrayal -Medical Model (Not Able to Interact in Society) -Social Model (Able to Interact in Society)	Perception Rating			
Application of Entertainment and Interest -Individuals with Disabilities -Individuals without Disabilities	Perception Rating Scale			
Broadness of Perspective -Domestic -International	Perception Rating Scale			
Functionality of Film Media -Education -Marketing	Perception Rating Scale			
Genre of Film Media -Animation -Documentary -Narrative -Other	Perception Rating Scale			
Professionalism of Film Media -Cinematography (Color, Lighting and Sound / Tempo) -Editing -Realistic Story?	Perception Rating Scale			

<b>Engagement Factor– Satisfaction (2) Specific Features of Film Media Sample (3)</b>	
Advocacy by Actual Individuals with Disabilities	Perception Rating Scale
Characterization by Actual Individuals with Disabilities	Perception Rating Scale
Characterization Importance of Individuals with Disabilities in Major Roles	Perception Rating Scale
Characterization of Individuals with Disabilities in Mainstream Normalized Roles (Not One-Dimensional Roles of Heroes or Victims)	Perception Rating Scale
Comprehension of Disabilities of Individuals from Story	Perception Rating Scale
Comprehension of Disabilities Issues from Story	Perception Rating Scale
Depth of Elicited Emotion from Story	Perception Rating Scale
Emphasis on Individuals Not the Disabilities (Not on Pity but on Strengths)	Perception Rating Scale
Engagement of Focus Group Participants from Story (“Part of the Action” vs. “Personality of the Camera”)	Perception Rating Scale
Honesty in Imaging of Individuals with Disabilities in Story	Perception Rating Scale
Inclusion and Interaction with Individuals without Disabilities in Story (Other Than Families)	Perception Rating Scale
Language Terminology (Not Negative -“People First” Terminology)	Perception Rating Scale
Perceptions of Individuals with Disabilities by Individuals without Disabilities (Not Only a One Character Perspective or Point of View)	Perception Rating Scale

<b>Advocacy Factor – Self-Efficacy (2) Current Impacts of Film Media Sample of Study (1)</b>	
I have increased pride in my potential as a person as a result of this film media.	Perception Rating Scale
My knowledge of the capabilities and contributions of individuals with disabilities increased as a result of this film media.	Perception Rating Scale
My knowledge of disabilities increased as a result of this film media.	Perception Rating Scale
My knowledge of disabilities issues increased as a result of this film media.	Perception Rating Scale

My knowledge of individuals with disabilities increased as a result of this film media.	Perception Rating Scale
My knowledge of the realities faced by individuals with disabilities increased as a result of this film media.	Perception Rating Scale
My possible prejudices or stereotypes of individuals with disabilities decreased as a result of this film media.	Perception Rating Scale

<b>Advocacy Factor – Sociality (2)</b> <b>Future Potential Impacts of Film Media</b> <b>Sample of Study (1)</b>	
I plan to be more involved in advocacy for proper representation of individuals with disabilities in the mainstream film media.	Perception Rating Scale
I plan to be more involved in advocacy for disability rights in society.	Perception Rating Scale
I plan to be more involved in advocacy for meaningful inclusion and pursuit of social justice for individuals with disabilities in society.	Perception Rating Scale
I plan to be more involved in self-advocacy for proper representation of individuals with disabilities in the mainstream film media.	Perception Rating Scale
I plan to be more involved in self-advocacy for disability rights in society.	Perception Rating Scale
I plan to be more involved in self-advocacy for social justice for individuals with disabilities in society.	Perception Rating Scale
I plan to participate in a community engagement course or program at the university.	Perception Rating Scale
I plan to participate in a community engagement course on outreach projects with students of a university.	Perception Rating Scale
I plan to volunteer with a community action program or a non-profit organization servicing individuals with disabilities.	Perception Rating Scale

Legend:

\* Perception Rating: 1-Yes and 2-No

\*\* Perception Rating Scale: 5 – Very High Participant Reflection, 4 – High Participant Reflection, 3 – Intermediate Participant Reflection, 2 – Low Participant Reflection, 1 – Very Low Participant Reflection, and 0 – No Participant Reflection

Sources:

- (1) Lawler and Li, 2005
- (2) Lawler and Joseph, 2013
- (3) Riley II, 2005

# Healthcare Information Technology Workforce Changes and Its Implications

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## *Healthcare Information Technology Workforce Changes and Its Implications*

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### **Abstract**

The Health Information Technology for Economic and Clinical Health Act (HITECH Act), enacted under Title XIII of the American Recovery and Reinvestment Act of 2009, has been considered as a bane or a boon depending on an individual's perspective. One of the provisions of law calls for implementation of Electronic Medical Record (EMR) systems to reach meaningful use. This led to the silicon rush of 2009. In this report, we analyze data from the Dorenfest Institute for H.I.T. Research and Education (HIMSS Foundation) to identify changes in the staffing requirements since the law was passed. We analyze the sectors of Information Technology (IT) where staffing has increased as we progress to reach meaningful use. We notice that the majority of the hospitals have been hiring IT project managers, management staff and EMR support staff. We study the co-relation of the hospital size to the IT hiring frenzy, to identify if the boom in healthcare IT job market was confined to only certain hospitals or if it was a universal phenomenon all across the board. We observed that the increase in IT staffing has occurred mostly in small size hospitals (hospitals with 100 beds or less). However, there has been a minor personnel increase in mid and large size hospitals. We also examined the effect, if any, of economies of scale with respect to this problem. The self-reported data shows that on average for 2008-2010, the small size hospitals were spending nearly 6 times more per bed on their IT budget than large hospitals, while the latest 2011 data shows that the small hospitals were spending 13 times more per bed on technology than large hospitals. The purpose of this paper is to raise flags about the staffing trends we observe in actual practice and to understand the organizational effect of technology in the healthcare industry.

### **Introduction**

The Health Information Technology for Economic and Clinical Health Act (HITECH Act), enacted under Title XIII of the American Recovery and Reinvestment Act of 2009, has been considered as a bane or a boon depending on an individual's perspective, and the usefulness of incentives is questionable (Pelaez, 2011). One of the provisions of law calls for implementation of Electronic Medical Record (EMR) systems to reach meaningful use. This led to the silicon rush of 2009.

Even though EMR systems had been in existence for more than 30 years, in 2006, less than 10 percent of hospitals were using a fully integrated EMR system with computerized provider order entry (CPOE), (Detlev & Berner, 2007). Though the technology existed, it was not being used in most of the hospitals. One of the major hurdles, to implementation of EMR technologies, was the cost of the EMR systems. In hopes to promote and expand the adoption of Healthcare Information

Technologies, the HITECH Act allotted \$25.9 billion to create a nationally integrated electronic health records and also authorized Centers for Medicare and Medicaid Services (CMS) to provide financial incentives.

Subsequent academic reports called for the increased need of Information Technology staffing and the need for educational programs to train the required IT staff. Hersh & Wright (2008) had suggested that an increase of 40,784 Full-time Equivalent (FTE) to supplement the IT workforce for the health information technology (HIT) Agenda was necessary. They proposed the required workforce numbers based on EMR Adoption Model scores. The Office of the National Coordinator for Health Information Technology (ONC) estimated that hospitals and physician practices need an additional 50,000 HIT workers during the next five years to satisfy EHR “Meaningful Use” criteria. The 2008 Bureau of Labor Statistics (BLS) report projected that there will be an additional need of 35,000 HIT workers by 2018 (U.S. Healthcare Workforce Shortages: HIT Staff, 2010).

Hersh et al. in 2008 based their analyses on Level 6 adoption scores. In that year, there were no hospitals in the United States at Level 7 adoption, the highest level of implementation based on EMR Adoption Model Scores. Considering that several hospitals have now reached the Level 7 adoption, we try to analyze using the same methods whether the proposed required FTE coverage was indeed necessary. HIMSS has also released their 1st Annual HIMSS Workforce Survey which gives us a closer look at the IT workforce in 2013 and a better understanding about the HIT workforce required for maintenance at Level 7 adoption.

Concurrently, researchers found that health IT–related job postings have grown substantially over time, tripling as a share of healthcare job postings since 2007. Analysis of this observed trend suggests that health IT–related job postings accelerated following the HITECH Act (Schwartz et al., 2013).

In this report, we intend to analyze the staffing requirement patterns that have changed since the law was passed and if the educational programs addressed the staffing requirements. To identify staffing trends observed in practice, we analyze the sector of IT staffing which has increased as we progress to reach meaningful use.

## **Discussion**

Research has shown that use of Electronic medical records or physician point order entry systems can yield higher positive outcomes, including fewer medication errors (Berger & Kichak, 2004), greater safety (Bates & Gawade, 2003), better quality of care (Øvretveit et al., 2007), improved performance (Kilbridge & Classen, 2008) and financial gains (Thouin et al., 2008). There is no doubt that this move to EMR systems is definitely a step in the right direction or at least there is no research out yet which proves it otherwise. The US government estimates that savings of between \$81–\$162 billion dollars or more annually in healthcare costs would be through increased

quality of care, better patient outcomes, and a reduction in errors, especially in drug prescriptions and administration (Taylor et al., 2005).

The HITECH Act included provisions for Centers for Medicare and Medicaid Services to provide financial incentives to eligible hospitals, and medical professionals for adoption and meaningful use of certified electronic health record technology in ultimately improving patient care. The HITECH Act also authorized the Office of the National Coordinator for Health Information Technology (ONC) to develop, establish and administer training programs to guide hospitals and medical professionals as they adopt and meaningfully use certified electronic health record technology (ARRA, 2009).

Section 3016 of the American Recovery and Reinvestment Act of 2009 under Title XIII authorized the creation of programs to assist in the establishment and/or expansion of education programs to train a skilled workforce to ensure the rapid and effective utilization, and development of health information technologies (ONC report to Congress, June 2013).

To meet the projected workforce needs, \$118 million was set aside by US government in funding for workforce development programs. This resulted in initiatives that were launched to develop curriculum for community colleges to implement 6-month training programs that trained 10,500 professionals per year to meet the growing demand (ONC report, September 2013).

Researchers predicted that the most common positions for which employers are recruiting in the health IT space include those related to information management, clinical informatics, and information technology support, e.g. equipment, development/programming, and software support (Hersh, 2010).

Subsequently, the 2013 HIMSS Leadership Survey listed the top three Health IT Staffing needs, since 2010, as Clinical Application Support, Clinical Informatics, and Network and Architecture Support (2013 HIMSS Leadership Survey).

Latest reports indicate that close to 80% of office-based physicians used some type of electronic health record system, an increase of 60% since 2001 and nearly double the percent in 2008 (42%), the year before the Health Information Technology and Economic and Clinical Health Act passed as part of the Recovery Act in 2009 (DeSalvo, 2014).

## **Methodology**

To analyze the staffing trends, we needed an unbiased data from a non-partisan group. For purposes of this report, we used data from the Dorenfest Institute for H.I.T. Research and Education (HIMSS Foundation). The Database includes a variety of detailed historical data about information technology (IT) use in hospitals and integrated delivery networks (Usage Agreement for the Dorenfest Institute data).

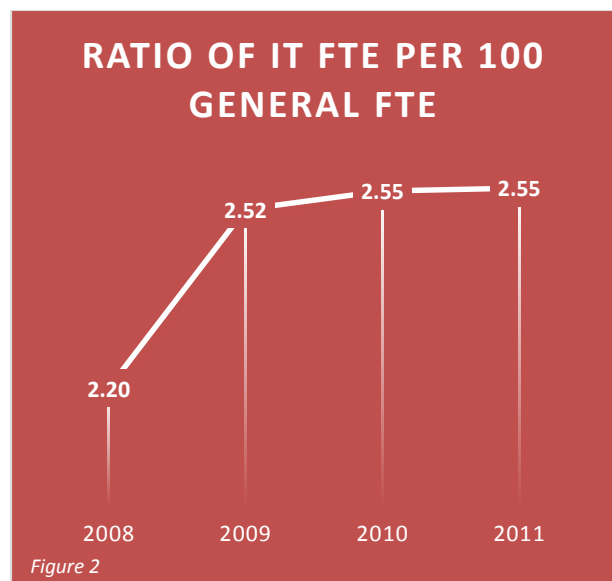
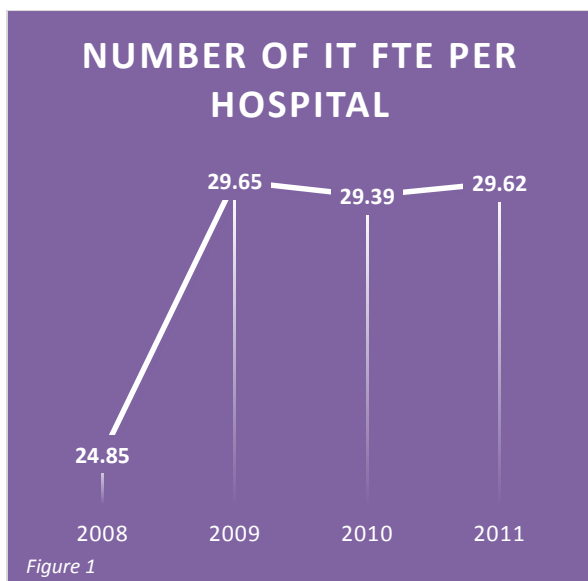


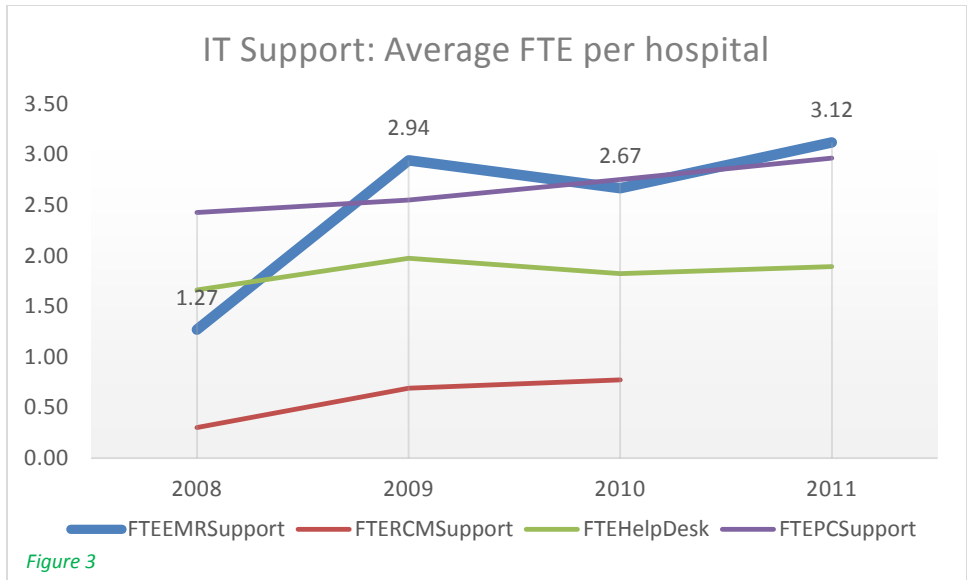
The data is self-reported from hospitals in response to the survey by HIMSS Foundation. Database contains information about the number of beds, number of Full-time Equivalent (FTE) staff, number of FTE Information Technology (IT) Staff and the breakdown of the IT staff per category, IT budget as a portion of the total operating budget and the percent range of the hospital's current medical record that is electronic.

Microsoft Access queries were run on the database for each year, and the results of sum and average of the data were charted to get a better understanding of the changes in job patterns over the years. The number of hospitals that responded to the survey and contributed to the database varied each year. Though the sum of the data indicates an increase or decrease in the statistics, it is not be a very reliable metric. To negate the effect of discrepancies caused while analyzing the sum of the values the averages of the data were charted. Using these averages, we extrapolate the values to give a better analysis of the overall staffing requirements. We used data only from hospitals that had reported the variables that we were trying to compare.

## Analysis

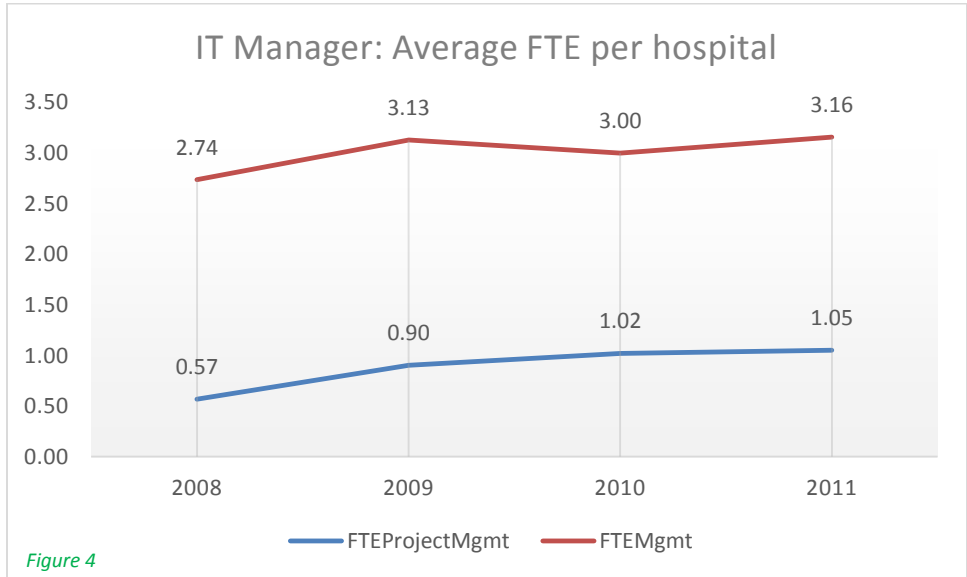
From a general overview, on an average each hospital in the United States had 24-30 FTE IT Staff. This was an average increase of an additional 5 FTE IT staff per hospital (Figure 1). For preliminary examination of the overall effect of the technology adoption, the ratio of FTE IT staff to FTE of general staff was analyzed. In 2008, many hospitals had close to 2 IT staff per 100 FTE general staff. Since 2009, this number increased to 3 FTE IT Staff (Figure 2). As an immediate response to the HITECH Act, it seems like each hospital has hired proportionately more IT staff than general staff.

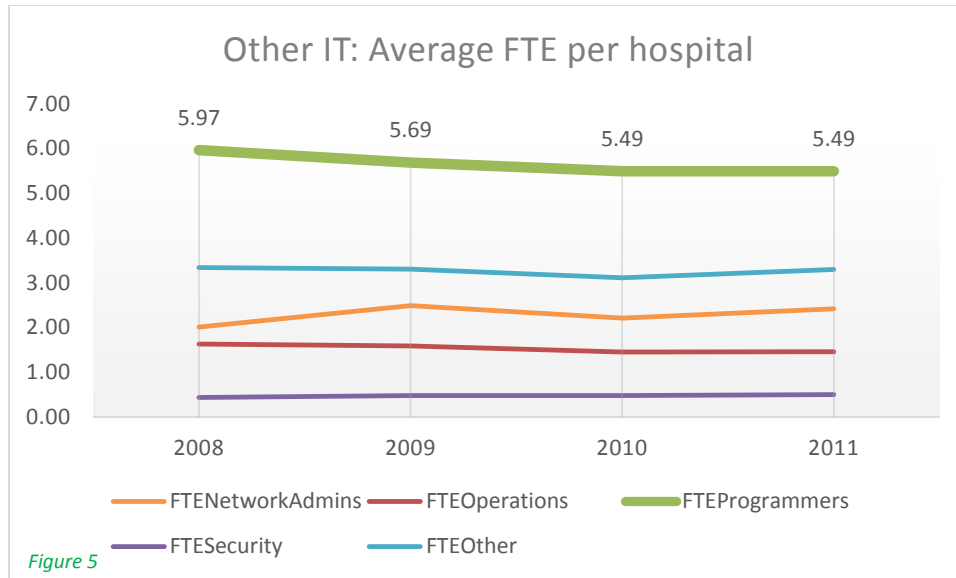




As expected, hospitals have hired more EMR support staff to help clinicians with the new technology. The hospitals have either hired three new FTE EMR support staff or increased their EMR support staff (Figure 3).

On an average, hospitals have also increased their IT Managerial staff to oversee these new EMR implementations (Figure 4).



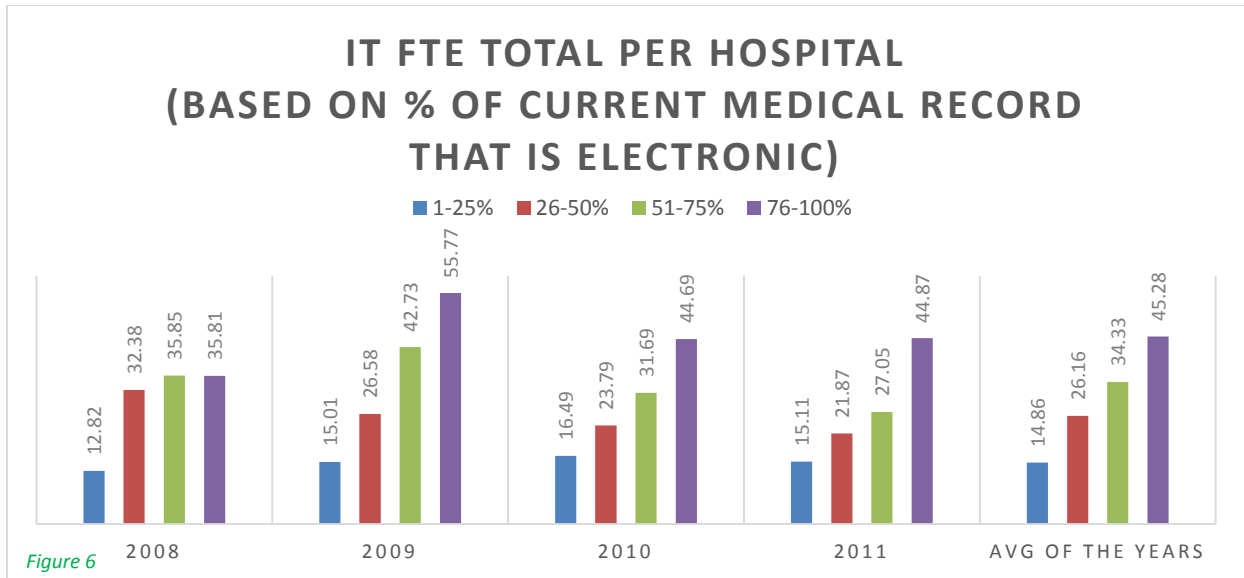


Apart from the EMR support and the managerial jobs, hospitals have been recruiting IT network administrators (Figure 5). In Figure 5, though the increase in network administrator jobs looks minor, the actual number of new network administrator jobs is nearly as many as the new managerial jobs (Figure 16).

These jobs trends (the increase in Network administrators, managers and support staff) are all geared to ensure that the EMR implementations are secure, completed on time and maintained properly.

There has not been an increase in the number of FTE for any of the other IT job categories. The data used to analyze the IT staffing breakdown was not available from all hospitals. Hospitals that did not report categorical breakdown of IT job functions were not included in the analysis for Figures 3, 4 or 5.

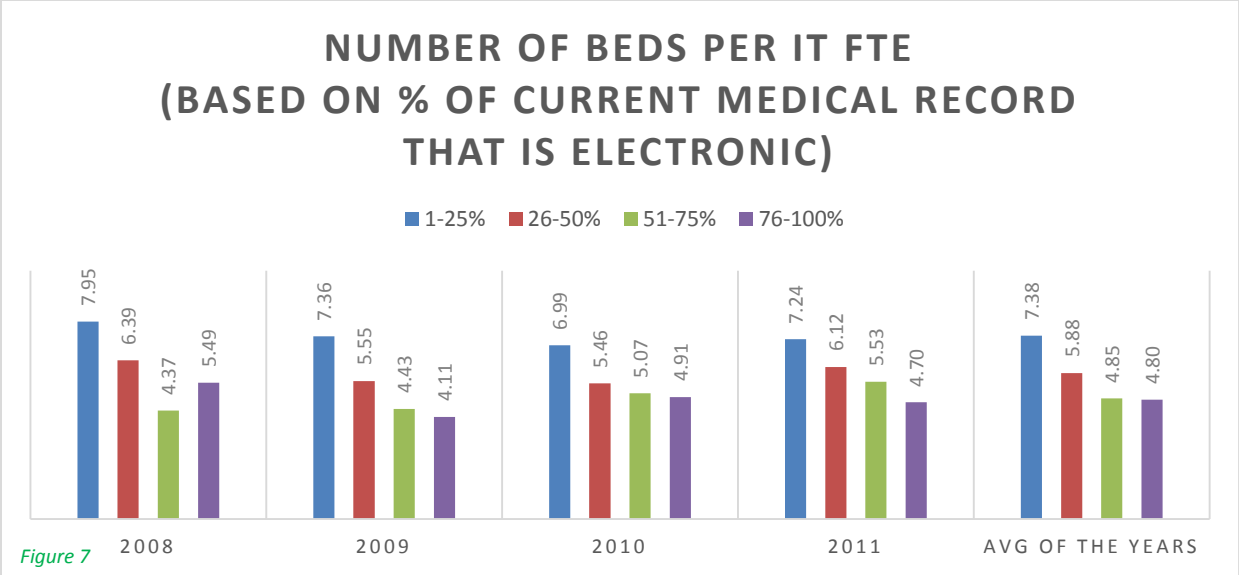
The HIMSS database also contained data about the percent range of the hospital's current medical record that is electronic (includes digital and/or scanned data). This data was broken down into 4 categories: 1-25%, 26-50%, 51-75% & 76-100%. Looking closely at the categorical data a better understanding of the staffing requirement to achieve complete EMR implementation emerges.



The observed trend of the number of FTE employed per hospital within a category illustrates that the percentage of EMR implementation parallels the FTE IT staff employed. On an average, hospitals that have 1-25% EMR implementation have about 14 FTE IT staff, hospitals with 26-50% EMR implementation have about 26 FTE IT staff and hospitals with 51-75% EMR implementation have about 34 FTE IT staff while hospitals with 76-100% EMR implementation have about 45 FTE IT staff (Figure 6).

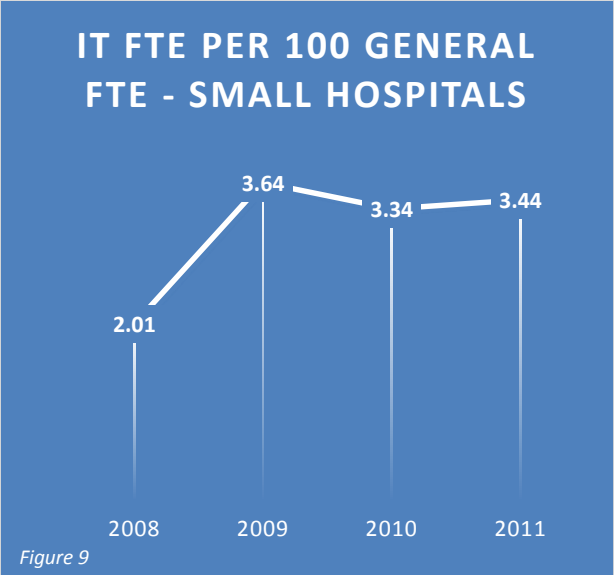
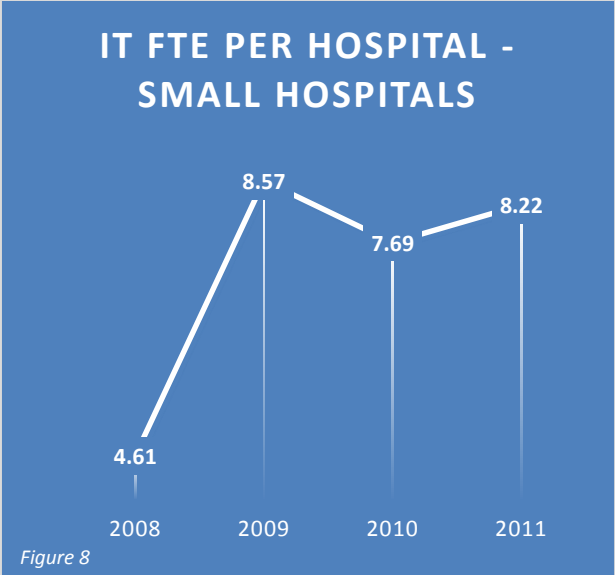
But this general overview has a bias since the hospitals that had higher percent of EMR implementation also included large hospitals. These large hospitals had more number of beds hence required more FTE IT staff. Taking this into account, the number of FTE IT staff required per bed was analyzed. Calculations reveal that hospitals with 51-75% EMR implementation and with 76-100% EMR implementation had nearly the same FTE IT staff ratio per bed, i.e. 0.208 and 0.210 respectively.

In other words, hospitals with 51-75% EMR implementation and with 76-100% EMR implementation have 1 FTE IT staff handling the IT needs for a maximum of 5 beds (Figure 7). However, the rest of the hospitals are understaffed. 1 FTE IT staff in hospitals with 26-50% EMR implementation handled the IT needs for nearly 6 beds and in those with 1-25% EMR implementation handled the IT needs for nearly 7 beds. If hospitals are looking to achieve more than 51% EMR implementation they should appropriately increase their staffing to a ratio of 1:5, i.e. 1 FTE IT staff handles the IT needs for a maximum of 5 beds in the hospital.

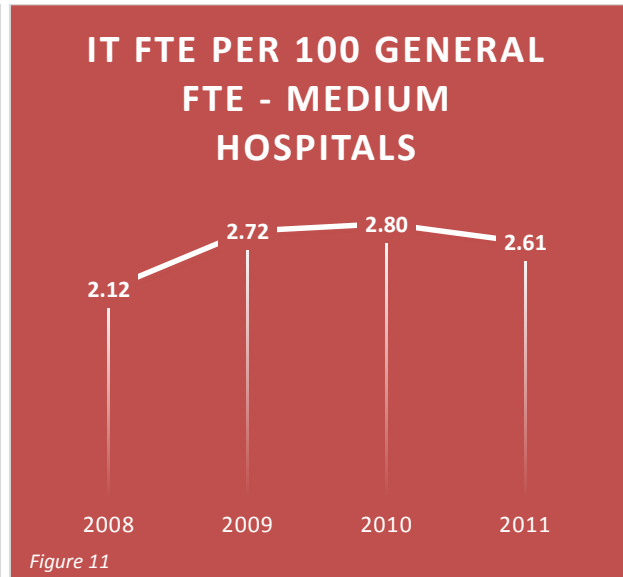
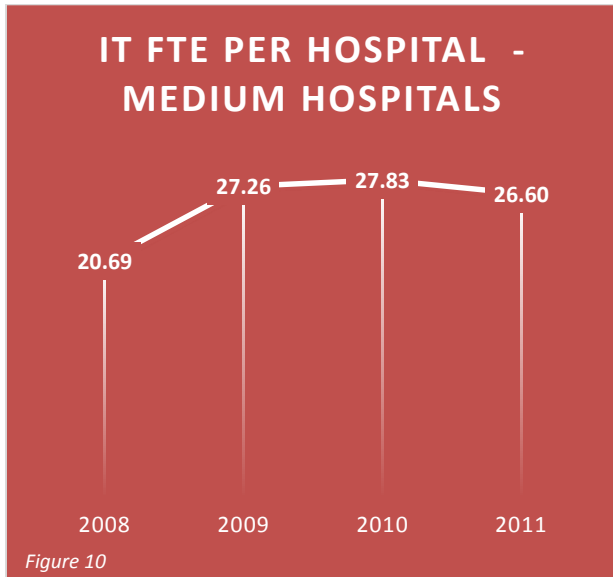


The hospitals are divided into 3 categories based on the number of beds count: small hospitals as those hospitals with up to 100 beds, medium hospitals with 101 to 300 beds and large hospitals with 301 or more beds (Katz et al., 2008). Analyzing the data from this viewpoint will highlight where the jobs have categorically increased.

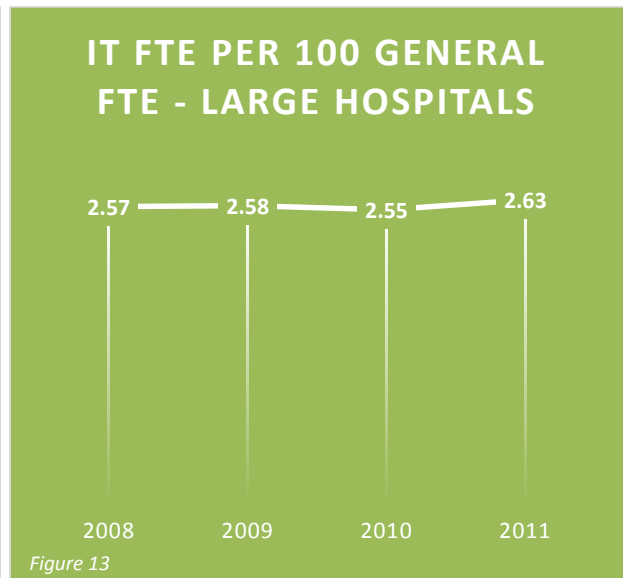
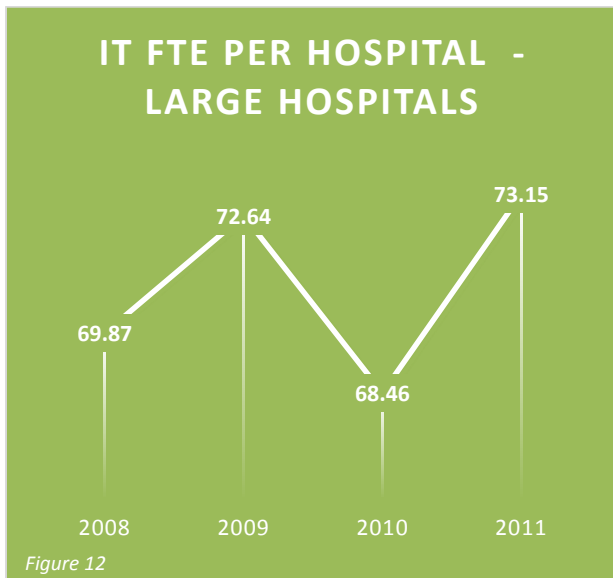
From this perspective, the trends illustrate that most of the hiring was in the small hospitals. These small hospitals had to double their IT FTE staffing numbers. The numbers were analyzed in terms of the proportion of IT FTE staff per 100 general all staff to ensure that this trend was not a part of an all-round hiring spree. Results revealed that the major staffing increase was in small hospitals that had to hire an additional 1.5 FTE of IT staff in proportion to their general staff (Figure 8, 9). This is nearly a 75% increase in staffing.



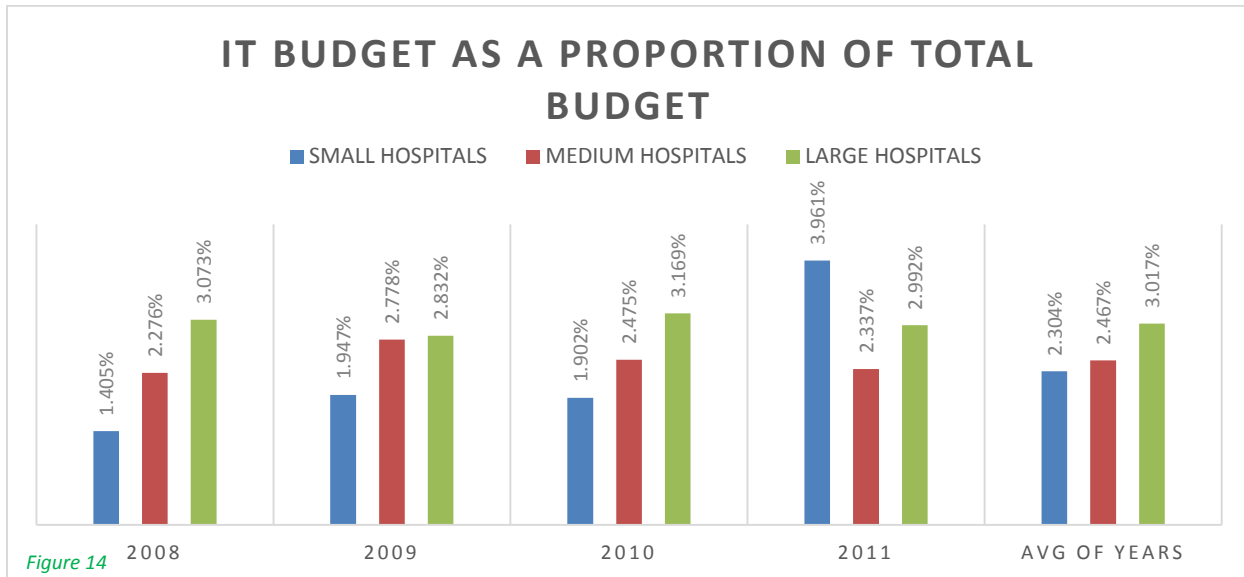
The medium size hospitals had to increase the proportion of FTE IT staff by at least 25% (0.5 FTE) to keep up with the technological changes (Figure 10, 11).



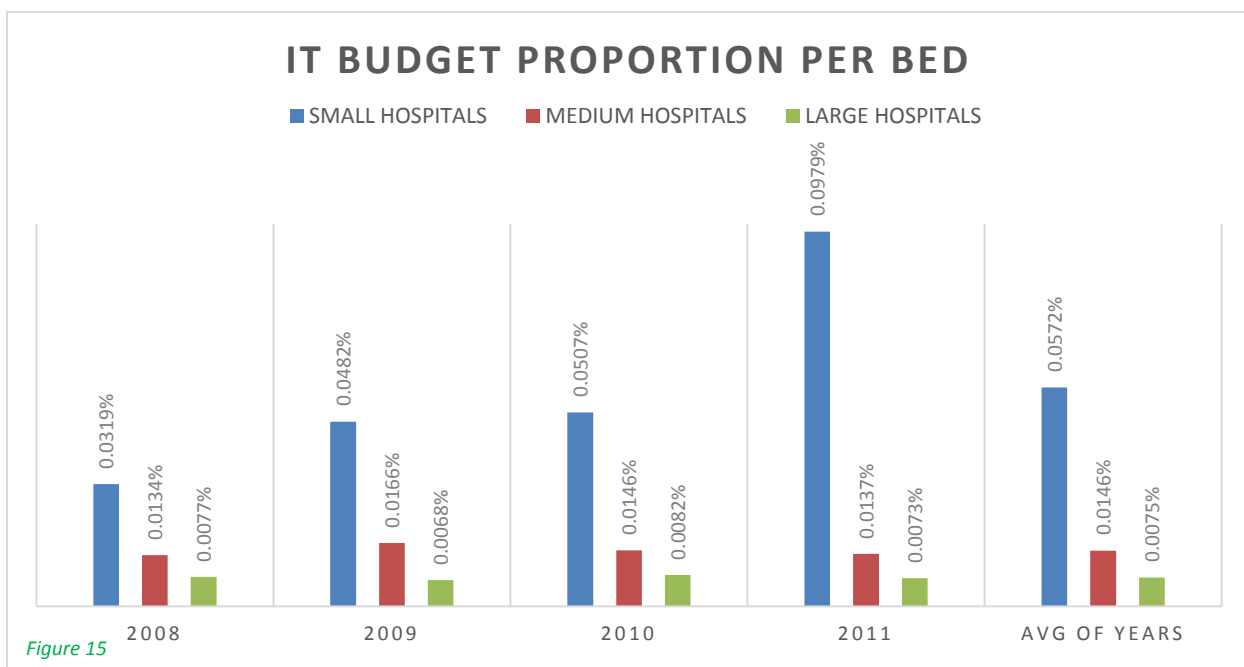
The staffing proportions in the large hospitals have not changed over the years. Though the large hospitals might still be hiring, this is part of a general staffing increase across the board. These hospitals might have moved towards EMR systems earlier than 2008 therefore not necessitating a disproportionate IT staffing increase (Figure 12, 13).



The breadth of data allows comparison of the IT budgets in terms of the hospital size. On an average, the small hospitals allot a lesser proportion of their budget towards IT, while the medium and large hospitals allot a larger proportion of their budgets towards IT (Figure 14). This seems to defy the concept of economies of scale.

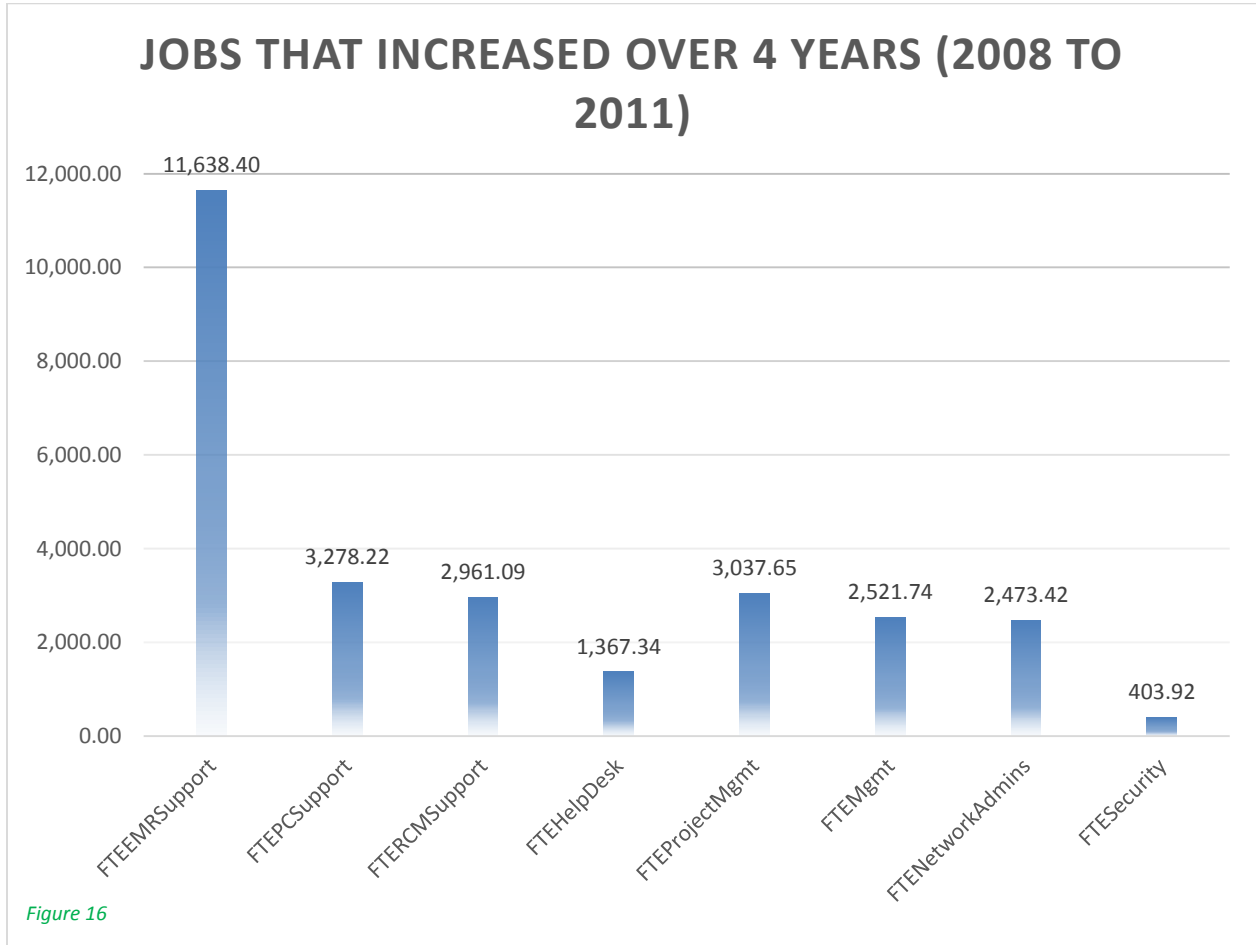


However, comparison in terms of the IT budget per bed reveals a different picture. The large hospitals are spending much less on IT per bed than the small hospitals. Hospitals also report the number of staffed beds, beds that are appropriately staffed to operate efficiently. On an average, the small hospitals are spending 7 times more per staffed bed for IT than the large hospitals. In 2011, the small hospitals spent 13 times more than the large hospitals (Figure 15).



In 2008, there were 5,010 hospitals and in 2011 there were 4,973 hospitals (Health Forum LLC). From our results and extrapolating the data using the Health Forum data, there were 124,489.51 FTE IT staff in 2008 and this number has increased to 147,299.68 FTE in 2011. This is an increase in 22,810.17 FTE over the 4 years.

Of these over 22,000 new jobs, nearly 12,000 jobs (11,638.40 FTE) have been EMR Support jobs. This means that 1 in every 2 new IT jobs in the hospital is for an EMR support staff (Figure 16).



It is also interesting to note is that the hospitals have reduced the number of programmers employed by a large number. Since 2008, hospitals have reduced the number of IT programmers employed by 3,272.75 FTE (Figure 17). This could be because the hospitals were buying EMR software from major vendors rather than developing the required technology in-house.





## Limitations

One of the limitations of the database from The Dorenfest Institute for H.I.T. Research and Education is that the data is self-reported. This makes us skeptical about the accuracy of the data, especially since the depth of the data is immense. We believe that the data might have low internal reliability. Self-reported survey data are usually fraught with self-report bias (Donaldson & Grant-Vallone, 2002).

We had initially planned to analyze the staffing data based on the EMR Adoption Model<sup>SM</sup> (EMRAM) score as was done by Hersh & Wright in 2008 for their paper “What Workforce is Needed to Implement the Health Information Technology Agenda? Analysis from the HIMSS Analytics<sup>TM</sup> Database”. But unfortunately the access to this EMRAM score data has now been restricted since the score is now protected by proprietary copyrights. We had to work around this by comparing the data based on the bed size and the percentage completion rates.

We were not able to predict accurately the staffing requirements to reach 100% EMR implementation since the data also included hospitals at 76% of EMR implementation in the same category. While this gives us an understanding of the staffing requirements, it does not give us the complete picture.

Each hospital reports its IT budget proportion as part of the survey but it is not clear if the reported budget includes the outsourced IT budget as well. It is unclear if the reported budget is only for the IT work done by the hospital staff. It could be presumed that the IT budget reported comprises of the outsourced budget as well. Therefore, it is difficult to compare the IT budget that might include the outsourced budget with the hospital’s staffing size and suggest effectively economical solutions. The small hospitals could be spending more per bed for IT due to various reasons; this might be because of high EMR implementation costs or due to the excessive costs incurred during outsourced IT operations.

The hospitals that reported their IT staffing as zero (0) were excluded from the analysis because the significance of this number is unclear. If this reported data is correct, it is not clear if the IT was outsourced. If not, it is ambiguous whether the hospital was just not disclosing or not collecting this data. This could be made clarified as part of the HIMSS survey allowing us to gain a deeper understanding about the number of hospitals that outsourced their IT operations.

The database survey does not seem to collect the IT staffing information about Clinical informatics staff. It is not clear whether these jobs are not classified under the IT department in the hospitals. Clinical informatics staff has long been considered as part of the healthcare IT (Health Informatics workforce survey by the National Health Service, 2006; Pelaez & Mohan 2013). It would be interesting to note the growth of this new field.

### **Implications for future research**

The whole movement towards EMR systems is to use the data towards meaningful use. It is extremely concerning to note that the small size facilities are outspending the large hospitals for their IT. Further investigation is needed to identify why these small hospitals are spending excessively. This would clarify whether the increased spending was allocated to IT staffing, the EMR systems or the outsourcing costs.

More research could be conducted in hospitals that have merged recently. The IT budget patterns, before and after the mergers, could be plotted to identify hospitals that are ripe for mergers. These data points could help the Mergers & Acquisition teams in giving them a better understanding about the benefits of the acquisition and help evaluate possible future acquisitions.

Once the EMR implementation is complete in all hospitals, the majority of the hiring is expected to be for EMR support staff and Clinical informatics staff. We need to track the number of EMR support staff required to run IT operations in hospitals with 100% EMR implementation. This would help hospitals better staff their own individual IT operations.

From the IT budgeting data, we notice that the small hospitals seem to be spending excessively when compared to the large facilities. This might mean that they do not have the cost benefits of a large hospital and indicates an excessive wasting of resources. Hospitals should look to merge if they are unable to reduce their spending to levels close to the national averages. Now that we have more data being collected, more research should be conducted into the each individual field. The healthcare expenditure in this country is excessive; we need to analyze each sector individually.

The US government has allotted \$118 million in funding for workforce development programs. Analysis needs to identify where the education allocation was spent and if the spending has been supportive of the market job trends that we have observed in this report.

## Conclusion

For any job seeker trying to enter into the healthcare IT sector, multiple job opportunities exist in the EMR support sector. In addition, rather than trying to find jobs in the large hospitals, they could try small hospital facilities that are hiring IT staff at a much higher rate. If they are well-versed with the EMR technologies, they could even move up to management positions that have shown a growth in the recent years.

The small hospitals seem to have a higher proportion of IT staff working. One of the major concerns is the spending. If these hospitals have reached close to 100% EMR implementation, they need to consider reducing their IT staff. They would need to run a lean IT operation to reduce their IT expenses.

If the small hospitals find themselves outspending despite a thorough audit, they need to consider alternatives to their current IT plans. They could consider strategic alliances with large facilities only for their IT requirements. All hospitals need to work together to cut costs. The healthcare expenditure in the United States is disproportionate to the value of the outcome received. We need to analyze each department individually, and work together as a nationwide collaboration of hospitals to minimize the excessive spending and try to improve outcomes.

Additional research is essential to determine the ideal lean hospital organizational size for all the departments including the Healthcare Information Technology workforce and the required education to train this workforce.

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# **MARKETING PLAN TO STRATEGICALLY PROMOTE A WEB BASED RESOURCE FOR HEALTHIER LIVING**

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## **ABSTRACT**

Many American adults and children struggle to manage their health. Diet and exercise are proven tools to help reduce weight and become healthier, and many people are looking for ways to track both. According to a 2013 survey by the Pew Research Center's Internet & American Life Project, 69% of individuals track health indicators such as diet, exercise and weight. The survey also reports that 1 out of 5 people use technology to track health indicators, and is most common in adults younger than the age of 30. Currently, there is a limitless supply of web based resources in the forms of websites or applications that are commonly used by people to monitor food intake and exercise. Healthier Days is one of these web based resources with its aim to reach and help lots of people. The purpose of this paper is to present a marketing plan that attempts to help Healthier Days generate the broadest exposure possible and establish a stronger presence with consumers. The PEST and SWOT analyses were used to produce valuable data focusing on the current industry of web based health resources. The data helped narrow down the Healthier Days' target market and yielded a comparative analysis of its top competitors using criteria such as strengths, weaknesses, marketing strategy, and pricing. A total of 1,474 distribution channels were identified in the Healthier Days' locality. These were comprised of 26 nonprofit institutions, 63 colleges/universities, 78 fitness centers, 75 nursing homes/long-term care facilities, 278 sports and recreation centers, and lastly 954 membership organizations. Healthier Days' services proved to be more costly in comparison to its competitors. Several strategies were developed to attract potential customers by focusing on the local market and lowering the cost of its services. Other strategies included increasing brand awareness and brand interest through the use of promotional items, popular social media, the adoption of a slogan, and also providing the alternative of a phone application for more convenient use.

Keywords: marketing, consumer, health, diet, exercise, web-based

## EXECUTIVE SUMMARY

Healthier Days is an online resource for healthier living with the goal of creating “healthier days through healthier ways” for the organization’s users. Primarily a web-based organization, Healthier Days was launched in 2010. The organization seeks to meet its mission to help people pursue and experience healthier days through healthy living by offering users access to its resources through the sale of gift certificates.

Healthier Days primarily seeks to engage users from universities as well as disease-specific charitable healthcare organizations. As a wellness resource, Healthier Days looks to work with other organizations to expand its expertise and creative thinking to be the best resource it can possibly as well as always improving.

The objective of this marketing plan is to achieve the broadest exposure possible through the sale of Healthier Days Gift Certificates. Users can purchase gift certificates in a variety of different time lengths through the Healthier Days website or by contacting the organization directly via telephone or email.

Table 1. Healthier Days Gift Certificates

<b>Subscription</b>	<b>Price*</b>
30 Days	\$15.00
60 Days	\$30.00
120 Days	\$60.00
180 Days	\$90.00

\*excluding the cost of any optional cash rewards.

Healthier Days website offers a variety of products allowing users to create their own plan to produce healthier days. The scope of service line includes resources for managing health conditions, healthier day stories from other users, tips for eating healthier, exercising, and weight loss. It also includes tools such as a BMI calculator and journal to track progress as well as a My Programs portion for users to plan their weekly approach to eating healthy, exercising, and doing good for others. The My Action Record shows users the actions they need to complete each day for their self-determined program and the Score Card allows users to view their progress. Healthier Days also includes recipes for healthy cooking and links to top-rated articles. Finally, users can “ask the coach” questions in regards to healthier living in which a staff member will respond back to them within a timely fashion.

Being a web-based organization gives users the power to access this health resource when it best suits their schedule as well as while on the go. Through this analysis, Healthier Days aims to

market its services to achieve the broadest exposure possible through the sale of gift certificates to help its users see the benefits of producing “healthier days”.

## **SITUATIONAL ANALYSIS**

### **A. Industry Overview**

The current healthcare system is comprised of consumers who struggle to manage their health. Many of these include people with chronic conditions or are at risk of having these conditions. Electronic and virtual tools have been proven to help people monitor these conditions and ultimately improve their health. The statistics below highlight the prevalent use of these resources.

#### **Social Changes**

- 69% of individuals track health indicators such as diet, exercise and weight [10].
- One in five use technology to track health indicators [10].
- 62% of adults with two or more chronic conditions track health indicators [10].
- 75% adults have high blood pressure and 45% have diabetes [10].
- 54% of trackers with two or more chronic conditions track on a regular basis, 46% track with one condition, 43% with none [10].
- 46% of trackers say this activity has changed their overall approach to health [10].
- 16% 18-29 year olds use an app or mobile device or other device to track health compared to 9% 30-49 year olds and 3% 50-64 year olds and 1% 65 years and older [10].

Based on this data, various organizations are designing ways to encourage people to make a healthy lifestyle a priority. People are living longer. Therefore, they need to be in good health to ensure healthcare costs may be reversed.

#### **Economic Reimbursement**

According to 2008 survey by Harris Interactive, 91% of employers believed they could reduce health costs by influencing employees to adopt healthier lifestyles [4]. Employers are enforcing no tobacco policies in and out of work, and are also providing incentives to lose weight using gym memberships. There are also discounts on health premiums if health standards are met, and additional premium charges if standards are not met [10]. 52% of large employers use financial incentives along with their wellness programs [6].

#### **Demographic Changes**

There is an increase in the population over 65 years and a decrease in the younger population. The state of Pennsylvania ranks 4<sup>th</sup> in US with one of the highest populations of people 65 years and older and 3<sup>rd</sup> in those 85 years and older [7]. The projected population of people 65 years and older in the state of PA by 2030 is 2.89 million and .42 million for those 85 years and older [7].

#### **Health Delivery Changes**

In Pennsylvania the numbers of physicians are not growing. 50% of physicians are over the age of 50 years and less than 8% are under 35 years old [8]. National shortfall of physicians



projected to drop to 55,000 in 2020 [8]. Patient-centered medical homes are also evolving. As the population ages, there is a shift from acute care to chronic care. There is also an increasing presence of other health delivery changes such as retail clinics, accountable care organizations, and telemedicine. Healthcare is transitioning towards a consumer centric environment, particularly as patient satisfaction could impact reimbursement.

### **Regulatory Changes**

HIPPA accounting of disclosure rule is still under debate but in process of discussion [5].

HIPPA/HITECH Omnibus Final Rule- strengthens privacy and security protections for health information [5].

## **B. Service Overview**

### **Strengths**

The cornerstone difference with Healthier Days is that it prides itself on allowing users to set up their own plans. Knowing that the individual is the best person to determine what may work for them. They also include opportunities to complete good deeds in addition to meeting health and fitness goals. This allows members to accumulate points as a reward system that can be linked to incentives. The website also includes information on wellness topics and an “Ask a Coach” feature that provides assistance to members to answer their health related questions. Emails and reminders can be set up and your health plan can be adjusted at any time.

The value in this product is that it is a tool that can help individuals with behavior change. Employee Assistance Program providers could utilize this resource as a tool to show staff the types of healthy behaviors that are important to the company which in turn, reduces healthcare costs. By having members collect points on the website, once a set amount is determined could lead to discount incentives on health insurance premiums, wellness services or gym memberships. If an app could be developed a check in feature could be added to link the website and the membership showing the employer that in fact, the service has been utilized. Other referral sources may like this tool for its emphasis on expert articles about healthy living.

### **Weaknesses**

According to a Pew Internet Study (2013), 1 in 3 American adults have gone online to seek health information. Of which, 26% of internet users who looked for answers to their health related questions were asked to pay for access to that information, only 2% elected to proceed with payment. Eighty-three percent looked elsewhere for the same information and thirteen percent gave up searching [1]. This shows “health seekers” are primarily looking for health information that is accessible free of charge. Given that major competitors like Web MD or LiveStrong provide health information for free online, it may be difficult to generate new memberships from search engines. Providing a trial membership may be an opportunity to turn

this limitation into a strength by allowing potential members to identify the value in creating one's own plan.

### **Opportunities**

The reality is that according to Pew's Health Tracking study, 8 out of 10 online health inquires start within a search engine, [2]. This creates a tremendous opportunity to improve website optimization to improve website visibility. If individuals can spend time on the website while searching for solutions to their high blood pressure, they may decide the Healthier Days plan is for them. Fox and Duggan identified that women are more likely than men to look up a health condition online as well as younger people, white adults, and individuals making \$75,000 or more or those with advanced degrees. This information provides opportunity to create a web experience that most closely represents the needs of this market. If the website is unable to compete with other resources, this market will move on. Society as a whole benefits from healthier communities. This results in reduced healthcare spending, more good deeds, and happier neighbors.

### **Threats**

The largest obstacle for Healthier Days to overcome is the amount of free programs and resources available that are often backed by large organizations like Web MD or the Mayo Clinic. Often the business model surrounding large websites and free applications is focused on selling advertising space. By creating the infrastructure that keeps target demographics engaged while increasing page views, a consistent revenue stream is able to be sustained. In an interview with techcrunch.com My Fitness Pal founders, brothers Mike and Albert Lee indicated that the website has grown to more than 40 million registered users. They report that they have not focused on their business model initially and simply, "slapped some ads," onto the website. They have worked through an ever growing to do list by addressing three items at a time. They most recently focused on raising money to expand their team and create new and exciting partnerships with other tracking tools. The brothers have raised \$18 million in their first round of funding and have recently partners with popular tracking tools such as Fitbit, Endomondo, Runtastic and Body Media [2]. This is a free service that offers high valued tracking tools, a comprehensive 2 million item food data base as well as an online community for its 40 million registered members. Given the current trends in social media, it is difficult to compete in this target market when data is so readily available, comprehensive and free.

## **TARGET MARKET**

Healthier Days' has established its target market as those age twenty-one and older whom are educated and interested in health and/or chronic health information for themselves or a loved one they are caring for. Initially, Healthier Days will choose nonprofit institutions, college/universities, fitness centers, nursing home/long-term care facilities, sports and

recreations, and membership organizations, within Dauphin and Cumberland County of Pennsylvania as its distribution channels for marketing Healthier Days memberships.

Healthier Days will focus on targeting the individual associated with the following distribution channels. Looking first at the twenty-six nonprofit institutions in Dauphin and Cumberland County, there is an industry opportunity for pursuing this distribution channel based on their favorable demographics (i.e. older adults and estate donors) experience with internet donations, and vast utilization of social networking platforms. These nonprofit institutions are primary grant making foundations and health fund-raising organizations with fifty or less employees [3].

Next, there are sixty-three college and universities in Dauphin and Cumberland County. Research shows there is a great deal of industry opportunity marketing to this distribution channel. There is vast array of student/faculty demographics, there are a significant number of computers in the classroom setting, and educational institutions are looking for more creative learning techniques to improve student engagement. Also, colleges and universities are offering student vouchers for healthier programming as well as making their recreation and food services more appealing. Of the sixty-three, fifty-five are classified as colleges and universities and eight are classified as community colleges with five thousand employees or less [3].

The third distribution channel will be the seventy-eight fitness centers in Dauphin and Cumberland County. There is an industry opportunity to pursue this distribution channel based on the increasing health and obesity concerns of the United States population as well as the aging populations shift towards exercising in a social setting. Fitness centers are able to offer customizable programs and services as well as form corporate partnerships such as well hospitals and manage care centers making access to fitness centers more affordable. Fitness centers tend to have less than fifty employees [3].

The fourth distribution channel Healthier Days will pursue is nursing homes/long-term care facilities. These seventy-five facilities in Dauphin and Cumberland County have less than five hundred employees and are mainly classified as privately owned. Initial research shows there is an industry opportunity for pursuing this channel based on the fifty percent anticipated increase over the next fifteen years in the number of people in the United States over the age of sixty five [3].

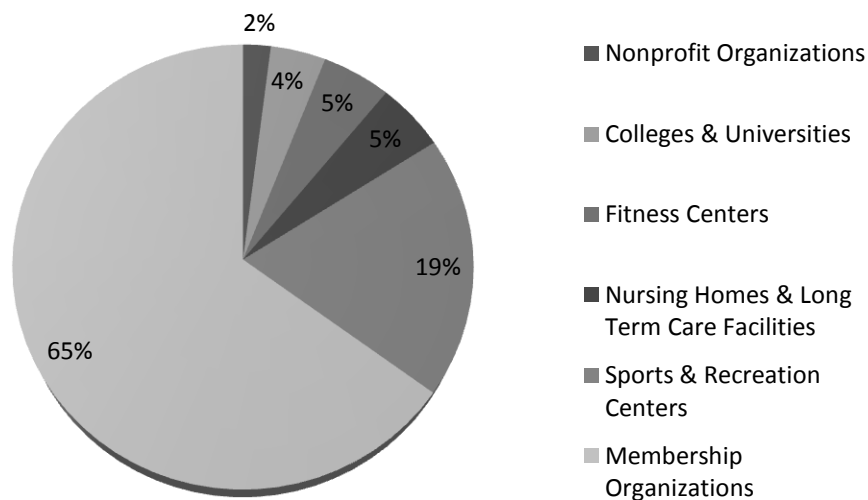
The fifth distribution channel Healthier Days will pursue is the two hundred and seventy eight sports and recreation services within Dauphin and Cumberland County. These facilities mainly have staffing of less and 100 employees. There is an industry opportunity for pursuing this channel based on their model of looking for new and additional features in order to attract and sustain users. This industry also heavily uses social media marketing to attract potential

customers similar to that of Healthier Days. Also, the cost of recreation services has remained relatively stable as opposed to other industries rising costs [3].

Finally, there are nine hundred and fifty-four membership organizations in Dauphin and Cumberland County. This distribution channel aligns with the structure of Healthier Days which serves as an industry opportunity for marketing to potential Healthier Days users. Members are primarily engaged through social media outlets. Dues are flexible, where rates are determined based on the member or discounts are offered based on educational status. Membership organizations also generate revenue through attending trade-shows, conferences, and seminars. Also member research is generally conducted through surveys, interviews, and online panels. The majority of the distribution channel is classified as membership organizations, two hundred and two are business and professional associations, and eighty-two are classified as labor unions. They consist of fifty or less employees [3].

Healthier Days is bringing an innovative web-based health resource to potential users within Dauphin and Cumberland Counties nonprofit institutions, college/universities, fitness centers, nursing homes/long-term care facilities, sport and recreation centers, and membership organizations. These users will have the opportunity become better educated and be able to better manage their health information or that of a loved one thus producing “healthier days through healthier ways.” Organizations in the initial target market will choose Healthier Days because it is an easily accessible, flexible, and adaptable resource the aims to help users improve health outcomes.

Figure 1. Target Market Distribution Channels



## COMPETITIVE ANALYSIS

How important is health, particularly within the context of obesity, diet related illness and sedentary lifestyle? Many Americans are trying to lose weight or change their lifestyle with diet and exercise. Unfortunately, it is not an easy task. Many people have tried to do it on their own but lack the motivation, tools or capacity to do it. Maintaining a healthy diet, weight and exercising can be challenging. Many people seek the assistance of structured programs to help simplify this process.

Traditionally, fitness and wellness programs are confined to the walls of a gym or bizarre diets. In this technological era, many consumers are looking for convenient and innovative ways of improving their health and lifestyle habits through the use of the internet. According to the Pew Research Center, 77% of internet users have searched the internet for health information; 60% of U.S adults say they track their weight, exercise, and routine. Due to this high demand, the availability of health information in the form of virtual health websites on the internet has also skyrocketed.

Healthier Days is a virtual based health community aimed at improving the overall health of its members. It provides resources to customers, who want to lose weight, exercise or simply improve their lifestyle. Healthier Days has unique features and thrives to ensure high quality services to online customers. However, it is not the first of its kind based on the results of a Google engine search. Virtual health communities such as Weight Watchers and LiveStrong are very popular and can be searched for by their names. Other searches with phrases like “online fitness programs” or “online weight loss programs” yield results such as Lose It and My Fitness Pal among many others. These searches have been narrowed down to ten top competitors (five of which are very well known) based on their strengths, weaknesses, target markets, marketing strategies, and costs. They are listed below:

1. Lose It
2. My Fitness Pal
3. Weight Watchers
4. LiveStrong
5. Fit Day
6. HealthCare4Me
7. Map My Fitness
8. Ace Fitness
9. Spark People
10. Daily Burn

A few questions need to be answered in order to determine how effective Healthier Days is regarding the needs of its customers. How important is a virtual health website? Should it meet the individual needs of each customer? Should it offer unique features that other competitors do not have? Should it provide incentives to customers in the form of a free trial or discount? A comparative analysis of these competitors provided some definitive answers to these questions.

Table 2. Comparative Analysis of Top Five Competitors

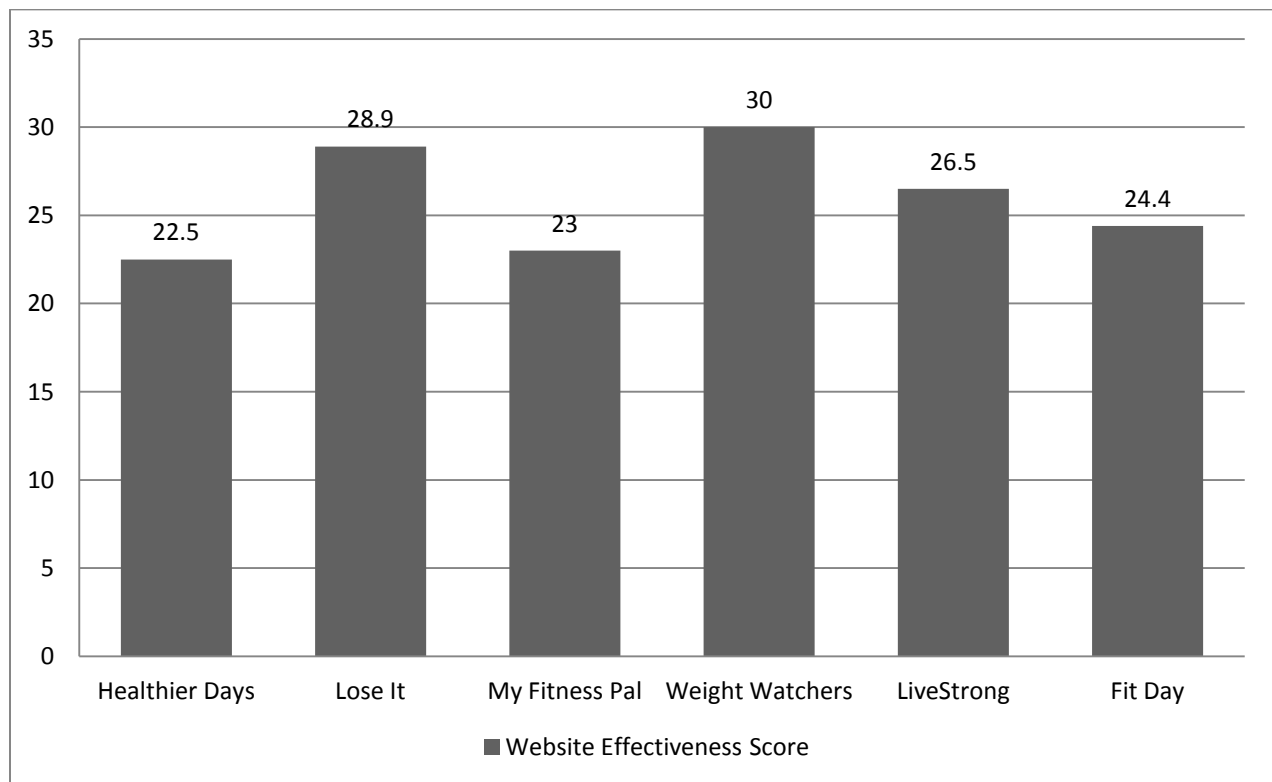
<b>Competitor</b>	<b>Lose It</b>	<b>My Fitness Pal</b>	<b>Weight Watchers</b>	<b>LiveStrong</b>	<b>Fit Day</b>
Strengths	Website or phone applications	Website or phone applications	Website or phone applications	Website or phone applications	Stresses community involvement
	Links to popular social media sites	Links to popular social media sites	Links to popular social media sites	Links to popular social media sites	Links to popular social media sites
	Community involvement through healthy competition	Community involvement through message boards	Encourages healthy food choices through patented point system	Offers a Spanish version of its program	Offers access to registered dieticians
	Encourages healthy food choices through calorie tracker	Food database with recipes Member of the month	Stresses community involvement	Encourages healthy food choices through “My Plate” calorie tracker	
Weaknesses	Expensive	Limited promotion about healthy eating	Expensive	Frequent unnecessary ads	Frequent unnecessary ads
Marketing Strategy	Customizing each customer experience	A non-restrictive environment for users to eat what they want in moderation	Utilizes television, radio, and web based marketing.	Utilizes television, radio, and web based marketing	Utilizes web based marketing through social media
	Tracking total pounds lost by all its members		Use of celebrity and non celebrity success stories	Capitalizes on popularity of its brand	
Target Market	All individuals	All individuals	All individuals	All individuals	All individuals
Pricing	Free	Free	\$29.95 signup fee with \$19.95 monthly fee	Free	Free
	Premium version is \$39.99 yearly			Premium version is \$9.99 monthly	Premium plans are \$4.16-\$39.95

Table 3. Competitive Website Analysis Results\*

Website Effectiveness Criteria	Healthier Days	Lose It	My Fitness Pal	Weight Watchers	LiveStrong	Fit Day
Clear Communication	4.6	4.9	4.3	5.0	4.4	4.3
Brand Consistency	4.0	5.0	3.8	5.0	4.5	4.3
Easy Navigation	4.2	5.0	3.8	5.0	4.3	3.8
Search Engine Optimization	3.8	4.8	3.2	5.0	4.6	3.6
Conversion Forms	4.0	4.3	4.1	5.0	4.1	3.6
Analytics	2.0	5.0	3.8	5.0	4.5	4.8
<b>Total</b>	<b>22.5</b>	<b>28.9</b>	<b>23.0</b>	<b>30.0</b>	<b>26.5</b>	<b>24.4</b>

\*Results are based on a series of questions with response values ranging from 1 being the lowest to 5 being the highest.

Figure 2. Website Effectiveness Scores for Healthier Days and Top 5 Competitors



## OBJECTIVES AND RECOMMENDATIONS

Our findings show that Healthier Days' costs more in comparison to its top competitors and could develop the analytic components of its website. Various strategies were designed to generate a wider customer base. Based on the distribution of its target market, Healthier Days has several channels to explore. Also, its major objectives should include increasing brand awareness and brand interest through the use of promotional items, popular social media, the adoption of a slogan, and optimizing its online search presence via search engine optimization. It could also increase user trials and adopt new members by using a QR code and providing the alternative of a phone application for more convenient use.

The utilization of social media through blogging, social networking sites such as Facebook, Twitter, and LinkedIn will be essential to increasing brand awareness and interest. Photo and video sharing through mediums such as YouTube, Flickr, and Instagram will also play a key role. These tools will help educate users and solicit feedback as well as recognize milestones reached by users. They serve as an opportunity to engage, communicate, and invite others to join an interactive online dialogue about health promotion. It also keeps stakeholders updated and informed while creating a digital identity.

Healthier Days can also optimize its online presence by using site and keyword analytics to discover what terms its prospective audience is searching for to ensure search engines direct those individuals to its site. This can be achieved by submitting its URL to search engines, site aggregators and directories. It can also add an RSS button so readers can subscribe to feeds from its website, blogs, or social networking sites. In addition, the distribution of promotional items such as welcome packages, notepads, clothing, mugs, pens and wristbands showcasing a new slogan to members or potential members will help increase brand awareness. Healthier Days can also increase user trials primarily through direct selling to fitness centers, nonprofits, and academic institutions via a variety of methods to include Clipper Magazine, Double Take Offers.com and gift card distribution of \$10 (one free month).

Customer loyalty is crucial to a website survival. Healthier Days should provide unique experience, incentives to customers, and implement strategies that promote growth. One way of adopting new members is by establishing a customer loyalty program that could provide a discount to existing member by encouraging them to bring in family members, friends, and co-workers. Also, establishing a fundraising program and requesting support from organizations within its distribution channel could also prove to be successful. Other important ways to gain new customers is collecting demographic data about all members to help with tracking and retention purposes, and requesting feedback from members to improve website services.

Healthier Days can monitor the success of these objectives with key performance indicators (KPI) and targets. The table below shows these KPIs and targets:



Table 4. Key Performance Indicators and Projected Targets by the end of First Quarter

<b>Key Performance Indicator</b>	<b>Target</b>
No. of Blog Contributors	10
No. of Blog Followers	20
No. of Microblog Followers	20
No. of Likes – Facebook	500
No. of Requests on LinkedIn	20
No. of Likes- YouTube	500
No. of Views on Instagram	100
No. of Double Take Offers	50
No. of Gift Cards Redeemed	100
No. of New Memberships	50

Therefore, consumers are actively seeking healthcare information and data using virtual resources to improve their health. These resources are convenient and innovative. Many adults have seen improvements in their health status with the use of these websites and/or phone applications. Healthier Days can meet its goal of providing an integrated and seamless resource to help its customers manage their health by increasing its brand awareness and interest. Based on the data presented in this study, it will need to adopt social media as a driving force to access many members of its 1474 distribution channels. Promotional items and a slogan will help this process as well as creating a stronger presence online through search engine optimization. Health management tools are evolving rapidly and Healthier Days is moving in the right direction.

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**Unauthorized Downloading and Purchasing Intention of  
Digital Culture Products Through Online Streaming  
Services: The Relevance of Exchange Interface Attributes**

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**Proceedings Northeast Decision Sciences Conference 2014  
Philadelphia, PA  
March 27–29**

**ABSTRACT**

Because of the special nature of digital culture products, such as the near zero costs of duplication and distribution, and easy manipulation of digital bits, preventing unauthorized file sharing is difficult. Digital rights management tools are not foolproof and can often be circumvented or rendered obsolete by new technologies. Deterrence strategies are sometimes impractical or not socially feasible. Another approach is to offer the consumer an attractive alternative based on the online streaming of digital content. This paper presents the results of an empirical analysis that examined characteristics of the interface through which digital products were streamed and its impact on both the intention to adopt an online streaming music service and unauthorized downloading intention. Perceived ease of use was positively related to both perceived website enjoyment and perceived website usefulness. In turn, perceived website usefulness and perceived website enjoyment were found to be positively related to purchasing intention an online streaming music service. Perceived website usefulness of a legitimate online streaming service was found to be negatively related to unauthorized downloading intention.

## **Introduction**

The issue of digital piracy has been of great concern and the subject of ongoing research for quite some time. Early on much of the focus was on software and direct unauthorized exchanges among relatively small groups of individuals who copied files from one disk to another. Later, the focus shifted towards developing an understanding of the nature of large-scale unauthorized file sharing of music and film over P2P networks. Increasingly, the concern has come to also include the unauthorized use of digital products more generally as technology evolves and presents consumers with new opportunities to use products in ways not sanctioned by the copyright owner. For example, individuals can now easily share e-books and computer games without permission. It is becoming easier to modify and repurpose digital products to create unauthorized mashups, anime, machinima, and amateur films.

The extent of unauthorized file sharing specifically is quite significant. According to a report by Envisional Limited dated January 2011, excluding pornography, 23.76% of all global Internet traffic and 17.53% of all U.S. Internet traffic was infringing [25]. In P2P file sharing networks, 86.4% of all traffic, excluding pornography, was infringing [25]. These figures suggest that significant economic harm to the entertainment and publishing industries is probably occurring. This affects not just copyright holders, but also the many individuals who work in the industries including artists, writers, filmmakers, technicians, investors, and numerous other professionals.

High rates of unauthorized file sharing have been attributed to several factors. They include evolving technical, economic, and social developments such as the size of the global Internet commons. It is a function of the pervasiveness of social and file sharing networks and the increasing availability of broadband connections to the Internet. Powerful computers and software that facilitate unauthorized file sharing have become increasingly accessible and

inexpensive. Widely available digital content is no longer anchored to physical containers that in the past could impede certain forms of unauthorized use. Easier to use software tools allow the average user to more easily circumvent usage restrictions.

Consumers also seem to have largely rebelled against a business model that tried to force the purchase of unwanted bundles of music such as albums. Consumers have increasingly demanded the ability to purchase individual songs. As a result, contemporary business models that deliver content as digital downloads and online streams have become increasingly popular, as reflected by the relative success of companies such as Apple, Spotify, Rhapsody, YouTube, Netflix, and others.

The nature of the products offered by various companies differs significantly in terms of usability, esthetics, and the value proposition. If a consumer is provided with a compelling user experience, as a function of consumption parameters, object characteristics, and the exchange interface attributes, it could persuade the individual to adopt an online service for music streaming or downloading. It might also dissuade an individual from unauthorized file sharing, and there is some evidence to support this possibility.

In a survey done by the NPD group, the volume of illegally downloaded music files from P2P services declined by 26 percent in 2012 compared to the previous year, and one of the possible reasons cited was the increasing availability and adoption of online streaming services [72]. Aside from this report, we still have limited empirical evidence to support the causal validity of whether the availability and adoption of online streaming affects unauthorized downloading in any way. This study examines whether the characteristics of the exchange interface can affect an individual's willingness to adopt an online streaming service.

## **Literature Review**

Unauthorized file sharing in its various forms has been examined in numerous theoretical and empirical studies from various perspectives. One consistent set of findings indicates that there is a negative relationship between both age and education level, and unauthorized file sharing and, in addition, men are more likely to engage in this behavior [4, 11, 15, 29, 32, 37, 43, 46, 58, 76, 89, 90, 99]. These results are largely descriptive correlations. Other studies have examined a wide range of causal effects, and include those related to environmental conditions, sociocultural factors, ethics, technology, product utility, and psychological factors.

### *Environmental Factors*

Unauthorized file sharing has been linked to political and economic instability. It may be that unstable conditions contribute towards creating a climate of anxiety and apprehension that encourages opportunistic behavior [54]. Such behavior generally diminishes when there is economic prosperity and products become more affordable [67, 69]. This is consistent with studies that show a negative relationship between unauthorized file sharing and personal and household income [10, 32, 46, 51, 58] and national wealth [5, 24, 28, 29, 49, 81]. However, how wealth is distributed seems to matter. A high level of inequality, which may feed general perceptions of economic and social unfairness, has also been linked to high rates of unauthorized file sharing [6, 49, 51, 81].

Researchers have noticed that economic freedom, transparency, lower levels of regulation, good governance practices, and the extent to which societies operate with liberal democratic political systems that protect social and civil rights are all associated with lower rates of unauthorized file sharing [8, 10, 79]. There is evidence to suggest that in overly regulated economies that are characterized by high tariffs, fees, and taxes may produce and sustain a

climate of evasion and corruption that is linked to higher levels of unauthorized file sharing [7, 8, 81].

Open societies tend to produce a larger amount of intellectual property that has economic and cultural value. This may contribute to a broad realization that it is in the common interest to protect intellectual property. As the creative and knowledge based industries such as media, entertainment, and software become more important within a society, there is often a noticeable shift in attitudes that is less tolerant of intellectual property theft [12, 29, 51].

### *Sociocultural Factors*

There is a consistent positive relationship between subjective norms and various forms of unauthorized use [4, 18, 61, 77, 84, 101]. An environment in which unauthorized file sharing is common and socially acceptable can influence individuals adopt the behavior [32]. Peer beliefs can be very influential [3]. One reason for the link could be that the act of sharing digital culture products helps to produce social bonds and helps an individual achieve acceptance by the group [47, 58, 59]. Social learning theorists note that individuals observe, learn from, and emulate their peers [37]. By observing the social consensus, individuals learn what behaviors are appropriate and acceptable [14, 17]. This is one of the reasons that beliefs regarding the acceptable use of digital products may vary by context [50].

Unauthorized file sharing may also be influenced by certain cultural traits and values. Researchers using Hofstede's cultural framework have empirically established a positive relationship between collectivism and an individual's willingness to engage in unauthorized file sharing [24, 49, 65, 67, 69, 86, 88, 102]. Other studies have indicated a positive relationship between unauthorized file sharing and the cultural traits of masculinity [69] and power distance [24, 88].



### *Ethics*

Among the most examined issues with respect to unauthorized file sharing is the role of ethics in regulating behavior. Numerous studies have established a link between ethics and various forms of unauthorized file sharing [18, 29, 32, 62, 73, 85, 93, 94, 95, 96, 101, 104]. However, the role of ethics is context specific. For example, ethical evaluation of unauthorized file sharing varies by culture [28, 55]. It can vary among specific groups such as college students who often view unauthorized file sharing as quite acceptable [13].

### *Product Utility*

For the average consumer, the decision to purchase a product often comes down to whether the benefits outweigh the costs and numerous studies support this utility perspective [20, 56, 63, 73, 101]. The price of a digital product is the most obvious cost factor and is a key driver of unauthorized file sharing [11, 14, 28, 57, 58, 59, 67, 70, 77]. Increasing the risks associated with the behavior is one way to decrease the utility of a product acquired through unauthorized file sharing and is the rationale for a strategy of deterrence.

Deterrence takes into account consumer risk aversion and the perceived probability of being caught [14, 17, 30, 48, 60, 61, 68, 70, 77]. This strategy can involve increasing the technical, social, and economic risks of downloading an unauthorized product and is often more effective than preventative measures that are based on digital rights management technologies [30]. The key to effective deterrence is that it must be visible, vigorous, and credible [45].

### *Psychological Factors*

Risk does not always have the same deterrent effect for all consumers and it depends a great deal on the type of risk involved. Some consumers are risk averse, while others are risk seeking. Some are more sensitive to financial and prosecution risk. Others are more sensitive to social

risk. In general, those who are more risk seeking will be more open to engaging in unauthorized file sharing [27]. Their fear of being caught is either diminished or adds an appealing element of excitement or challenge. In some cases, a consumer's need to seek out novelty can overwhelm their fear of risk [21, 27, 61]. For others, ignoring risk and pursuing a course of action could reflect a lack of self-control [35, 36, 37, 38, 39, 40, 41, 42, 56].

Risky behavior may be the result of self-positivity bias. Self-positivity bias is a measure of confidence in one's good fortune [56]. It is an irrational and unrealistic sense of optimism [66, 103]. Those with a high self-positivity bias tend to believe that they are less likely than others to experience misfortune such as accidents, crime, or loss of employment. With respect to unauthorized file sharing, they believe that they are less susceptible to being caught [66].

### *Technology*

Digital rights management systems can have a significant impact on preventing the unauthorized use of digital products [19]. The components of a digital rights management system vary widely in terms of function and complexity. For instance, simple watermarking can preserve the provenance of digital content and facilitate tracking and monitoring [71]. Tamper proofing and code obfuscation can thwart the ability to reverse engineer a product [19]. Hardware keys and code customization prevent unauthorized file sharing by tying a digital product to a piece of hardware and can be very useful in places where the enforcement of laws are lax [92]. Code customization appears to be a growing trend among some businesses as a way of dealing with software piracy in particular [44].

Digital rights management technology may discourage some consumers from purchasing a product outright, but it can also drive others to circumvent protection schemes. In many cases, deterrence strategies, such as the threat of legal action, are superior and may increase profits for

the copyright owner [30]. While many digital rights management technologies are effective, they can quickly obsolesce due to innovations or changes in the marketplace. One well-known example is the Content Scrambling System used for DVDs. It was rendered obsolete when Jon Lech Johansen made the descrambling code available on the web in order to provide the Linux operating system with DVD support [1].

### **Theoretical Development and Research Model**

In the last decade, several new business models have emerged that have dramatically changed the way individuals consume music, film, books, and various other types of digital products. The shift began in earnest with development and widespread adoption of the mp3 file format and players. It accelerated with the introduction of Apple's iTunes Store in 2001, which allowed consumers to purchase individual music tracks that could be downloaded, stored, and played on iTunes media players. Other companies such as Spotify, Rhapsody, Grooveshark, and Hulu focused on streaming digital content that could be consumed primarily via a web browser. The online streaming model has become increasingly feasible and more popular as always-on broadband becomes more widely accessible, reliable, and adopted.

There are several types of online streaming services available. The exchange interfaces through which files are sourced, downloaded, consumed, modified, and shared vary a great deal with respect to design esthetics and usability. It is possible to attach an assortment of features that greatly differentiates the online experience from one vendor to another. The extent of this differentiation is made possible because of the digital nature of the core product and the exchange interface mechanism, i.e., the website.

Through specific software and hardware choices, a vendor can specify the extent to which products can be shared and with whom. Vendors can determine the length of time that a

consumer can have access to a product. Search, recommendation, and browsing features can vary across different sites. A vendor can allow a user to create playlists and a personal library. A vendor can support a narrow or wide range of consumption platforms that can include computers, tablet devices, smartphones, and various operating systems. As a result of the design decisions made by a vendor, consumers may find certain websites and apps more useful, easier to use, enjoyable, and more appealing overall in comparison to others.

This study focuses on the usability and hedonic characteristics of the exchange interface, i.e., website of online streaming services. The focus in this study is also on the digital culture product, music in particular. Focusing on a particular class of product is motivated by the possibility that consumers may view, treat, and respond to certain products differently in comparison to, say, utilitarian products such as productivity software. Digital culture products such as music are an important means in which culture is produced and reproduced. It is a way in which individuals express ideas, communicate values, make social connections, and define patterns of interaction and behavior. Through the use of digital culture products we can create, contribute towards, and maintain a mutually shared reality. As a result, digital culture products may resonate with the consumer in a way that utilitarian products may not.

### *Perceived Website Usefulness*

The website of an online streaming service is essentially the front end of an information system. Davis' technology acceptance model has proved to be a consistent and robust model of system adoption across diverse settings, including e-commerce [74]. We know, for example, that the usability of a website can influence attitudes towards a website and the vendor, the willingness to shop at the website, and the willingness return to the website [31].

Perceived usefulness has tended to be the more dominant factor, especially for utilitarian systems [2, 64, 97, 98]. Perceived usefulness has been defined as *the degree to which a person believes that using a particular system would enhance his or her job performance* [22]. In the context of this study, perceived website usefulness is defined as *the degree to which a person believes that using a particular website would enhance his or her ability to consume digital music products*. This refers to the steps associated with the consumption of music, including product awareness, search, selection, acquisition, and any other related tasks that are important to the user. It is essentially about the effectiveness of a website from the perspective of the consumer.

The usefulness of online streaming music website is a function of its collection of features. A useful online streaming website can be, for example, one that provides music access and discovery. It may provide information about the artists and their influences. It may offer news about touring schedules and upcoming projects. A useful website may allow users to create libraries and playlists. A website could be useful if it provides tools for sharing and community building. A useful website may offer products that can be used in different settings or that can be used in diverse multi-media projects. We can expect that a useful online streaming website will attract consumers.

The usefulness of an online streaming website can have another important consequence. Even though unauthorized downloading of digital products is widespread, and there is much available through unauthorized sources such as P2P file sharing networks, finding a particular piece of work, in a desired format can be difficult. It can be time consuming to download large files, especially films. It can take a significant amount of time to find a specific piece of work, especially if it is obscure. Sometimes the quality of an unauthorized file can be compromised. It

is reasonable to expect that if a consumer finds a legitimate online streaming website useful, they might be encouraged to adopt that website, and it might dissuade that individual from engaging in the unauthorized downloading of music.

**H1:** *Perceived website usefulness is negatively related to unauthorized downloading intention.*

**H2:** *Perceived website usefulness is positively related to the purchasing intention of an online streaming music website.*

### *Perceived Website Ease of Use*

A system can be very useful because it contains a full set of features that permits the user to accomplish a variety of tasks. However, the potential usefulness of a system can be undermined by the mental and physical effort required to use it. A system that is overly complex can discourage users from adopting the system. A complex system could encourage some to undermine the system, use the system in ways that are not optimal, or avoid using the system entirely. A complex system could tempt users to modify the manner in which use of the system was intended. A system that is difficult to use could motivate users to seek alternatives.

With respect to the online streaming of music, a vendor could make a website easier to use by ensuring that it is compatible with a wide range of browsers and platforms. A vendor could avoid the requirement that the user install proprietary software or avoid the use of software that requires a lot of resources. A vendor could create or make it easy for third parties to create browser extensions that make a website easier to use. An easy to use website is one that is reliable, fast and secure. A website can be easier to use if an individual does not first have to register and create a password. Vendors could also make their websites easier to use by presenting information clearly, conforming to standard design layouts, providing easy to access menu and navigation tools, and allowing the user to accomplish their tasks with standard, readily

accessible controls. An easy to use website could include good search tools that can correct typing mistakes, anticipate user search queries, and offer suggestions.

In the literature regarding information system usability, perceived ease of use is defined as *the degree to which a person believes that using a particular system would be free of effort* [22]. This construct is hypothesized to impact system acceptance directly, and also indirectly through perceived usefulness. In the context of this study, perceived website ease of use is defined as *the degree to which a person believes that using a particular website would be free of effort*. The expectation is that if the website of an online streaming service is easy to use individuals will adopt it. If the website is not easy to use, individuals would be motivated to seek alternatives, including the unauthorized downloading of digital music files.

**H3:** *Perceived website ease of use is negatively related to unauthorized downloading intention.*

**H4:** *Perceived website ease of use is positively related to the purchasing intention of an online streaming music website.*

**H5:** *Perceived website ease of use is positively related to perceived website usefulness.*

#### *Perceived Website Enjoyment*

When the use of a system is driven primarily by utilitarian factors, designers try to enhance the user's performance by ensuring, to the extent possible, that the goals of the system are optimally aligned with the features of the system, and that distractions are minimized [34]. The use of an information system, however, is not always driven solely by utilitarian factors. Often the use of a system is motivated by hedonic factors as well. In other words, users sometimes adopt a system simply because it is fun to use. We can expect that an information system whose function is heavily geared towards providing entertainment, hedonic factors will be very important to the user. It therefore makes sense to use an extension of the TAM that includes the construct of perceived enjoyment [34].

Perceived enjoyment, an intrinsic benefit, is defined as *the extent to which the activity of using a computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated* [23]. This extended model was examined in productivity-oriented (i.e., utilitarian) information systems and pleasure-oriented (i.e., hedonic) systems and the results indicated that perceived enjoyment and ease of use were more important for hedonic systems than usefulness [34]. This result has important implications in the context of this study because the consumption of digital culture products, such as music, is usually for pleasure and entertainment. Online streaming music websites are generally hedonic information systems. The benefits derived from these websites are largely intrinsic and allow the user to access and consume music for emotional or spiritual purposes, for relaxation, or for pure fun and entertainment. Music can help the consumer achieve or augment a certain mood. Music can be used to express feelings and sentiments. Online streaming websites enable the user to discover, recommend, rate, and share music strictly for personal enjoyment. Furthermore, enjoyment of a site can be enhanced to the extent that it does not require mental effort. In other words, a site that is easy to use is more enjoyable [33, 34].

In the context of this study, *perceived website enjoyment is the extent to which the activity of using a website is perceived to be enjoyable in its own right separate from any performance considerations*. Given the hedonic nature of legitimate music websites, one could reasonably expect that perceived website enjoyment would be an important benefit that negatively impacts unauthorized downloading intention. The positive impact of enjoyment in general on intention to adopt a system, especially with respect to hedonic information systems has been established in prior research [33, 34, 82].



**H6:** *Perceived website ease of use is positively related to perceived website enjoyment.*

**H8:** *Perceived website enjoyment is negatively related to unauthorized downloading intention.*

**H7:** *Perceived website enjoyment is positively related to the purchasing intention of an online streaming music website.*

#### *Attitude Toward Unauthorized Downloading*

Several studies have indicated that a positive attitude towards unauthorized downloading is positively related to unauthorized downloading intention. Even though the strength of this relationship may vary according to the context, it is nevertheless significant, substantial, and consistent. It was therefore deemed important to include in the model for completeness. To be clear, in this study, *attitude toward unauthorized downloading* refers to preexisting attitudes and not those that were formed over the course of this field study. We can expect that the attitudes that individuals may have with respect to unauthorized downloading has been established over time and that they would not necessarily be altered within the very short time frame of this study.

**H9:** *Attitude toward unauthorized downloading is positively related to downloading intention.*

#### *Perceived Costs of the Product*

Numerous studies have found that perceived costs are an important factor that influences unauthorized downloading intention. As the price of a digital product goes up, the willingness to acquire digital products without paying for them goes up as well. This is further positively influenced by the extent to which the consumer feels that they need the product. The impact of costs has been very consistent across several studies [11, 14, 28, 57, 58, 59, 67, 70, 77]. As a result, cost was included in the model for completeness.

**H10:** *Perceived cost is positively related to unauthorized downloading intention.*

## **Methodology**

The research methodology was a cross sectional field study that employed an anonymous, self-reported online survey. The research design and analytical approach was modeled after studies that examined the impact of website characteristics on behavior [34, 52, 53, 74, 75]. A cross sectional field study is appropriate when the goal is to ascertain subject attitudes at a specific point in time that is current or in the recent past [78]. It is suitable as a way of assessing the initial attitudes that form during the early stages of technology adoption.

Subjects were screened and assigned to an unfamiliar music streaming website. They were given a video introduction to the site and a handout highlighting key features. Subjects were given an opportunity to familiarize themselves with the website by performing specific tasks and by completing a belief elicitation task in the form of a shopping scenario. Subjects were asked to imagine being asked to find, sample, and select appropriate music from a small catalog of unfamiliar music that could be contributed to a playlist for a friend's birthday party. The music would also be used to create an audiovisual montage (e.g., slideshow) of music, photos, and video clips associated with events in their friend's life. Subjects were told that in creating these projects, audiovisual material would be collected, possibly edited and remixed, arranged, and subsequently shared among members of their circle of friends. They were told that both projects could be completed using any programs of their choice such as PowerPoint or iMovie. Subjects were told that the music they were searching for was only available for purchase at their assigned website. They were told that the music was also available on P2P file-sharing networks.

After completing the shopping task, subjects were asked about their experience at the site. In an effort to keep subjects engaged, motivated, and to encourage thoughtful replies, care was taken to limit the duration of the session to less than one hour. The concern with sessions lasting

more than an hour is fatigue and boredom. In addition, subjects were compensated in the amount of \$20 for their time.

Before the main data collection took place a pilot study was conducted. The measures used were adopted from previous studies and modified for the specific context of this research. The measures underwent a process of validation that involved testing and refinement in order to ensure content, convergent, and divergent validity. The instrument was also assessed for reliability. Content validity was assessed by panel review. Convergent and divergent validity, and reliability were assessed statistically after the pilot study and verified again after the main field study data collection. The language associated with the instructions, questionnaires, and scenarios were assessed for potential bias by a panel of experts. Negative terms such as *piracy*, *unauthorized*, *illegal*, etc., were avoided to the extent possible. The instrument, as well as the procedure, was assessed for ease of use and understanding.

The field study sites selected were Grooveshark.com and Rhapsody.com. Their selection was consistent with the goals of the study. Both sites were representative of online streaming music websites and allowed for an evaluation of the theoretical model that could be generalized to other contexts. Each site had a different look and feel in comparison to each other, and they each implemented specific features in different ways. Users could browse for music or search using various criteria. Both sites included a personal music library, recommendation tools, browser based music players, the ability to create playlists, and the ability to share music with others. Users could tag favorite music and review their listening history. The sites allowed the user to create a personalized listening experience, based on personal music preferences. The Grooveshark interface had a minimalist design in comparison to Rhapsody, the latter of which

included additional content such as music blogs, band history, news, artist features, and charting information.

At the time of data collection, Grooveshark offered music in the form of streaming content exclusively and had a library of approximately 3 million tracks. Rhapsody had a library of approximately 8 million tracks. Grooveshark generated its revenue primarily through advertising, but users also had the option of paying \$3 per month to have all advertising removed. Rhapsody generated revenue through advertising, subscription fees, and also through a sister site that allowed users to purchase mp3 downloads.

The subject pool was a convenience sample of undergraduate students at a large northeastern, urban commuter college. Convenience samples from a population of college students have been criticized in the past for not being sufficiently representative of the broader population. However, for the purposes of this study, the sample pool was deemed suitable because students from an urban commuter college, in contrast to traditional college students, tend to better reflect the general adult population. They tend to be somewhat older, working adults with comparatively more life experience in comparison to traditional college students. The subject pool was appropriate also because college students tend to have experience in acquiring digital products online, both legally and as unauthorized downloads [4, 87].

In order to ensure a meaningful population sample for the purposes of this study, the subjects were screened in order to verify that they personally had access to computers that they controlled and could freely choose from among different methods of acquiring music online. Subjects were included in the study if they had engaged in any form of file sharing in the past, legal or otherwise. They were asked questions to ensure that they would be assigned to an unfamiliar website to shop for unfamiliar products during the field study that they did not own and had not

formed opinions about in order to reduce the effects of prior experience, and to encourage an exploration of the website's features.

### **Analysis and Results**

Partial Least Squares (PLS) Path Modeling was used to analyze the data. The procedure has several advantages over other methods. It does not have strict normality requirements giving the researcher measure of flexibility [9, 16, 100]. The technique is well suited for testing complex relationships since it avoids inadmissible solutions and factor indeterminacy that can result from models with large numbers of variables, relationships, and moderating effects [75].

Multicollinearity, which can lead to non-positive definite matrices, does not automatically impede the generation and interpretation of results. Finally, one of the major advantages of PLS Path Modeling, from the standpoint of the researcher, is that the sample size requirements are relatively small allowing the investigator to economize on time and expense. A rule of thumb is to consider the latent construct with the most causal relationships and the indicator block with the largest number of indicators. Whichever is the higher number, multiplied by ten, determines the minimum sample size [16]. For this study, there were 139 cases, which exceeded the minimum required sample size.

Table 1 below summarizes some key characteristics of the population sample, including self-reported file sharing habits and music consumption. Among the participants in this study, 62% have acquired authorized music online from sources such as Amazon and iTunes in the past. P2P file sharing experience was highly prevalent among the subjects with 89% reporting having engaged in some form of P2P file sharing. Several reported having substantial libraries of unauthorized music on their computers with a median of 225 music tracks.

The possibility of common methods bias was addressed in this study. This bias occurs when data is collected using the same process. The concern is that common variance is inflated upward. In this study, data was collected via a self-reported survey, conducted as part of a cross-sectional study; therefore the potential presence of common methods bias cannot be dismissed and should be examined; however, it is worth noting that there is no universal agreement on the prevalence and impact of common methods bias [83, 91].

One way to assess common methods bias is Harman's one factor test [80]. In this approach, an exploratory factor analysis is conducted including all of the factors. Common methods bias is assumed to exist if a single dominant factor emerges from the unrotated factor solutions or if the first factor in a principal components analysis explains the majority of the variance in the variables [80]. No single factor accounted for a majority of the variation in the dataset. Therefore, we could exclude the possibility of common methods bias. Finally, note that the correlation matrix did not exhibit high correlations between constructs ( $r$  value  $> 0.90$ ), which would have supported the existence of common methods bias [75].

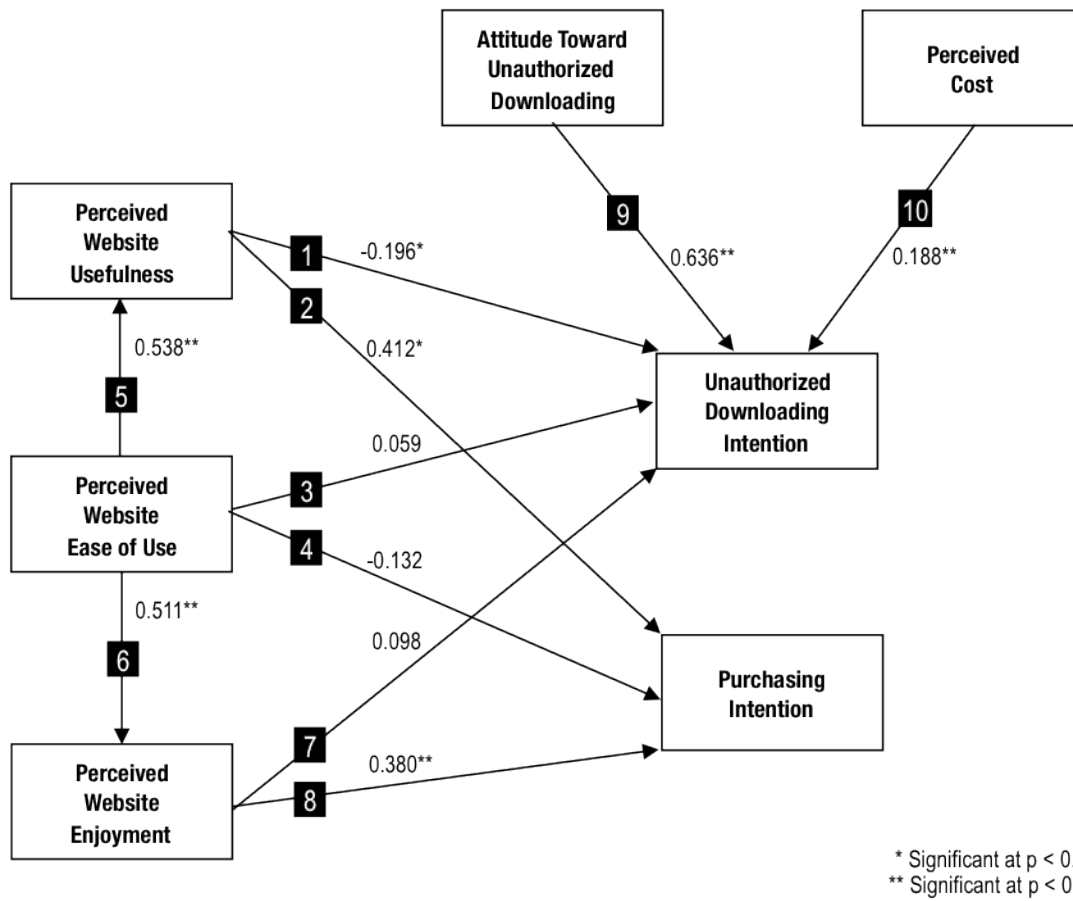
#### *Measurement Model Assessment*

Item reliability and internal consistency were assessed according to common practice [9, 16, 100] and were reasonably good. Note that in Table 4 and 5 below, each item loaded highly on its latent construct and with a significant t-value. In Table 2, we can note that the AVE exceeded 0.50 for all constructs, which supports the convergent validity of the constructs in this model. Cronbach's alpha was well above the generally recommended value of 0.70 for most constructs. The composite reliability statistic demonstrated good item reliability since every statistic was above the generally recommended value of 0.70.

Discriminant validity of the construct measures was also satisfactory. As noted in Table 2, the square root of the AVE associated with each construct was greater than the correlations between that construct and others indicating that the construct shares more variance with its own measures. In addition, as noted in Table 2, no item loaded higher on other latent constructs than the construct it was designed to measure. Discriminant validity is further support by the fact that the correlations among all constructs were below the threshold of 0.90.

### *Structural Model Assessment*

The model was largely supported by the data as illustrated in Figure 1. Perceived website usefulness was found to have a negative relationship with unauthorized downloading intention and a positive relationship purchasing intention ( $\beta = -0.196, p < 0.05$  and  $\beta = 0.412, p < 0.05$ , respectively). Perceived ease of use did not have a direct impact on unauthorized downloading intention and purchasing intention, but indirectly through perceived website usefulness and perceived website enjoyment. Perceived ease of use was positively related to perceived website usefulness ( $\beta = 0.538, p < 0.01$ ). Perceived ease of use was positively related to perceived website enjoyment ( $\beta = 0.511, p < 0.01$ ). Perceived website enjoyment was positively related to purchasing intention ( $\beta = 0.380, p < 0.01$ ). The relationship between perceived website enjoyment and unauthorized downloading intention was not supported. Finally, existing attitudes regarding unauthorized downloading and the perceived cost of digital products were both positively related to unauthorized downloading intention ( $\beta = 0.636, p < 0.01$  and  $\beta = 0.188, p < 0.01$ , respectively), which is consistent with previous studies. Overall, the model explained more than 50% of the variation with respect to unauthorized downloading intention. It explained just under than 45% of the variation regarding purchasing intention as noted in Table 3.



**Figure 1**



**Table 1. Demographic Information and Music Acquisition Habits**

	Subjects Frequency (%)	Age Mean / Mdn / SD	Online Music Purchasing Experience Frequency (%)	P2P File Sharing Experience Frequency (%)	Number of Authorized Music Files Owned Mean / Mdn / SD	Number of Unauthorized Music Files Mean / Mdn / SD
Female	71 (51%)	21.7 / 21 / 2.78	34 (48%)	66 (93%)	290 / 50 / 772	564 / 250 / 843
Male	68 (49%)	22.6 / 21 / 3.79	28 (41%)	58 (85%)	348 / 5 / 1354	2423 / 200 / 6937
Overall	139 (100%)	22.1 / 21 / 3.34	62 (45%)	124 (89%)	318 / 20 / 1096	453 / 225 / 4959

**Table 2. Construct Correlations (Square Root AVE in Bold)**

	ATUD	PC	PI	PWE	PWEOU	PWU	UDI
ATUD	<b>0.888050</b>						
PC	0.173409	<b>0.736244</b>					
PI	-0.204406	-0.232407	<b>1.00000</b>				
PWE	-0.267809	-0.340253	0.609768	<b>0.812937</b>			
PWEOU	0.050243	-0.178473	0.284344	0.510631	<b>0.748794</b>		
PWU	-0.134514	-0.200385	0.615086	0.720001	0.538433	<b>0.704256</b>	
UDI	0.672609	0.294607	-0.224302	-0.250192	0.000080	-0.219285	<b>0.829815</b>

**Table 3. Assessment of Measurement Model**

	AVE	Composite Reliability	R Square	Cronbach's Alpha	Communality	Redundancy
ATUD	0.788632	0.949058		0.932772	0.788632	
PC	0.542055	0.773679		0.624328	0.542055	
PI	1.000000	1.000000	0.447964	1.000000	1.000000	0.319123
PWE	0.660866	0.920952	0.260744	0.897371	0.660866	0.166939
PWEOU	0.560693	0.862342		0.805723	0.560693	
PWU	0.495977	0.853392	0.289910	0.794719	0.495977	0.129776
UDI	0.688593	0.868952	0.502476	0.773646	0.688593	0.309109

**Descriptive Stats**

Mean	STD
4.528	1.752
3.791	1.757
4.144	1.958
5.168	1.563
5.630	1.369
4.784	1.617
4.568	2.016

**Table 4. Construct Loadings**

	REFLECTIVE INDICATORS			
	Item	Loading	T Statistics	P Value
<b>Attitude Towards Unauthorized Downloading</b>	<b>ATUD1</b>	0.925961	64.026486	< 0.0001
	<b>ATUD2</b>	0.905955	48.670987	< 0.0001
	<b>ATUD3</b>	0.847496	17.953577	< 0.0001
	<b>ATUD4</b>	0.849197	24.044437	< 0.0001
	<b>ATUD5</b>	0.908636	27.958528	< 0.0001
<b>Perceived Cost</b>	<b>PC1</b>	0.644603	3.941010	< 0.0001
	<b>PC2</b>	0.600633	3.431109	= 0.0006
	<b>PC3</b>	0.921897	16.120698	< 0.000
<b>Perceived Ease of Use</b>	<b>PEOU1</b>	0.776974	11.754955	< 0.000
	<b>PEOU2</b>	0.742398	12.699065	< 0.000
	<b>PEOU3</b>	0.547834	5.093069	< 0.000
	<b>PEOU4</b>	0.816931	19.255983	< 0.000
	<b>PEOU5</b>	0.825303	21.040790	< 0.000
<b>Perceived Website Enjoyment</b>	<b>PWE1</b>	0.856474	41.760985	< 0.000
	<b>PWE2</b>	0.821062	26.899753	< 0.000
	<b>PWE3</b>	0.725321	12.955372	< 0.000
	<b>PWE4</b>	0.859518	30.155759	< 0.000
	<b>PWE5</b>	0.835713	31.316315	< 0.000
	<b>PWE6</b>	0.770862	16.508008	< 0.000
<b>Perceived Website Usefulness</b>	<b>PWUA1</b>	0.774649	23.942007	< 0.000
	<b>PWUA2</b>	0.661786	8.772794	< 0.000
	<b>PWUA3</b>	0.720606	11.020644	< 0.000
	<b>PWUA4</b>	0.795153	24.604426	< 0.000
	<b>PWUA5</b>	0.703019	12.277867	< 0.000
	<b>PWUA6</b>	0.540411	6.784060	< 0.000
<b>Purchasing Intention</b>	<b>PI</b>	1.000000	—	—
<b>Unauthorized Downloading Intention</b>	<b>UDI1</b>	0.807661	15.821084	< 0.000
	<b>UDI2</b>	0.850354	26.602769	< 0.000
	<b>UDI3</b>	0.830880	16.916645	< 0.000

**Table 5. Outer Model Loadings and Cross Loadings**

	ATUD	PC	PWEOU	PWE	PWU	PI	UDI
ATUD1	<b>0.925961</b>	0.179750	0.092869	-0.245789	-0.100011	-0.169123	0.640739
ATUD2	<b>0.905955</b>	0.195191	0.076262	-0.227195	-0.115937	-0.159346	0.625637
ATUD3	<b>0.847496</b>	0.141471	0.029524	-0.240182	-0.077739	-0.223547	0.548801
ATUD4	<b>0.849197</b>	0.132659	-0.049474	-0.237094	-0.149146	-0.185942	0.509039
ATUD5	<b>0.908636</b>	0.117739	0.053624	-0.241606	-0.155668	-0.178239	0.644674
PC1	0.093561	<b>0.644603</b>	-0.258109	-0.194762	-0.205002	-0.203455	0.127944
PC2	0.025887	<b>0.600633</b>	-0.038002	-0.143600	-0.053656	-0.115782	0.107959
PC3	0.193587	<b>0.921897</b>	-0.130645	-0.344031	-0.176910	-0.200826	0.319693
PEOU1	0.062169	-0.153570	<b>0.776974</b>	0.399350	0.422238	0.277029	0.050638
PEOU2	0.047576	-0.212206	<b>0.742398</b>	0.291006	0.329462	0.196523	0.038140
PEOU3	-0.085464	-0.109281	<b>0.547834</b>	0.269627	0.151296	0.045367	0.012968
PEOU4	0.055088	-0.121885	<b>0.816931</b>	0.505386	0.561926	0.283289	-0.073044
PEOU5	0.044755	-0.091382	<b>0.825303</b>	0.373131	0.400136	0.168279	0.007862
PWE1	-0.210307	-0.298522	0.536305	<b>0.856474</b>	0.658496	0.558055	-0.228480
PWE2	-0.247228	-0.209288	0.321390	<b>0.821062</b>	0.596534	0.576350	-0.316412
PWE3	-0.192552	-0.369888	0.389674	<b>0.725321</b>	0.465353	0.425928	-0.110985
PWE4	-0.292388	-0.301064	0.448429	<b>0.859518</b>	0.532303	0.419490	-0.239693
PWE5	-0.117902	-0.219503	0.475742	<b>0.835713</b>	0.723865	0.572060	-0.105277
PWE6	-0.276546	-0.292374	0.265014	<b>0.770862</b>	0.477610	0.366572	-0.215848
PWUA1	-0.189353	-0.296847	0.561197	0.766858	<b>0.774649</b>	0.536901	-0.187555
PWUA2	-0.178488	-0.158595	0.224562	0.449798	<b>0.661786</b>	0.479793	-0.275805
PWUA3	-0.076840	-0.044644	0.165874	0.478944	<b>0.720606</b>	0.437842	-0.162453
PWUA4	-0.005383	-0.136170	0.522681	0.488062	<b>0.795153</b>	0.434333	-0.128769
PWUA5	-0.114050	-0.019328	0.247713	0.435739	<b>0.703019</b>	0.394314	-0.179378
PWUA6	0.035023	-0.096360	0.428557	0.299847	<b>0.540411</b>	0.265468	0.037258
PI	-0.204406	-0.232407	0.284344	0.609768	0.615086	<b>1.000000</b>	-0.224302
UDI1	0.593475	0.222882	-0.009225	-0.176285	-0.134436	-0.151383	<b>0.807661</b>
UDI2	0.538519	0.282897	0.038540	-0.181270	-0.168380	-0.171554	<b>0.850354</b>
UDI3	0.539980	0.227736	-0.029245	-0.266986	-0.245467	-0.237179	<b>0.830880</b>

## **Discussion**

This study addressed whether there was a connection between the website (i.e., exchange interface) attributes and unauthorized downloading and purchasing intention at an online streaming music website. It is a topic that has been relatively unexplored and one that will become increasingly important to understand because of the rising demand for different types of digital products, and the many emerging business models for delivering those products. Many of the new business models, apart from attempting to generate profits, offer an attractive alternative to unauthorized downloading. Online streaming is a business model that is consistent with the idea of a sharing economy in which individuals do not own, but rather borrow products. Instead of buying a piece of music, either as a download or as a physical disk, consumers essentially rent access to that product at online streaming websites.

The study affirmed the relevance of the extended TAM that includes enjoyment and the need to address fundamental consumer needs, if progress is to be made in steering consumers away from unauthorized downloading and towards the many emerging and legitimate services for digital products. When the utilitarian needs of a consumer are addressed at a legitimate site, they become much more open to paying for their digital products at that site. The reality is that searching for products via P2P file-sharing sites in order to avoid having to pay for them can be time consuming, especially when one has specific requirements. If a particular music track is not well known, there will be fewer nodes hosting that particular file. This can directly impact the length of time that it might take to acquire the file. Differences in file characteristics such as bit rate, format, and quality will further add to the time necessary to locate and acquire a suitable file. Purchasing a track from a legitimate site can be much faster and there can be assurances regarding the quality of the product. In addition, legitimate sites typically provide extensive

product information, which is typically lacking at P2P file sharing sites. Many online streaming music websites also provide recommendation tools for the discovery of music. Users can easily discover music that they did not even know they were looking for. This is generally not the case with P2P file sharing networks.

This study also affirmed a consistent finding across numerous studies that unauthorized downloading is motivated by high prices for digital products and by pre-existing attitudes towards unauthorized downloading. Regarding costs, those who market digital products need to be aware that consumers are very price sensitive and are looking for good value that goes beyond the digital music file itself. There is a reason that Amazon thrives even though there are free lending libraries. Amazon provides many useful services on its website that consumers value and is reflected through their purchases. Companies such as Amazon address the entire consumer purchasing cycle with useful tools and find ways of making the process easier.

This study also revealed the importance of hedonic attributes for online streaming music websites. It has to be fun. Consumers have to enjoy using it. It is interesting to note that prior research regarding hedonic systems showed that perceived enjoyment tended to be the stronger factor; however, that was not the case here. Although essentially the same, perceived website usefulness nonetheless was associated with a slightly higher beta coefficient than perceived enjoyment. This indicates that online streaming music websites appeal to consumers not just as passive consumption environments; they also expect a lot of utility from these sites. The implication for companies is that their sites must provide the tools to facilitate the consumer purchasing and consumption cycle. Features such as recommendation tools, search tools, artist information, personal libraries, listening history, and sharing tools are probably very important to the consumer and will determine the extent to which a consumer is willing to adopt a site.

## **Limitations**

This research was a survey-based field study, which is a methodological approach that has been used extensively in information system research, especially with respect to unauthorized file sharing. Field studies have some advantages over certain methodologies such as lab experiments. Perhaps the most important is that the results can be generalized to a greater degree because the phenomenon is studied in a natural setting, subject to realistic conditions that can often be difficult to replicate in a controlled laboratory setting. Furthermore, field studies are more appropriate than experiments when the control of independent variables is neither possible nor desirable, or when models are relatively complex [78]. However this research methodology is not without limitations.

First, field studies do not offer the degree of internal validity that can be expected from experiments. Second, a cross-sectional study only examines attitudes that develop within a relatively short period of time and measured at a point in time. Third, this study measured self-reported intention and not actual behavior, which could be at variance, especially over the long term. The fourth limitation concerns the subject pool. Even though the subject pool used in this study was deemed to be appropriate, there are some questions as to whether the results of this study could be applied to other demographic segments.

## **Future Research**

The results of this study suggest several avenues for further exploration. First, in light of limitations associated with field studies noted above, future studies can address the central research question using different methodologies in order to affirm and further the findings of this research. Second, a longitudinal study is warranted in order to determine whether attitudes uncovered in this study are transitory or stable over the long term. Third, future studies can

examine in detail the specific features of a website that increase usability and enjoyment. Possible areas of investigation include the role of recommendation systems, automatically generated playlists, the many ways in which a website can help users discover music, system quality, and numerous other system features. Finally, the focus here was on digital music, but there are potential implications for a wide range of digital products, including e-books, film, and games given the many emerging business models for creating value and delivering content to the consumer.

### **Conclusion**

This research explored the factors that influenced the adoption of online streaming services and whether that could lead to a concomitant decrease in unauthorized file sharing. Digitalization allows product rights owners to deconstruct, commoditize, and customize every aspect of product consumption and this creates opportunities for new types of business models. Firms can offer the consumer a highly unrestricted consumption experience or one that is tightly circumscribed. Firms have many design options that can make their sites easy to use, more useful, and enjoyable. Results suggests that the range of features can have a significant impact on whether a consumer chooses to adopt an online streaming service or instead chooses to source unauthorized digital products via P2P file sharing networks.

## Appendix

### Attitude Towards P2P Downloading (Adapted Scale [77])

[ATUD1] To me, unauthorized downloading of songs from P2P networks is  
(1= “very bad”; 7= “very good”)

[ATUD2] To me, unauthorized downloading of songs from P2P networks is  
(1= “very unpleasant”; 7= “very pleasant”)

[ATUD3] To me, unauthorized downloading of songs from P2P networks is  
(1= “very foolish”; 7= “very wise”)

[ATUD4] To me, unauthorized downloading of songs from P2P networks is  
(1= “very wrong”; 7= “very correct”)

[ATUD5] To me, unauthorized downloading of songs from P2P networks is  
(1= “very unacceptable”; 7= “very acceptable”)

### P2P Downloading Intention (Adapted Scale [77])

[UDI1] I may download unauthorized copies of songs from a P2P network in the future to avoid using this website for acquiring music. (Assume the song is available only from a P2P network or your assigned website.)

*1 = strongly disagree — 7 = strongly agree*

[UDI2] If I had the opportunity, I would download unauthorized songs from a P2P network to avoid using this website for acquiring music. (Assume the song is available only from a P2P network or your assigned website.)

*1 = strongly disagree — 7 = strongly agree*

[UDI3] I would never download unauthorized songs from a P2P network to avoid using this website for acquiring music. (Assume the song is available only from a P2P network or your assigned website.)

*1 = strongly disagree — 7 = strongly agree*

### Product Cost (Adapted Scale [77])

[PC1] I feel that the price for music at this website is very inexpensive.

*1 = strongly disagree — 7 = strongly agree*

[PC2] In my opinion, music at this website is

*1 = very inexpensive — 4 = just right — 7 = very expensive*

[PC3] If I wanted to acquire music from this website today, it would cost me too much money.

*1 = strongly agree — 7 = strongly disagree*



**Perceived Ease of Website Use** (Adapted Scale [26])

[PWEOU1] The website is easy to use.

*1 = strongly disagree — 7 = strongly agree*

[PWEOU2] It is easy to become skillful at using the website.

*(1 = “strongly disagree” — 7 = “strongly agree”)*

[PWEOU3] Learning to operate the website is NOT easy.

*(1 = “strongly disagree” — 7 = “strongly agree”)*

[PWEOU4] The website is flexible to interact with.

*(1 = “strongly disagree” — 7 = “strongly agree”)*

[PWEOU5] My interaction with the website is clear and understandable.

*(1 = “strongly disagree” — 7 = “strongly agree”)*

**Perceived Website Usefulness** (Adapted Scale [34])

PWUA1: The website is useful.

*1 = strongly disagree — 7 = strongly agree*

PWUA2: The website saves me time.

*1 = strongly disagree — 7 = strongly agree*

PWUA3: The website helps me be productive.

*1 = strongly disagree — 7 = strongly agree*

PWUA4: The website makes the task I want to accomplish easier to get done.

*1 = strongly disagree — 7 = strongly agree*

PWUA5: The website helps me be more effective.

*1 = strongly disagree — 7 = strongly agree*

PWUA6: The website requires the fewest steps to accomplish what I want to do with it.

*1 = strongly disagree — 7 = strongly agree*

**Perceived Website Enjoyment** (Adapted Scale [34])

[PWE1] To me, the website is enjoyable.

*1 = strongly disagree — 7 = strongly agree*

[PWE2] To me, the website is exciting.

*1 = strongly disagree — 7 = strongly agree*

[PWE3] To me, the website is unpleasant.

*1 = strongly disagree — 7 = strongly agree*

[PWE4] To me, the website is boring.

*1 = strongly disagree — 7 = strongly agree*

[PWE5] To me, the website is interesting.

*1 = strongly disagree — 7 = strongly agree*

[PWE6] To me, the website is dull.

*1 = strongly disagree — 7 = strongly agree*

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## **Shutting Down the Public Service Broadcasting Statutory Corporation TV (ERT): The Case of Greece**

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### **Extended Abstract - Proposal**

Closing down the public service broadcasting statutory corporation TV (ERT) in Greece in June 2013 was a shocking phenomenon for the international broadcasting and journalism society from a media as well as from a financial point of view. The shut down of ERT, which was a Ltd. company, was followed by the constitution of a temporary organization for a period of 6 months. Finally, a new public service broadcasting statutory corporation TV channel (NERIT) was created, that with a new legislative directive was allowed to use the facilities and the equipment of ERT; however, the obligations and the debt from the old one were excluded. Nice decision, nice model!

Moreover, the implications and effects of this decision were not only in relation with internal matters. A series of international conflicts of interest have been arisen, as there were a lot of contracts signed by ERT that needed to be honoured in one way or another. Services including live productions, sports events such as European Champions League (Football) and the Football World Cup of 2014.

Sports broadcasting is among the most popular of television programmes. The viewers watching such programmes are usually the ones with the highest purchase capacity, therefore the audience is of particular interest to advertisers, as it is considered a very special audience not easily attracted by other programmes. As a result, the competition on advertising spots during these programmes as well as on acquiring TV broadcasting rights to sports events is much higher.

However Sports television broadcasting is of a very individual nature in comparison with the broadcast of other events. In addition to that it is a common practice that sports broadcasting rights are offered for sale by each sport federation as a package. In this way the clubs do not compete with each other in order to sell this product and the competition between possible purchasers of these rights is correspondingly restrained.

It is the first time in the history of European television broadcasting rights, a contract was likely to snap in the air due to the padlock on a public broadcasting organisation. UEFA (rightsholder of Champions Leagues) and FIFA (rightsholder of the World Cup), felt very unsafe when they were informed that ERT was being closed down, which had paid for the rights to broadcast those two sports events.

The representatives of UEFA and FIFA, including members of the legal service of both Associations, have expressed their concern about the situation that was developed after these events in ERT. Both organizations were doubting that ERT would fulfill the contract, in terms of the total money that should be paid to them and the display of their sponsors.

The purpose of the contacts was to determine whether and when public TV would transmit again in Greece and they have not ruled out termination and renegotiation of rights by UEFA and by FIFA. According to the legal circles, UEFA and FIFA would require the full amount arising from the contract. Finally decision was made to renew their contracts with the new company/organization NERIT which replaced ERT but these raises issues among other competing TV channels so it is a decision that will be discussed for quite some time and needs further analysis to see how it was reached.

To that end our research is coming to shed some light on the origins of the decision as well as the profound consequences of it. The importance and the value of both sports events is very significant and correlated to media and especially television broadcasting.

As Jacques Marchand points out in his work *Responsables* (i), "the sporting press is sport's conscience". Sporting exploits only exist insofar as they are relayed by the media. In the ancient world, poets made champions. In the course of modern history, journalists have reinvented sport; it is them who have created its competitions, football included.

## **Relative Literature**

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- ♣ UEFA.com Media Rights, Terms and Conditions



## INTRODUCTION TO THE USES AND MISUSES OF STATISTICS IN EDUCATION

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### ABSTRACT

Probability and statistics are powerful weapons that can help people make good decisions, but that can also be used to wreak havoc. This paper provides examples of how statistics can be used to mislead the public and result in poor decision-making. Topics discussed include: the use of statistics in evaluating educational institutions, how such statistics can be manipulated, metrics used in outcomes assessment, and statistics and rankings used by students in selecting a school. We illustrate how sampling bias can make these statistics suspect, and how this creates an incentive for schools to manipulate them. This is particularly useful to those looking to introduce a discussion of ethics into a statistics course.

**Keywords:** Misuse of statistics, rankings of schools, ranking of law schools, higher education, best value lists.

### INTRODUCTION

These days, everything from products to hospitals and colleges is assessed and rated. With the increased omnipresence of statistics comes an increased opportunity to use statistics to mislead and obfuscate. As a result of this, it is important for students in all areas to not only have a familiarity with the uses of statistics, but to also be familiar with the abuses of statistics. In this paper, we present real-life applications that will illustrate uses and misuses of statistics. The purpose is to present ideas in a way that can be used in the classroom, and to help show students the everyday importance of statistics. We discuss the use of statistics in evaluating educational institutions, and how such statistics can be manipulated. This not only serves to introduce students to an application of statistics that is particularly relevant to their lives, but also leads to a discussion of ethical issues in the use of statistics. This would be particularly useful to those looking to introduce a discussion of ethics into a statistics course.

### OUTCOMES ASSESSMENT

Every school is concerned about outcomes assessment or assessment of learning. States are now demanding that colleges prove how much students have learned. This is the result of the 2002 *No Child Left Behind* law [3]. Under this law, standardized tests should be used to measure whether learning takes place; schools where the tests indicate little or no learning have been closed down. While the purpose of the law was to ensure that there would be accountability in

the elementary and secondary schools, colleges are now undergoing the same scrutiny and must demonstrate that students are learning something of value while in college. According to Arum and Roksa [1], however, a significant number of college students only barely improve their skills in the vital areas of critical thinking, writing, and problem solving.

### SAMPLING BIAS

One standardized test used by colleges for assessment purposes is the Educational Testing Service’s Proficiency Profile; it purports to measure mathematics, reading, and writing skills of college students. However, as we shall see, this statistic can be misleading when presented alone. Consider a comparison of School A and School B, with scores on the learning assessment test as shown in Table 1.

	School A	School B
Average Score on Learning Assessment Test	55	75

**TABLE 1**

Basing an evaluation on the average scores alone, we conclude that School A should be closed down, since students are doing very poorly on this key metric. However, suppose that we reexamine the data, looking not only at the average scores after attending the schools, but those before entering the schools. Suppose the numbers are as in Table 2.

	School A	School B
Average Score on Learning Assessment Test (Before Entering)	25	85
Average Score on Learning Assessment Test (After Entering)	55	75

**TABLE 2**

Now we see that students in School A have gained 30 points, while those attending School B lost 10 points. Using this data, it appears that School B is inferior, and is actually harming students.

This simple example highlights the danger of looking at pure scores, and not considering changes in performance. It also illustrates the problems of so-called sample bias. When comparing two treatment conditions, for example, it is important to be sure that the samples are drawn from the same population. Otherwise, it may appear that one treatment is superior, while in fact it is inferior. As a particularly stark example, hospitals that only perform surgery on relatively healthy patients will usually have a higher survival rate than those that perform surgery on all types of patients. Some doctors will purposely avoid high risk patients (e.g., elderly patients with advanced cancer) in order to improve their statistics. It is very easy to alter statistics if you can control the kinds of patients, students, cases, etc. you select. The only time we can do a fair comparison of outcomes is if there was a truly random assignment of subjects, something which is rarely true.

In the case of outcomes assessment, sample groups in different schools can be very different. As illustrated by Table 2, a school that starts with predominantly low-scoring students, and helps them to improve, may end up with a lower score than a school that has high-scoring students, but harms their performance. Many institutions know how easy it is to manipulate data by selecting the “right” kind of sample, i.e., students who will perform well on the assessment test. This creates an incentive for institutions to concentrate on recruiting good students, instead of trying to improve the performance of all students. In a high school in Birmingham, Alabama, 500 weak students were convinced to drop out before the test was administered in order to boost average scores [12].

### STUDENTS EVALUATING SCHOOLS

Similar issues arise when students are evaluating schools in order to decide which to attend. Consider a student who is deciding between attending business school A and business school B. The schools report earnings of graduates as shown in Table 3.

	School A	School B
Average Earnings of Graduates	\$120,000	\$70,000

**TABLE 3**

Again, the student might conclude that School A is preferable, since graduates are likely to earn more. However, it may again be true that this is the result of sampling bias. Suppose School A is a school where many of the parents are extremely wealthy and able to help their children obtain highly paying jobs. School B, on the other hand, is located in a city where many parents work at low-paying jobs or are unemployed. These parents are unable to provide good job opportunities for their children. In this case, the numbers are again misleading – School B might actually better prepare their students to succeed, but the numbers are skewed because of sampling bias. Suppose that we examine salaries before and after attending the two schools, and find the data as in Table 4.

	School A	School B
Average Salary (when starting MBA)	\$115,000	\$50,000
Average Salary (a year after completing MBA)	\$120,000	\$70,000

**TABLE 4**

Now we see that school A did not actually offer as much as school B. School A’s results were skewed because of a sampling bias – those who entered started off with a higher salary than those that entered School B. Despite this, many MBA programs advertise how well graduates do after they complete the MBA. They might state, for example, that the average income of a student with an MBA from their school is \$120,000. What is not stated, and what students must understand, is that this number may suffer from the sampling bias discussed above.

As mentioned, the effects of sampling bias create an incentive for schools to engage in practices

that artificially inflate the statistics used to measure them. For example, a school could decide to increase acceptance of students who have already achieved some measure of success, like working for several years in high-paying jobs. Admitting a few executives who earn million dollar salaries can artificially inflate the average salary of graduates. In fact, many MBA programs do not admit students unless they have a few years of work experience. Also, schools may decide to direct recruiting efforts at cities like New York, where earnings tend to be higher. Schools may push students to enter high paying fields, as opposed to relatively low-paying fields that deal with issues like social justice. These practices will skew the numbers, making it appear that the school is providing a greater benefit to students. What is really happening is that the sample is being biased.

The practice of engaging in tactics that artificially boost statistics is not limited to MBA programs. The pass rate on the CPA exam is used as a metric by many schools to measure the quality of its accounting program. Schools can help ensure an extremely high pass rate by limiting the number of accounting majors. Furthermore, they can give accounting majors screening exams and disallow those that do not perform extremely well on these exams from continuing as accounting majors. Schools can also introduce special requirements for accounting majors, such as obtaining sufficiently high grades on prerequisite classes. This screening of students artificially inflates the passage rates on the CPA exam, by selecting only those students who had a higher probability of passing anyway. Again, this makes it appear that the school is providing a benefit to the students, but the numbers have been skewed by sampling bias.

## **SCHOOL RANKINGS**

An important statistic that many students look at before deciding where to attend college or graduate school is the school's ranking. However, like any attempt to measure and evaluate using statistics, it is again possible to inflate results artificially [9]. A school can improve its ranking, for example, by spending more money on faculty, better facilities, smaller classes, etc., regardless of the additional benefit provided to students by this spending. Kevin Carey, director of education policy at the New America Foundation, remarked: "If you figure out how to do the same service for less money, your U.S. News ranking will go down" [9]. Schools can also increase their rankings by being more selective in their admission process. Admission statistics can be artificially skewed by spending money to encourage students, even weak ones, to apply, and then rejecting them. This way, without accepting any additional students, the selectivity of the school increases. Another method for increasing rankings is to boost average SAT scores and high school GPAs by placing low scorers into "special admission" categories which are usually not reported [4]. Schools can achieve similar results by admitting only high-scoring students, while allowing weaker students to transfer later.

There are now "best value" lists that rank colleges in terms of providing "best bang for the buck." For example, to get on the Washington Monthly "best bang for the buck" list colleges must meet four criteria [8]:

First, to make sure they aren't just catering to the affluent, at least 20 percent of their students must be receiving Pell Grants, which go to students of modest means (typically those with annual household incomes below \$50,000). Second, they must have a graduation rate of at least 50 percent—hardly an exacting standard, but a fair one

considering that we're requiring that a fifth of their student body have lower incomes, a demographic that tends to graduate in lower numbers. Third, each school's actual graduation rate must meet or exceed the rate that would be statistically predicted for that school given the number of lower-income students admitted (among other things, this calculation assures that schools with more than the minimum 20 percent of Pell students aren't penalized). Fourth, to make sure their graduates are earning enough in the workforce to at least cover their student loans, schools must have a student loan default rate of 10 percent or less.

A major issue with ranking schools based on value, however, is that it is unclear how exactly to measure that value [7]. Some rankings, like Payscale's list of Colleges Worth Your Investment, stress salaries (<http://www.payscale.com/college-education-value-2013>). Of course, these rankings will favor schools where a very large percentage of students enter well-paying fields such as engineering [7]. Some rankings consider return on investment (ROI) as a measure of value; this means the earnings of graduates is of prime importance. Other lists focus on graduation rates, diversity, and/or student satisfaction. What is clear, however, is that the way "value" is defined will affect the rankings.

Rankings of law schools have had a particularly strong influence on school practices, sometimes resulting in resources of law schools being shifted to inflate ratings [11]. Inflated ratings, however, may not indicate improved quality. Indeed, according to Bush and Peterson [4], rankings do not actually measure the quality of a school. According to them, the situation is unlikely to improve, since publishers of rankings have "little incentive to expend resources to monitor the data that law schools provide, to correct inaccurate data, or to make algorithmic adjustments unless the results produced by its formula are egregiously false or schools flagrantly manipulate the data that they submit" [4].

Flanigan and Morse [6] provide the methodology used by U.S. News and World Report, the leader in law school rankings; 12 measure of quality are used. One important statistic is the undergraduate grade points averages (UGPA) of admitted students. Another statistic, admitted students' LSAT scores, is a better predictor of performance during the first year of law school. [11] Many of the sampling issues raised above, arise in this context as well. It is no secret, for example, that it is more difficult to get high grades in some majors; in most colleges, education is considered the easiest college major, while science and mathematics are the most difficult. [5] [10] Similarly, in some schools, it is easier to get high grades than in others. It is not clear, then, what the meaning of a GPA is, since students of all majors attend law school. How to compare a 3.3 GPA in science from a difficult school to a 3.9 GPA in education from an easier school? A school that wants to improve its rankings might not admit a student with a lower GPA, despite the fact that the student had a more difficult major and went to a higher quality school.

Stake [11] describes several other ways that law schools can artificially inflate their rankings. Many of these are similar to the methods introduced above, and not particular to law school rankings. Some additional methods mentioned by Stake include:

- (1) Rejecting students whose particularly high scores make it unlikely that they will accept, in order to increase "acceptance ratios".
- (2) Hiring students to boost employment numbers. According to Bush and Peterson [4],

students working as taxi drivers are included in the USNWR employment figures, as are students working in the college itself as librarians or research assistants.

(3) Admitting students with lower scores into part-time programs, which are not included in evaluating a school's LSAT and UGPA scores.

(4) Focusing on teaching students to pass the bar exam, which will increase pass rates on the exam. Furthermore, a school might reject students from states with a difficult bar exams and admit students from states with easier bar exams.

(5) Spending money on public relations to increase "reputation among legal academics", a major factor in the USNWR rankings.

(6) Providing scholarships to attract students with high LSAT and UGPA scores.

(7) Making it difficult for faculty to leave during the fall. Faculty/student ratios are measured during the fall semester, so this tactic will inflate those ratios. Of course, it may have an adverse effect on the quality of courses given during the spring semester.

(8) Increasing the number of book holdings by the library by buying a lot of cheap books, and storing them off-site.

A consequence of schools' strong incentives to engage in practices that increase rankings, is that they can cause a school to focus on particular types of students or career paths. For example, a school has a strong incentive to focus on students with good LSAT and UGPA scores, perhaps at the expense of other students who may lack these scores, but have worthwhile experience. Similarly, schools have an incentive to focus on career paths that will attract the "right" sorts of students. These sorts of practices have, according to Stake led to legal education being "homogenized", since it is difficult for schools to "experiment with different ways of producing an extraordinary product" [11].

## DISCUSSION

In order to evaluate educational institutions, it is important to be able to understand the various metrics used to measure them. However, we must always be aware that statistics can be misleading. They can give the false impression of concreteness and rigor. Underlying many statistics are arbitrary choices as to how to measure things like quality or value. In addition, we have seen is that such metrics can be skewed by sample bias, which may create a false impression of quality where there is none, or vice-versa.

What we have also seen is that when statistics are used to evaluate educational institutions, it can create an unhealthy incentive to engage in practices that will inflate their ratings. These practices can be expensive, and may not actually create value for students. This raises the question of how much these metrics are driving schools to improve, versus how much they are driving schools to artificially inflate the numbers.

Recently, President Obama has proposed that the Department of Education start ranking colleges based on "value." Value would be based on criteria such as graduation rates, cost of tuition, number of students receiving Pell grants, and the earnings of graduates [2]. As we have seen, however, it is difficult to put a number on "value", and any time a particular statistic is used to evaluate schools, it creates an incentive to distort the ratings. In the current instance, ratings based on graduation rates might encourage schools to use factors such as zip codes and high

school attended to avoid admitting weaker (and poorer) students, who will have a more difficult time graduating. Similarly, if the salary of graduates affects rankings, the new plan may incentivize colleges to reject students who are interested in low-paying professions such as “social work, ministry, and preschool education” [2].

The bottom line is that there is no easy way to measure schools, either in terms of performance or value. This does not mean that such statistics are useless. Bateman [2] proposes the alternative of providing as much information as deemed necessary, and allowing students and their families to decide for themselves. The issue with this approach, and one of the reasons educational statistics were introduced in the first place, is that it is often difficult to process so much information. Rankings may over-simplify, but drowning students in data may be confusing. Also, there will still be an incentive for schools to manipulate those statistics that are most important to students. If students tend to focus on graduate earnings, it will still be possible to manipulate this statistic, even if students have access to other information. Forcing students to process too much data will also tend to favor those students who have the time and money to do so.

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## IDENTIFYING MIS MAJORS TO INCREASE ENROLLMENTS

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### ABSTRACT

*Although recently leveling off, the enrollments in the Management Information Systems (MIS) major continues to be a significant concern. Several theoretical models have been proposed to explain what influences students to choose MIS, however, these most often are aimed at validating these models and influences on an aggregate basis and do not examine how those models could be further developed to predict the choice of major for individual students.*

*Our research extends a theoretical model based on participation in a program of co-curricular activities, which are factors not considered in prior work. Our research demonstrates a predictive model that can determine which students are more likely to major in MIS, and do so using only information observed during their first two semesters. This model can lead to more targeted approaches and offer more effective means to increase the number of students choosing MIS as their major.*

**Keywords:** Information systems enrollments, MIS major, classification models

### INTRODUCTION

The rapid decline of enrollments in computing majors including MIS has been well documented; estimates have placed the decreases from 50% [1] to 70% [2]. Enrollments have trended upwards more recently with reported gains of approximately 10% [3]. This is certainly encouraging, but given some projections, even with this level of growth the enrollment problem might be reversed in coming years and become one of opportunity costs from not being able to fill the gap between the number of graduates and employers' needs [4].

Given the magnitude of this problem there has been no shortage of recommendations for improving MIS enrollments. Among these are a 12 step program including steps for furthering communication skills within the curriculum, increasing students' interest in MIS by exposing them to innovative technologies and outside speakers, and linking them more tightly to careers and prospective employers [1]. Changes to the MIS curriculum have been recommended [5] as has a focus on introductory MIS courses to draw more students [6].

Increasing the awareness of careers in MIS and stimulating interest in the field have been frequently recommended as options [7] [8]. Other researchers have recommended establishing international programs [9], and building websites to provide students with better and more comprehensive information about the field of MIS and majoring in it [2].

Most recommendations have been aggregate approaches – “mass marketing”, so to speak – reaching out broadly to large groups of students. On a more granular level, predictive analytics can be used to predict the behavior of specific individuals. For example, search engines customize results based on each link that is clicked on, airlines offer fares based on previous behavior and web pages visited, and even casinos choose offers of complimentary food and beverages by analyzing how a gambler plays.

Higher education often uses predictive analytics, such as in applications predicting academic [10] and student retention [11]. However, relatively few studies have looked at how existing theories explaining how majors are chosen can be tested. Fewer have attempted to develop methods that can predict what major a student might be most attracted to, and possibly still fewer have sought to build predictive models to identify specific students that might be most attracted to the MIS major soon after they matriculate.

Our research proposes a theoretical framework that includes factors for participation in MAP, a program of co-curricular activities. Our goal is not to study factors to explain why students choose MIS, but to compare MIS and non-MIS majors and determine if factors can be used to predict who will major in MIS; research suggests there are differences between students in MIS and other business majors in terms of perceived difficulty of MIS, awareness of opportunities, and self-perceived skill levels [8]. A model based on factors such as these to predict which students will major in MIS offers the possibility of tying together recommendations and suggestions from prior research, and using them selectively to target the individual students where they are most likely to find a positive reception, most likely be effective attracting students to the major, and most likely to increase enrollments in MIS.

We first review the MAP program as background in order to position it within the theoretical framework, and then move to evaluating models for predicting MIS majors.

### **BACKGROUND - THE MAP PROGRAM**

Our research and analysis is based on a program of co-curricular activities called the Management Achievement Program (MAP). MAP was designed and created to increase the sense of professionalism for students enrolled in the undergraduate program at the college of management within a large public university located in the northeast. To increase professionalism the program focuses on enhancing soft skills, increasing the awareness of job opportunities and the means to pursue them, and fostering student engagement. All have the ultimate aim of helping students achieve more success in their careers.

MAP is built on co-curricular activities and the premise that professionalism can be more effectively developed and demonstrated through engagement in co-curricular activities than by attempting to assimilate content delivered only through lectures or seminars. It is based on the principle of Experiential Learning, which posits that learning is “a cycle driven by the resolution of the dual dialectics action/reflection and experience/abstracts” [12]. This principle incorporated in the program’s definition:

“An engaging and comprehensive program designed to develop and enhance each student’s professional demeanor, build competencies for academic success, increase involvement in the College and local business communities, and allow the opportunity for students to personally synthesize their academic and professional goals and experiences.”

MAP is a requirement for all undergraduate students in the college regardless of their major and whether a student majors in MIS or in any other area. In MAP, miles are used as a metaphor for achievement and every student has a specific number of MAP miles as a requirement for graduation. Immediately after entering the college, students can start to fulfill that requirement by earning miles through participation in MAP events. Each event offers a pre-determined number of miles depending on its level of involvement and initiation. For example, shorter and less involved events such as resume preparation workshops might offer an award of 50 miles, whereas for more involved events such as a case competition the award could top 200 miles.

Each student is assigned a set number of MAP miles on matriculation as a graduation requirement. Although some students may already have fixed on a major before joining the college, a major cannot be declared until after a student has earned 60 credits. With the exception of the few students able to transfer into the college with a large number of credits, students do not declare a major until after their first two semesters and often much longer for students that are not full time. For this reason we base our study and analysis to differentiate those who will become MIS majors versus those that will not on MAP participation during those first two semesters

The operation of the program works as follows. Upon matriculation to the college and prior to taking courses, each student is issued an identification card from the college and given access to the MAP web portal for reviewing upcoming events, registering for specific events, entering written reflections as required for certain events, and checking the status of their MAP miles awards and their accounts. MAP events are independent of course schedules and are often held outside of classrooms or off-site; for this reason attendance and participation are recorded using a mobile bar-coding scanning system and then uploaded to the back-end system.

MAP was instituted in the fall 2006 semester and rapidly grew to become an integral part of the college. Students can select from a wide range of events and activities. Among those routinely offered are career workshops, seminars, company visits, career fairs, company information sessions, presentations by senior executives and faculty, student clubs, and service learning. Through 2012, a total of 1,588 events and activities have been held. Throughout this period, there were some 4,800 students entering the program, with a total participation of 25,600 in events and activities.

Students can select among many different types of events and have frequent opportunities to participate. On average 122 events are held during a semester and there is usually at least one MAP event offered every day from Monday through Thursday throughout each semester.

MAP was created as a means to increase students’ sense of professionalism, and not specifically as a means to increase retention or analyze enrollments, whether for MIS or non-MIS students. But many of the factors that influence the choice of a major that researchers have studied for MIS enrollments in prior work have factors analogous to MAP participation. The next section discusses how MAP factors are associated with factors from prior work and positions these within a theoretical framework.

## THEORETICAL FRAMEWORK

While a wide variety of MAP events are offered, they can be grouped into four distinct categories. The first category consists of events directly oriented towards careers. These include attendance at career fairs and participating in company visits. There are frequent information sessions; these are events in which a representative or employee, or an alumnus, comes to campus and discusses their company, their own career, or opportunities within their company or field.

Career oriented workshops are frequently offered and fall into a second category of events. These focus on career preparation; representative titles of workshops are “Writing an effective cover letter”, “Resume preparation”, “Network your way to success”, and “Job/Internship Search Strategies”. Some workshops focus on a specific area such as “Interviewing for Science and Technology Majors”.

These first two categories of events are both highly career oriented and therefore are grouped together in our theoretical model.

A third category of MAP events and activities are presentations. These events are intended to improve knowledge in a specific topic. Presentations cover a wide range of topics; sample titles from past events are “Sales and Marketing Basics”, “The Changing World of Work in US Retail Trade”, “Getting Started in Business”, “Doubleclick for Advertisers”, and “Foreign Nations Means Business”. Presentations can be made by executives, faculty, government officials, and others within the university. Also in this category are “meet the department” events that are presentations of the majors and curriculum offered by a department made by faculty. Presentations are not typically focused directly on job opportunities.

Student led events are the fourth category, and within this category are student clubs, student government, and volunteer activities. These generally require a higher degree of initiative than do other types of events, and the MAP miles awarded are commensurately higher. Credit is offered for membership in the “Entrepreneurship Club”, “Business and Marketing Club”, “Delta Sigma Pi”, and an “MSIS Club” also exists. MAP events in this category include participation in the “Student Leadership Conference” and service activities such as becoming a “Volunteer Coordinator for Jumpstart”.

Table 1 illustrates our theoretical model to conceptualize the factors we analyze in the context of factors from prior work. It associates factors from the four categories of MAP participation with factors known to influence MIS enrollments. Because prior work has found that job and career prospects influence the selection of MIS as a major [13], and considered more broadly as Expected Outcomes [6] [7], we associate them with MAP participation in career events and workshops as shown in Table 1.

Self-efficacy and the related factors shown in Table 1 have been also considered in prior research and found to be significant, such as when modeled in the context of Social Cognitive Theory [6]. We associate participation in MAP presentations with these factors because many presentations are designed to increase students’ knowledge and familiarity, and ultimately confidence. As explained in the analysis section we also associate a factor for overall MAP achievement with self-efficacy in our model. We associate participation in student oriented MAP events with peer influences because they are initiated and led by students, and because factors related to peer influences such as an interest in helping others and in social interactions have also been found to influence the choice of MIS as a major [7].

These factors from prior work and from MAP are conceptualized within either Attitude or Subjective Norms. These are constructs from the Theory of Reasoned Action [14], and both have been found to influence MIS enrollments such as in research models of the intention to major in MIS [13]. Table 1 illustrates our theoretical model to conceptualize the factors we analyze in the context of factors from prior work. It associates factors from MAP participation with factors from prior research shown to influence MIS enrollments. Each factor is conceptualized as related to either Attitude or Subjective Norms. These are constructs from the Theory of Reasoned Action [14], and both have been found to influence MIS enrollments such as in research models of the intention to major in MIS [13].

<b>Construct</b>	<b>Factor</b>	<b>Examples from prior research</b>	<b>Association with MAP participation</b>
Attitude	Expected outcomes	Job and career prospects Salaries Opportunities for advancement	Participation in career events Participation in workshops
	Self-efficacy	Interest in MIS and computers Knowledge of what MIS is Difficulty of curriculum	Attending presentations Progression of MAP achievement
Subjective norms	Peer influences	Prestige Peer admiration	Participation in student events and activities

**Table 1. Relationship between factors from prior work and MAP participation**

This theoretical model relates factors for MAP participation within the context of prior work and factors known to influence choosing MIS as a major; the analysis of those factors for MAP participation follows.

### **ANALYSIS**

There are two steps in our analysis; the first is to determine whether factors from MAP participation that are aligned with theory might be able to differentiate MIS majors from non-MIS majors. The second step is to build and evaluate a classification model to see if it can be used to predict the likely MIS majors based on those factors. The model built and tested is based on MAP participation during the first two semesters after matriculation, which can enable programs to inform students about the MIS major to be selected and directed towards the specific students where they are most likely to be effective.

### **MAP Participation**

Our analysis is based on a random sample of 128 undergraduate students who graduated in either 2011 or 2012. Both MIS and non-MIS majors are included; the latter category includes majors in Management, Marketing, Accounting, Finance, and Supply Chain Management. The sample was evenly split between the two groups, which is important to avoid measurement bias when evaluating the performance of a classification model [15].

The first step in the analysis is to determine if MAP participation patterns prior to the time a student chooses a major can differentiate between students who ultimately choose MIS and those who will choose another major. If no differences can be found, then regardless of its accuracy a predictive model is unlikely to yield meaningful results.

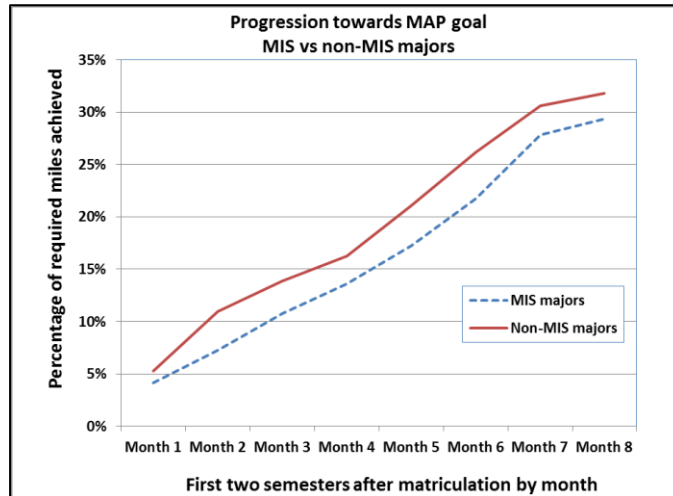
Students are free to choose any MAP event; there are no predetermined tracks or types of events suggested or needed to fulfill the requirements of this program. This means there is no programmatic structure that differentiates MIS majors from non-MIS majors, and that we can compare participation in each type of event for students who go on to major in MIS with those who will not. Table 2 shows the percentage of students who attend each of the four categories of events during the first semester after matriculation, both for students who would become MIS majors and non-MIS majors.

	<b>Percentage participation during first semester</b>			
	<b>Career events</b>	<b>Workshops</b>	<b>Presentations</b>	<b>Student orgs</b>
MIS majors	52%	76%	32%	20%
Non-MIS majors	36%	72%	56%	36%

**Table 2. Percentage participating during first semester**

Participation in career-oriented events and workshops are factors associated with the outcomes a student can expect after graduation, which in turn relate to the attitude a student has towards a particular major. The percentages in Table 2 show that students who will become MIS majors tend to participate more in events from the category of events that are directly career oriented, and both MIS and non-MIS majors participate heavily, but evenly, in career workshop events.

Participating in presentations is more indicative of a student who will not major in MIS than one who will. In order to understand this, we reviewed the topics of presentations held as MAP events and found the majority were in accounting and finance, which are the largest in the college, and in technology or information systems. This might explain the difference shown in Figure 2, but this particular factor may have an unclear relationship with the belief structure for self-efficacy from the theoretical model. Therefore, we included and evaluated another factor that represents the overall progress towards the MAP requirements. Figure 1 plots the average percentage of overall MAP requirements achieved each month during the first two semesters a student was in the college, showing separate lines for students who became MIS majors and those who not. Students who would go on to choose MIS consistently lagged the other students through the first two semesters, and although more investigation can confirm the significance for self-efficacy, the differences in MAP achievement suggest the ability of a predictive model to distinguish MIS from non-MIS majors.



**Figure 1. Progress towards MAP requirements, MIS vs non-MIS majors**

Participation in student-oriented events is linked to subjective norms, and factors from prior work such as helping others and a perceived prestige of an IT career [7]. Table 2 shows that participation in events and activities such as student clubs and volunteer work is slightly more indicative of someone who will not major in MIS than someone who will. This result does not rule out the potential influence of social networks and cohort groups on choosing to major in MIS, but does mean that non-MIS majors tend to participate in the student-oriented events offered by MAP and that this may be a factor that can be used to predict which major a student will choose. This supports some recommendations and prior findings and influence of peers on choice of major [1] [2].

Table 2 shows differences between MIS and non-MIS majors and suggests the influence of several factors related to expected outcomes, self-efficacy, and subjective norms on the decision to major in MIS. Our study addresses only factors related to MAP participation, and not others that prior work has found significant, such as teaching effectiveness in first year courses [16]. While more factors can be significant, the goal of our research is to determine if factors related to participation in a co-curricular activity alone may be enough to distinguish future MIS majors from non-MIS majors early after matriculation and build a model for prediction. The development of a classification model to do so is discussed next.

### **Identifying future MIS majors**

The first step of analysis indicates there are differences between future MIS and non-MIS majors, and suggests factors that might influence which major is chosen. These factors are based solely on the first two semesters after a student matriculates, and with the few exceptions of students who transfer with a large number of credits and immediately declare a major, this is prior to the point a student declares a major.

The second step of this analysis is to test whether a model can effectively differentiate MIS majors from non-MIS majors using factors from MAP participation. Classification models are very suitable for this purpose; here we build a model to predict a binary class variable for whether a student becomes an MIS major or not. The attribute variables used to predict that class variable are shown in Table 3.

<b>MAP participation data used for classification</b>	<b>Details and number of variables (in parentheses)</b>
Cumulative percent of MAP miles requirement earned	For each month during the first two semesters (8)
Total MAP miles earned	For each month during the first two semesters (8)
Number of events attended	For each month during the first two semesters (8)
Number of career events attended	During the first semester (1)
Number of presentations attended	During the first semester (1)
Number of workshops attended	During the first semester (1)
Number of student events and activities attended	During the first semester (1)
Status	Whether a student is a transfer or first year student (1)

**Table 3. MAP participation variables tested for predicting MIS majors**

The variables related to MAP miles and events are all based on the time a student is matriculated and starts in the college. The attribute “Status” indicates whether a student is a transfer student or enters the college in their first year. This variable was included to enable the model to differentiate students who might have transferred with more than 90 credits and were more likely to declare a major within the first two semesters.

Several different classification algorithms were evaluated using SPSS Modeler, among them logistic regression, neural networks, decision trees, and rule-based algorithms. The overall predictive accuracy of these models ranged between 75% and 82%. The confusion matrix from the classification algorithm with the lower accuracy, the C4.5 decision tree algorithm, is shown in Table 4.

		<b>Actual</b>			<b>Pct Correct</b>
		<b>MIS</b>	<b>Non-MIS</b>	<b>Total</b>	
<b>Predicted</b>	MIS	45	20	65	69%
	Non-MIS	12	51	63	81%
	Total	57	71	128	75%

**Table 4. Accuracy of predicting major using MAP participation data**

The confusion matrix in Table 4 shows the model had 45 true positives, which are correct predictions of MIS majors, and 51 true negatives, which are correct predictions of non-MIS majors. This means the model could more accurately predict non-MIS majors (81%) than MIS majors (69%). However, accurate predictions of either group can help identify those most likely to major in MIS. An accurate prediction of someone who will not become an MIS major helps in predicting those who will. This is reflected in the AUC (area under the curve) statistic, which averaged .80 for the classification models tested.

The attribute variables were evaluated by their significance levels in the classification models and an entropy-based measure of their relative importance that is outputted by SPSS Modeler. This showed the most important variables for predicting who will choose a major in MIS to be the overall number of events attended during certain months, and the number of career events, presentation events, and student oriented events during first semester. The months in which the number of events participated which were most significant were the third, fourth, fifth, and seventh months after matriculation – in other words, the total number of events attended towards the end



of the first semester and at the beginning of the second are most predictive of students who will major in MIS.

Not significant were the number of workshops attended during the first semester. Workshops are directed at building career skills and are linked to expected outcomes, as are other events that are directly career oriented. However, workshop attendance was not a significant variable in the classification models. Table 2 shows what may be the reason, which is an even split between the percentage of MIS and non-MIS majors in workshop participation – workshops are heavily attended by the same percentage from both majors, as Table 2 shows, and so this factor is not useful in distinguishing between the two.

While there is an overall difference in student oriented participation as shown in Table 2, it was not always significant for predicting whether a student will major in MIS. This is not to say that social networking and building strong cohort groups does not influence choosing MIS, but rather that participation in these events did little to help predict who would major in it. Increasing the number of student oriented events that are more targeted to MIS might be useful for the institution to consider.

Several variables showed a lack of significance in the models and low indices of importance; they were also absent in any of the node splits in decision tree models. These include Status, which indicates transfer and first year students, meaning the model can be applied to both groups. Along with the total number of events during each month, the model also evaluated variables for total MAP miles during as well as the percentage of MAP requirements achieved. The plot of the percentage of MAP achievement in Figure 1 shows a clear distinction between MIS and non-MIS majors, and we expected those variables to be significant. However, neither these percentages nor the total miles earned each month were significant. The reason may be that these three sets of attributes are correlated, something data mining algorithms handle, and the analysis shows that the number of events attended in the months near the end of the first semester are more predictive of MIS majors.

## CONCLUSIONS

This research demonstrates a means to identify the students most likely to be attracted to majoring in MIS, and to do so early in students' academic careers prior to declaring a major. After aligning factors from participating in MAP, a program of co-curricular activities, with prior research, this study demonstrates a predictive model that can use those factors to determine which students are most likely to choose to major in MIS.

From a sample of 128 students who successfully completed their undergraduate programs in either MIS or another discipline in management, the model predicted the students who would major in MIS with 75% accuracy. The model indicates that the number of events and activities a student participates in as well as the composition of the types of those events, especially those directly related to careers, are the best predictors of which student will select MIS as their major. The model predicts which students will major in MIS and which will not.

Ferratt et al. [7] segmented prospective MIS majors into four categories from the least likely to the most likely, and suggested specific actions to improve enrollments for each category. A predictive model offers the opportunity to consider the portfolio of recommendations and actions that have been suggested, and then to develop and test the effectiveness of highly targeted efforts for improving enrollments in MIS.

There are several limitations of this study. Firstly, there are additional factors that might be relevant, especially factors from prior work shown as significant influences. For example, there were no factors in this study related to curriculum, family influences, or first year courses, all of which have been found as influences. Also, our results showed participation in student-oriented events not useful for predicting a major. Factors such as strong ties or cohesive cohort groups might positively affect MIS enrollments and might be useful to identify prospective MIS majors. One extension of this work is underway to integrate a social networking metric based on the degree of weighted network centrality into the model. Developing a metric to represent cohort group strength is beyond the scope of this study, however, methods from work in the seemingly unrelated area of ant colonization [17] may be useful in this regard.

Secondly, our analysis is based on a relatively small sample size. The differences in participation between MIS and non-MIS majors were consistent and aligned with theory, but given the sample size some of the differences in proportions were not statistically significant. A larger sample is needed to determine if they are.

There are an increasing number of universities offering some form of co-curricular programs with goals similar to MAP. This study was conducted at a single university; replicating it from a program at another university could add confirmation. Such a replication could enable new factors to be included in the analysis, which in turn could lead to predictive models with higher accuracy and more general applicability.

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## Experimental Design Research Project: Trust and Prospect Theory

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December 13, 2013

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### Abstract

Investors incur a risk when interacting with brokers who may shade returns to earn profit at the investor's expense. In these situations, trust can be influential in determining intermediation and if investors will forego assets to conduct diligence. This paper looks at how the proportion of total wealth being invested correlates with risk, optimal diligence and trust. An experiment is designed and a positive correlation between wealth and trust, and inverse correlation between wealth and diligence is predicted when a fixed asset is being invested. Prospect theory is also used to generate a theoretical valuation function on proportional assets. These predictions suggest wealth is best modeled in economics in relative rather than absolute terms.

I would like to thank my Experimental and Behavioral Class for providing valuable suggestions to improve my design and predictions.

Brokers serve as the bridge between return seeking investors and borrowers, and in doing so represent the fundamental form of financial intermediation for creditors. In such broker-saver interactions, brokers by designation possess complete information on returns and borrowers. When an individual hires a broker for a transaction as simple as selling a textbook, the individual is foregoing knowledge of the preferences of potential buyers, demand for her text and most importantly, the likely sale price to be obtained. It becomes evident that trust plays an imperative role in engaging agents as brokers, who have incentive to shade their customers and keep excess profits. In this experiment customers must be careful that they receive the full return on their investment in circumstances where only the cheating broker is aware of actual returns.

Investors are not entirely at the mercy of the broker holding their assets. As outlined by Zak and Knack (2001) several societal factors serve as checks on brokers. Social distance refers both to regional heterogeneity and the likelihood of interpersonal interaction that affect an investor and agent's awareness of one another. Institutions in place similarly factor in by increasing transparency and reducing informational imbalances between parties. In the United States for example, the Securities and Exchange Commission requires and makes available extensive documentation on the proceedings of publicly traded companies, guaranteeing stockholders the option to monitor their investment. These are a few of many factors that affect trust and the risk associated with a brokering agent.

In addition to such mechanisms, customers may further maximize returns but pursuing investigation of their own. Conducting due diligence incurs a cost on individuals and reduces the principal available for investment. In this manner transaction

costs adversely affect the total profit available from the venture but increase the proportion of the true return the investor can realize. Among other inputs Zak and Knack (2001) propose that individual wealth correlates positively with investigation conducted. The goal of this paper will be to apply prospect theory to show that wealth may actually have an inverse relationship with diligence.

## **Literature Review**

### *Absolute and Relative Assets*

Zak and Knack (2001) propose an economy in which consumers with standard preferences seek entry into credit markets by employing an investment broker. Consumers are paired randomly each period with brokers who have incentive to cheat consumers by dishonestly under-reporting returns and keeping the shaded excess. Despite being characteristically untrustworthy, brokers are encouraged to be honest by the formal/informal institutional factors previously mentioned and by diligence carried out by consumers with the threat of fee penalties. The authors proceed to develop a model relating lifetime utility and consumption where possible consumption is a function of returns on an absolute investment among other inputs. Wealth and diligence are inversely correlated in the model which is justified by the assumption that the greater one's wealth, the more investigation will be conducted to protect the considerable assets at stake. This proposition is based on equal valuation of absolute assets and therefore fails to account for individuals for whom the same absolute asset represents differing valuations. To clarify consider the simple example of misplacing a \$20 bill which may be a consequential sum to a low-income worker, but is likely a trifle to a wealthy

businessman. This suggests a departure from the model may be more accurate; specifically assets need to be considered in relative rather than absolute terms.

### *Expected Utility Theory*

Expected utility theory proposed by Bernoulli (1954) offers a framework from which we may analyze how perspective may affect diligence devoted to invested assets. Investments are essentially gambles in which individuals with available capital choose a set of events with expected probabilities from which they hope to attain profit. To make such an investment precise we may consider  $(x_i)$  the vector of possible total payoffs and  $(p_i)$  their associated probabilities. Note that the possible payoffs are directly correlated with the principal invested. Using expected utility theory we find the expected payoff to be  $\sum_{i=1}^n x_i^a p_i$  for  $n$  possible outcomes and  $a \in \mathbb{N}$ . This sum represents an individual's expectation of return and equivalently the gamble associated with his/her investment. In other words, calculated expected payoffs also take into account the risk an investor is taking on with the broker agent. Under expected utility theory, Zak and Knack's proposition holds true as the risk and diligence corresponding to a portfolio is directly proportional to  $\sum_{i=1}^n x_i^a p_i$  regardless of an investor's wealth. From the perspective of relative assets however, the elements of  $\langle x_1, x_2, \dots, x_n \rangle$  represent different values to different individuals, the low income worker and wealthy business man for example. Accounting for differing valuations requires that we extend our framework beyond expected utility theory.

### *Prospect Theory*

In their seminal 1979 paper, Kahneman and Tversky introduced prospect theory as an alternative to expected utility theory that allowed a weighting function on values

and probabilities. According to prospect theory, given a set of outcomes and probabilities associated with each, an individual begins by assigning subjective valuations of each outcome  $x_i$  and decision weights on each probability  $p_i$ . This creates a mapping  $x_i \rightarrow v(x_i)$  and  $p_i \rightarrow \pi(p_i)$  and a corresponding expected payoff of  $\sum_{i=1}^n v(x_i)\pi(p_i)$ . Values and probabilities are no longer necessarily represented by linear continuous functions but rather vary based on weighting. Further, payoffs can only be simplified through cancellation or combination of equal  $x_i$  or  $p_i$  values. To clarify note that  $v(\$20)$  for instance is no longer a point on a straight line indicating that though  $\$20 - \$15$  is  $\$5$ ,  $v(\$20) - v(\$15)$  may no longer be  $v(\$5)$ . Consequently, comparisons can only be made through strict dominance or transitive relationships such as  $v(\$20) > v(\$15)$  by monotonicity and  $v(\$15) > v(\$5)$  implies  $v(\$20) > v(\$5)$  by transitivity. In extending prospect theory to investors and brokers we need not consider  $\pi(p_i)$  as we may assume decision weights on probabilities to be uniform on average and similar to those presented by Kahneman and Tversky (A1). Prospect theory does present a distinct advantage in considering the weight placed on outcomes as this affords an opportunity to distinguish investors of different wealth levels.

### *Contingent valuation*

Assessing individual value weights much like measuring utility and disutility presents an interesting challenge as neither is conveyed in a specific unit of measure. The idea of quantifying subjective worth has developed primarily in the context of environmental economics in which products/policies with externalities such as pollution or park construction could not be comprehensively analyzed. Mitchell and Carson (1989) introduced contingent valuation as a possible choice modeling method based in attribute-



based theory and survey methods. In contingent valuation, preference levels are reflected by maximum willingness to pay or minimum willingness to accept. The non-tradable concept being quantified is first described in detail after which respondents are given incremental ranges on WTP or WTA. Further questioning may narrow this value further but the initial ranges provided are designed to ease the estimation process for boundedly rational individuals. Further preference questions may be used to help attain unbiased estimates. We will detail later how minimum willingness to accept may be utilized in estimating value weights associated with varying proportions of wealth.

### *Improving Incentives*

Creating consequential scenarios is imperative to the accuracy of contingent valuation methods and in exacting true preferences. In their 1994 paper, Loewenstein and Issacharoff illustrate how pricing is dependent on the source of the good being traded. Objects obtained as a prize for exceptional classroom performance were valued amongst students significantly higher than the same prized given after poor performance. In fact the effect on pricing was similar in magnitude to the endowment effect. This result is supported by Zink, Pagnoni, Martin-Skurski, Chappelow and Berns (2004) who observed greater activity in the striatum, a midbrain region affiliated with rewards, when subjects earned money than when the money was given with no effort. This will be an important consideration in designing our experiment, as subjects must have incentive to retain their theoretical wealth.

## **Experimental Design**

### *Contingent Valuation Scenario*

Let us first conduct an experiment to assess the weighting function based on individual wealth. Begin with a sample of 300 undergraduate students ideally including students sampled at random including various majors and ages. Students will then be assigned at random into groups one through six with 50 students in each wealth treatment. After being seated at computers in a manner such that students do not interact with one another, a 15-question logic quiz (A2) will be administered with a 10-minute time limit. The purpose of the logic quiz, as previously discussed, will be simply to provide subjects with tokens in a manner that associates personal value with the endowment. Doing so ensures students are wary of possible losses and seek to protect assets in a manner similar to investors in the real world.

Students will be informed on screen that they have been grouped with 5 other students and that the 3 top scores will be rewarded. After completing the logic quiz, no scoring will be conducted but every student will be informed that they received the highest score in the group and have earned a reward. Every student in groups one through six will be awarded 20000, 10000, 2500, 1667, 1111 and 1053 tokens respectively by group for their quiz performance. Students will be blind to the varying endowments.

#### *Value Weights and Diligence*

Prior to administering the questionnaire that follows the quiz, all students will be informed of the payoff scheme. Students begins with \$15 and will receive or lose \$1 for every 100 tokens won or lost in the game. The questionnaire (A3) begins by detailing a scenario in which the student must loan 1000 tokens to a stranger who has probability 0.3 of returning nothing and 0.7 of returning  $Z$  tokens. Two questions are then asked attempting to elicit a minimum value of  $Z$  for the student. Consistent with contingent

valuation, the first question provides incremental valuations (by 100 tokens) attempting to narrow each individual's minimum willingness to accept a gamble on 1000 tokens. With a narrowed frame of reference, students are better positioned to assess an exact evaluation so the second question directly ask what minimum value of Z the student would expect from the creditor. The borrower is unspecified and remains a stranger in order to avoid confounding trust variables discussed by Zak and Knack (2001) such as social distance.

The last question is designed to elicit diligence allocated to monitoring the risky loan. Students are asked how many of their tokens they would be willing to forego (up to 500) in order to increase the borrowing individual's likelihood of returning Z to 0.8 and thereby reducing the probability of default to 0.2. At some point following administration students will receive envelopes containing payoffs from the investment gamble with  $payoff = 15 + 0.01(\Delta a - d)$  for  $a$  equal to final assets and  $d$  equal to the amount foregone in question 3.

### *Country Level Analysis*

The second objective will be to assess if these findings are consistent with correlations in data aggregated over several countries. Zak and Knack conducted extensive analyses using a 41-country sample to test each of their predictions including Barro-type regressions, OLS and added proxies. In their work, GDP per capita is used to reflect income and wealth, which by hypothesis had opposing effects. We will not attempt to replicate their work but shall draw upon the sample and trust measures they use. We shall run an ordinary least squares to regress trust against wealth. Trust will be

measured using data from the World Values Survey conducted in 1981, 1990-1991, and 1995-1996. As articulated by Zak and Knack (2001),

The measure of trust we use is the percentage of respondents in each country agreeing that 'most people can be trusted' against the alternative that 'you can't be too careful in dealing with people'... Surveys typically include between 900 and 2,800 respondents, designed to be a nationally representative sample. Knack and Keefer (1997) provide empirical support for the validity of these data, finding... that trust is strikingly correlated across countries and regions with the number of wallets that were 'lost' and subsequently returned with their contents intact in an experiment conducted in various European nations and the United States.

Knack and Keefer (1997) assess the validity of measures on 29 countries included in the first two administrations of the WVSs after which 9 countries are added in 1995-1996.

Data on Greece and Luxembourg come from Eurobarometer surveys and New Zealand from a government-sponsored values survey. Wealth is best reflected by flow of funds data, in particular the average net worth of households by country. This data is available the Organization for Economic Cooperation and Development's database under 'Households' financial and non financial assets and liabilities'.

### **Predictions**

The pseudo-gambles presented in our first experiment seek to elicit approximate weighted valuations of a fixed amount from the perspective of individuals with different wealth. Our experiment was designed such that the reward presented to each group represented a specific wealth level when compared proportionally to the 1000 token loan that followed. By hypothesis wealth is assessed proportionally, implying groups one through six will view a 1000 token credit as an investment of 0.05, 0.1, 0.4, 0.6, 0.9 and 0.95 of total assets respectively.

Using responses to question two now produces a wealth valuation function in the form values  $v(x)$ , against any change in proportion of wealth as illustrated in figure 1. Proportion of wealth is given on the horizontal axis as the invested principal  $x$  over total wealth  $a$  on the domain  $[-1, 1]$ . Theoretically, we predict that similar to the valuation produced by Kahneman and Tversky (1979), the value and therefore utility derived from gains will be less than the disutility of equivalent losses. Our experimental results however only correspond to the above function on  $[0, 1]$  which we predict will be concave and strictly increasing. This contrasts a constant function suggested by considering wealth solely in absolute terms.

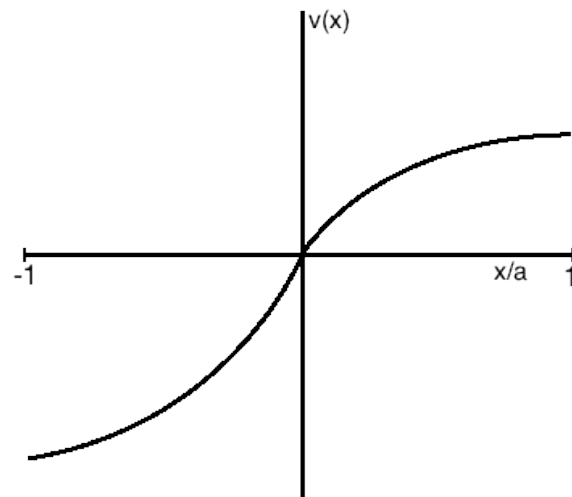


Figure 1

In accordance with our hypothesis and the predicted function, average expected return  $Z$  will increase as group number increases since 1000 tokens represents an increasing proportion of total wealth as group number goes to 6. Ideally we predict a statistically significant difference in mean  $Z$  in pairwise t-tests amongst each of the groups. By extension, the higher risk from  $v_{.95}(1000) > v_{.9}(1000) > v_{.6}(1000) > v_{.4}(1000) > v_{.1}(1000) > v_{.05}(1000)$  implies that low wealth players will invest greater amounts to investigate their brokers. Our third question is analogous to investigative operations taken at personal expense to increase the likelihood of higher returns. So we predict that low wealth players will sacrifice greater amounts  $d$  in question 3 to increase their expected return or transitively conduct greater due diligence.

In the regression analyses parameter estimates on our proxy for wealth, household net assets, should be positive. Positive parameter estimates would reflect the positive relationship between trust and wealth on a macroeconomic scale amongst the 41 countries we sample.

## Discussion

### *Trust and Growth Model*

As illustrated in our experiment, principal must be modeled in relative terms to account for varying risk perceptions of individuals with differing wealth levels. Now consider this alteration to the utility optimization model proposed by Zak and Knack. Let us begin by defining the relevant variables,

$c^i$  be consumption of a type  $i$  consumer who earns wage  $w^i$ , has wealth  $a^i$ , spends time  $h^i$  working in production, and devotes time  $e^i$  to investigate the return on his or her investments, with total time normalised to unity. Formal institutions, denoted  $p$ , seek to detect and punish cheating brokers and are funded by a lump-sum tax,  $\tau$ , paid by consumers. Agents have access to an investment investigation technology,  $\eta[e^i, p, D(i, j; \theta)]: [0, 1] \times \mathbb{R}^{2+} \rightarrow [0, 1]$

Lifetime utility is maximized by,

$$\text{Max}_{c^i, e^i} E \sum_{t=0}^{\infty} \beta^t U(c_t^i) \text{ such that } c_t^i = w_t^i h_t^i + R_t a_t^i \eta^{ij}[e_t^i, p_t, D_t(i, j; \theta)] - a_{t+1}^i - \tau (*)$$

and  $1 = e_t^i + h_t^i$  given  $U(c)$  is a continuous, increasing, and strictly concave utility

function that follows the Inada conditions and  $\beta \in (0, 1)$  is a subjective discount factor.

Our consumption function is simply the sum of labor income and investment income

respectively, with diligence costs accounted for by  $\eta^{ij}[\ ]$ , minus assets invested and taxes paid on existing institutions.

With an increased weight we find that less wealthy individuals incur a greater risk on investments of the same absolute value  $a_i$  and would therefore conduct greater

diligence on brokers. To incorporate this consideration into the above model (\*), let us consider assets as an input for the diligence function  $\eta^{ij}[\cdot]$ . The model is now max lifetime utility is  $Max_{c^i, e^i} E \sum_{t=0}^{\infty} \beta^t U(c_t^i)$  such that  $c_t^i = w_t^i h_t^i + R_t a_t^i \eta^{ij}[e_t^i(a_t^i), p_t, D_t(i, j; \theta)] - a_{t+1}^i - \tau$  and  $1 = e_t^i + h_t^i$  given  $U(c)$  is a continuous, increasing, and strictly concave utility function that follows the Inada conditions and  $\beta \in (0, 1)$  is a subjective discount factor. The model differs from the original only in that  $a_t^i$  now factors into time spent on investigation and  $\frac{\partial e_t^{i*}}{\partial a_t^i} < 0$ . The rate at which  $\frac{\partial e_t^{i*}}{\partial a_t^i}$  is decreasing, that is the magnitude and whether  $\frac{\partial^2 e_t^{i*}}{\partial^2 a_t^i}$  is positive or negative, depends on the concavity of the weighting function. By hypothesis our weighting function follows  $\frac{\partial v(x_i)}{\partial a_t^i} < 0$ , but further  $\frac{\partial^2 v(x_i)}{\partial^2 a_t^i}$  will shed light on the behavior of diligence in relation to wealth.

### *Low Trust Poverty Trap*

An inverse relation between wealth and diligence provides further rationale for the low-trust poverty trap associated with underdeveloped countries. Poor states typically face weak institutions, inefficient intermediation and other factors that propagate harsh investment conditions and systematic poverty. This cyclic relation between the economic environment and factors that determine trust levels account for the termed low-trust poverty trap that inhibits and even reverses any growth.

Our experiment portrays how low levels of wealth further contribute to transaction costs faced by investors. When the risk associated with a fixed investment is high and optimal diligence is correspondingly large, shifting available capital to its ideal use is very difficult. This can be modeled in the loanable funds market (figure 2) by a

large spread in financial intermediation that has the effect of driving up borrowing rates and lowering the equilibrium quantity of loans. With higher interest rates, investment is further discouraged adding to the harsh credit climate.

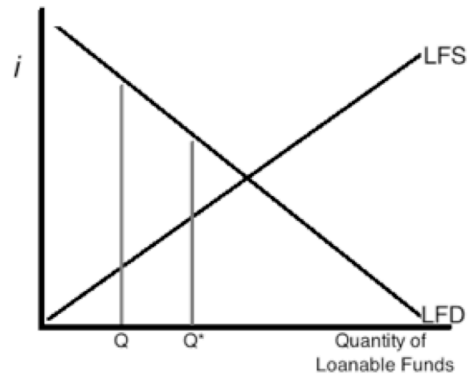


Figure 2

This has several implications in developmental economics including financial aid in particular. As part of Official Development Assistance, the UN set a 0.7% of GNI target on foreign aid by wealthy countries for 2015. Few countries have achieved this target rate but our findings provide evidence for its validity as a mode of promoting development. States with easy access to capital and low overhead on intermediation can provide the principal for investment at a much lower opportunity cost than domestic markets in these poor states can. More directly, this fixed capital is a small proportion of assets in the wealthy state thereby representing much lower risk and optimal need for diligence.

## Summary

Prospect theory when applied to Zak and Knack's (2001) work offers an intuitive and accurate revision of the predictions of expected utility theory. Weighting of fixed investments provides a better measure of risk and diligence suggesting that in future research, wealth must be modeled in relative instead of absolute terms. Doing so clarifies the direct correlation between wealth and trust as is consistent with the value weighting function constructed and our regression analysis. This conclusion reinforces the findings of previous work, highlighting the transaction costs prevalent in poor countries and the low-trust poverty trap that can ensue. Fixed capital investments are often the necessary

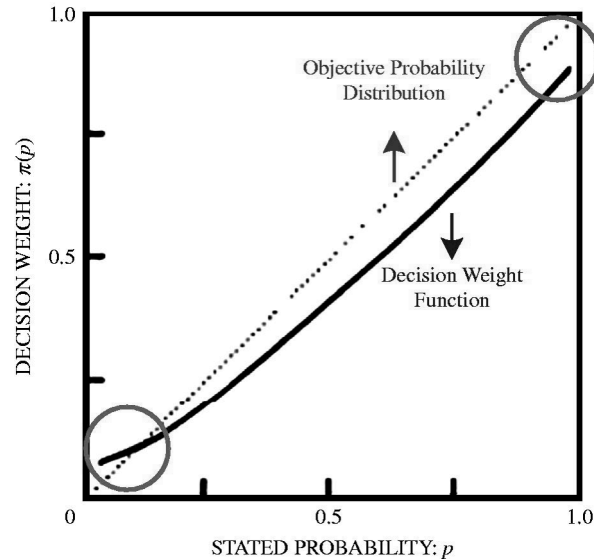


impetus for realizing returns through business or industrialization. The weighting function and wealth present another perspective on the role transaction costs and trust play in determining growth in economies.

## Appendix

### A1: Probability Weighting Function

Image based on Kahneman and Tversky (1979), courtesy of <http://www.emeraldinsight.com/journals.htm?articleid=1741977&show=html>



The objective probability distribution is simply  $p = \pi(p)$  and is consistent with expected utility theory. Note that probability weights are strictly increasing and consistent with the certainty effect. Weights are large near zero and 1 and underweighted for much of the middle of the range.

### A2: Logic Quiz

Quiz courtesy of: <http://www.quizrocket.com/free-iq-test>. This citation is not to be included in the quiz form administered during the experiment.

You have been placed in a group with 5 other individuals who will take this same simple logic quiz. The individual with the highest score will be awarded tokens that can be cashed in prior to your departure today. You have 10 minutes, good luck!

1. Serval, caracal, lynx, and oncilla are all types of what?
  - Butterflies
  - Cats
  - Computer viruses
  - Bacteria
2. These numbers follow a pattern. 2, 7, 13, 20, 28. What comes next?
  - 30
  - 36
  - 37

- 42
3. One of these things doesn't belong. Which is it?
- Computer
  - Typewriter
  - Cell phone
  - Post-it note
4. Fall is to Summer as Monday is to \_\_\_\_\_?
- Tuesday
  - Sunday
  - Wednesday
  - Friday
5. A, S, D, F, G, H, J. Which letter comes next in this sequence?
- K
  - W
  - V
  - M
6. "A Granola Nerd" - If these letters are rearranged, they create the name of which political figure?
- A former U.S. President
  - A former Supreme Court Judge
  - A former Senator
  - A former British Prime Minister
7. These numbers follow a pattern. 5, 10, 3, 8, 1. What comes next?
- 6
  - 5
  - 4
  - 2
8. Dome is to Mountain as Redwood is to \_\_\_\_\_?
- Forest
  - Tree
  - Plant
  - Paper
9. One of these things doesn't belong. Which is it?
- Gmail.com
  - Yahoo.com
  - Hotmail.com
  - Ask.com
10. Which word fits in the blank in this sequence: water, paperclip, business cards, \_\_\_\_\_, computer?
- cell phone
  - executive desk furniture

- pushpins
  - magnets
11. From the list of letters below, which one CAN NOT be turned upside down, reflected in a mirror and still look correct?
- B
  - D
  - U
  - O
12. Which word fits in the blank in this sequence: mouse, squirrel, \_\_\_\_\_, hippo, blue whale?
- Butterfly
  - Frog
  - Deer
  - Lion
13. One of these things doesn't belong. Which is it?
- Rat
  - Cheese
  - Man
  - Cat
14. "Advises Mil" - If these letters are rearranged, they create the name of which person?
- An actor
  - An author
  - A fictional character
  - A jazz musician
15. Rios, Amanti, Sorrento, Sedona. These are all types of what?
- Places in Italy
  - Places in Spain
  - Kia model cars
  - Saturn model cars

### A3: Experiment Questionnaire Form

Congratulations, you have been awarded (# of tokens corresponding to group #) tokens for placing at the top of your group! We will have one more section in today's study consisting of three questions. After you are done, you will receive \$15 plus or minus \$1 for every 100 tokens you gain or lose in this section.

By circumstance, you have been forced into a scenario in which you must loan a stranger 1000 of your tokens. This individual has a 30% chance of going bankrupt and returning nothing to you and a 70% chance of returning Z tokens to you.

1. What would you expect the value of Z to be to make this fair? Check all that apply.

- \_\_\_\_\_ Between 1000 and 1100 tokens
- \_\_\_\_\_ Between 1100 and 1200 tokens
- \_\_\_\_\_ Between 1200 and 1300 tokens
- \_\_\_\_\_ Between 1300 and 1400 tokens
- \_\_\_\_\_ Between 1400 and 1500 tokens
- \_\_\_\_\_ Between 1500 and 1600 tokens
- \_\_\_\_\_ Between 1600 and 1700 tokens
- \_\_\_\_\_ Between 1700 and 1800 tokens
- \_\_\_\_\_ Between 1800 and 1900 tokens
- \_\_\_\_\_ Between 1900 and 2000 tokens

2. Given you have to provide the loan, what minimum value of Z do you think is fair?

\_\_\_\_\_ tokens

3. You now have the choice to give up a portion of your final earnings for today, in order to increase the likelihood this stranger will pay you back. If you choose to monitor the stranger, the likelihood of default will reduce to 20%. Consequently, there would now be a 80% chance that you would receive Z tokens back from the stranger. Up to how many tokens would you be willing to give up to improve your chances of being returned Z (**no more than 500 tokens can be given up**)?

\_\_\_\_\_ tokens

Thank you for participating today! You may collect your cash earnings and depart.

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## Using a Branch-and-Price Approach for Runway Scheduling Problems

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### Abstract:

We address the problem of sequencing a set of aircraft operations (landings/departures) over multiple, mixed mode runways at congested airports. The problem, classically formulated as a mixed-integer program, is reformulated as a set partitioning model that is solved using a branch-and-price approach. In particular, a dynamic programming scheme that is embedded in the column generation approach is shown to significantly contribute to the numerical efficacy of this solution technique. Computational results are contrasted for different optimization approaches for this class of problems.



# DEVELOPING A PRELIMINARY AGENT-BASED MODEL AND SIMULATION FOR NEGOTIATION: NegSim

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## ABSTRACT

Modeling and simulation, as a discipline, covers a wide variety of sub-disciplines and topics, from biology to games, from earth science to art. Issues in social sciences are also being addressed within modeling and simulation through the use of different paradigms. The purpose of this research is to use the micro-modeling paradigm Agent-Based Modeling to create a preliminary setup to study the process of negotiations. The specific tool chosen to model and simulate negotiations is NetLogo. The paper describes the overall methodology and specific steps to create a model to simulate negotiations. The preliminary model developed can be used as a starting point for more complex negotiation processes.

## 1 INTRODUCTION

Agent-Based Modeling (ABM) has been used extensively in many areas within the social sciences, including leadership (Gigliotta, Miglino and Parisi, 2007), decision-making (Sun and Naveh, 2004), teamwork (Overwalle and Heylighen, 2006), sociology (Sallach and Macal, 2001; Gilbert and Abbot, 2005) and cognition and emotion (Bandura, 2001; Gratch and Marsella, 2005), among others. Hendrickson and McKelvey (in Silverman, Bharathy and Nye, 2007) state that there is a need for the theories of social science to be computationally formulized as agent models, in order to show that they are analytically adequate. The simulation paradigm is equipped with tools and techniques that help researchers address complex relationships, and analyze the situations in which these relationships take place.

Agent-based modeling and simulation has its own theoretical foundations, worldviews and philosophies built through its connection to other fields such as complexity science, systems science, systems dynamics, traditional modeling and simulation, and the social sciences (Macal and North, 2005). Epstein (1999, p. 56) describes ABM as a “powerful tool in the analysis of spatially distributed systems of heterogeneous autonomous actors with bounded information and computing capacity [*italics original*]”. Most social and psychological phenomena occur not as the result of isolated decisions by individuals but rather as the result of repeated interactions between multiple individuals over time (Smith and Conrey, 2007). Therefore, it is important to choose a specific method that will enable the researcher to observe these repetitive interactions and the patterns that emerge as a result of these interactions.

## 2 MOTIVATION FOR MODELING NEGOTIATIONS

Negotiation is something everyone does in their daily lives; negotiating chores with roommates, negotiating food with children, negotiating duration with the tread-mill, are all common and simple negotiations. When it comes to the world of business and organizations, however, the process becomes much more complex. Business deals, mergers, buy-outs, and other examples may take months, sometimes years to get finalized. However, in any of these negotiations, there are commonalities to be found:

1. Every negotiation takes place between two or more parties.
2. Each party has certain ability.
3. Each party will must be willing to negotiate.
4. Each party will have a specific target, or range, in their mind.
5. Each party will have a back-up plan, in case the negotiation fails.

Taking these commonalities into consideration, there are couple of important concepts to define. In case one party is not successful in a particular negotiation, there has to be a back-up plan, or an alternative to the negotiated deal. The parties need to understand their best alternatives to a negotiation agreement, or BATNA (Fisher, Ury and Patton, 1991). If one party has a strong BATNA, they will have more power throughout the negotiation, and will act accordingly. One other very important issue is the minimum and maximum values that make up the range an agent has in its mind. If the ranges of agents intersect, then there is a *zone of possible agreement* (ZOPA). If not, that is, if the minimum value of one agent's range is greater than the maximum value of the other agent's range, there is no ZOPA; therefore the negotiation cannot proceed. The type of negotiation that was modeled here is a *distributive* negotiation. This means that the resource being allocated is limited and fixed, and each party is trying to maximize their gain. This is sometimes called competitive, or win-lose bargaining situations. The more complex negotiations, i.e. integrative negotiations, can be modeled by adding more features to the ABM developed.

As a process, negotiation has been studied within the M&S world using different tools. Lepperhoff (2002) constructed a multi-agent simulation of computer-mediated negotiations using the Delphi programming language; Edmonds and Hales (2004) have analyzed when and why haggling occurs using Signed Document Markup Language (SDML), and Lee and Lee (2007) have studied decision support mechanisms in mobile commerce, specifically multi-agent negotiations using NetLogo. The focus and purpose of this paper is to present a detailed methodology on how an ABM can be developed for basic negotiations, so that the resulting model and simulation of the model can be used as a foundation to build more complex models on. Providing a formalization to this process will also be beneficial in establishing traceability and verification of results to initial premises and rules.

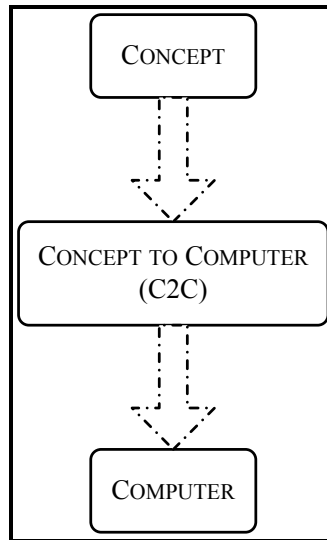
## 3 METHODOLOGY

As a result of the vast amount of research that has been done on ABM, it can be said that there is consensus to some degree on what characteristics an agent should possess. Taking into consideration a sample of these researches (Jennings et al., 1998; Gilbert and Terna, 2000; Bonabeau, 2002; Macal and North, 2005), here is how an agent is defined:

- Agents are identifiable, self-contained, discrete individuals, possessing their own sets of characteristics and rules. This means that an agent has its own boundaries, which helps determine whether something belongs to an agent, or is outside of the boundaries of that agent.
- Agents are situated in an environment, which provides the medium for agents to interact with other agents. There certain rules for the interaction of agents.
- Agents are goal-directed, meaning that each agent has a goal to achieve.
- Agents are autonomous; they independently seek their own goals based on their own local information. There is no central authority, controller or planner. This makes self-organization possible.
- Agents are interdependent. The actions of each agent influence the others.
- Agents follow extremely simple rules, simplest and best supported assumptions about individual agent behavior.
- Agents are flexible, meaning that they have the ability to learn and adapt their behaviors over time. This is reflected at the instances where an agent has a form of memory, and it may have some rules that modify its behavior according to these memories.

Moss (2008) states that the simulation model becomes more concrete when the contributing entities to the social process are captured in high levels of detail; whereas the model becomes more isolated when these entities are reduced for the purposes of concentrating on more specific causal mechanisms. This is why modeling is commonly described as an art, rather than a science; it is full of trade-offs and compromises, in order to reach the most accurate representation *for the purposes of a research*. The research methodology steps taken to start constructing the Agent-Based model include the Conceptual Step, the Concept-to-Computer Step, and the Computer Step. As Becker, Niehaves and Klose (2005) state, constructing a simulation model and interpretation of the simulation results are dependent on the researcher, the research topic, the experiences of the researcher, and the epistemological perspectives of the researcher.

The main research steps as shown in Figure 1 below start with the *Concept*. This is where the verbal model or the conceptual arguments are established and elaborated upon. In order to establish a valid and sound argument, followed by meaningful and *coherent* conclusions, it is crucial to make the premises explicit. The premises originating from literature are used as the foundation for the simulation model. This is followed by the *Concept to Computer (C2C)* phase. In this step, the previously developed conceptual model and the premises are shaped and formalized in such a way that they can be used as input for the computer simulation model. This can be thought of as the pseudo code. Having established this, the final phase (*Computer*) consists of building the computer simulation model.



**Figure 1. Main Research Methodology**

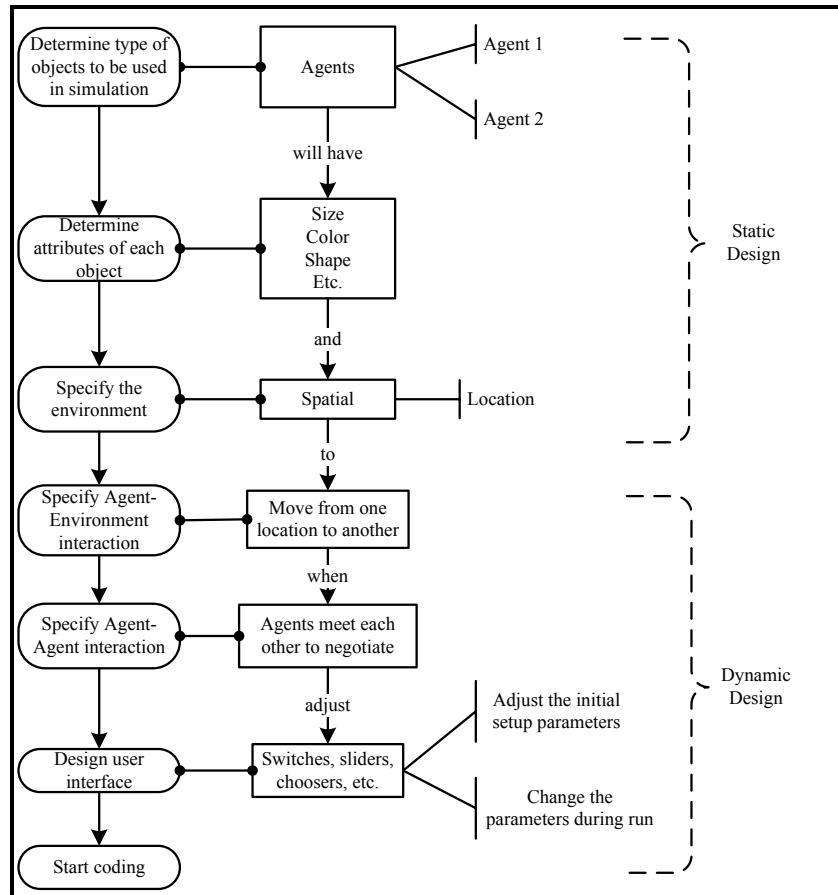
### **3.1 Step 1: Conceptual Design**

The conceptual design step consists of previously developed, identified and selected premises, rules and the context, in terms of negotiations. These premises are:

- Every negotiation will contain two parties.
- Each party has certain ability.
- Each party has a BATNA.
- Each party has a minimum and a maximum amount (range).
- The ranges for both parties define the ZOPA.
- The resource is limited.
- Each party has to be willing to negotiate.

### **3.2 Step 2: Concept to Computer**

The Concept to Computer (C2C) process, presented below in Figure 2, involves taking the above conceptual/verbal theory, structuring it and formalizing it in a way that it can be put into a simulation medium (ABM) using a particular tool (NetLogo). An important point to address here is that the below process is nonlinear; iterations, trials and errors, and modifications have been present in every step. In addition to this, it should be noted that the C2C process is done on paper, meaning that before even touching a computer, this process has to be completed, to ensure that the actual agent-based model is logically consistent and coherent.

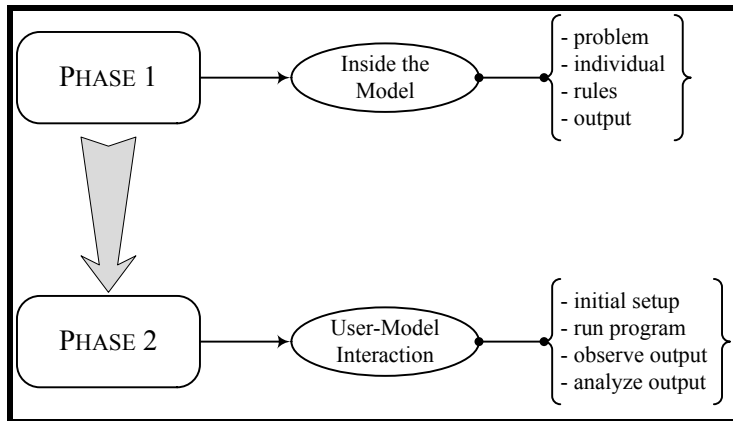


**Figure 2. Concept to Computer Step (Contents adapted from Gilbert and Troitzsch, 2005)**

### 3.3 Step 3: Computer Implementation

In this step, the design steps described above are implemented using NetLogo. The NetLogo (designed by Uri Wilensky in 1999) tool was designed so that building simulations could become common practice for natural and social sciences scholars investigating complex phenomena; the scholars themselves, and not hired programmers, build, run and interpret the simulations. For this purpose, the NetLogo “language” has been developed so that it can be accessible, easy to write, read and modify. This makes NetLogo very much distinct from common general-purpose programming languages like Java and C++. NetLogo is mostly appropriate for modeling complex systems, which are dynamic over time.

This last stage is where the agent-based model is built. Figure 3 is a general representation of the two main phases of this step. Phase 1 is a detailed discussion on the actual simulation model, and what is taking place inside the simulation run, and Phase 2 presents an explanation on how the user-model interaction takes place. Therefore, these two levels occur simultaneously. The user is responsible from the initial setup conditions, and the running of the program. While the simulation is being run according to the rules and interactions described in Phase 1, the user can directly observe the outputs identified. A more detailed analysis of this output takes place afterwards.



**Figure 3. Phases for the Computer Step**

Phase 1 (Inside the Model) represents the section in which how the agents are represented in NetLogo and modeled, and what the rules are, that describe how identified agents will act on their own, and how they will behave when they interact. During Phase 2 (User-Model Interaction), the use will determine the BATNA's of each agent and whether the time will be limited or not. Following this, the program will be run for the pre-determined duration. Finally, output will be observed and results analyzed in terms of what happens to both agents in terms of their abilities, BATNA's and the percentage of resource gained.

#### 4 COMPUTER MODELING AND SIMULATION OF A NEGOTIATION

The Agent-Based Model developed and the execution of this model (i.e. the simulation) will be called NegSim. This section will elaborate on the details that run NegSim.

##### 4.1 Representation of Agents

According to ABM rules and suggestions discussed previously, each negotiation agent will have the following attributes, shown in Figure 4.

Agent Type	Common Attributes
All Agents	Size
	Color
	Shape
	Number
	Location
	Movement

**Figure 4. Common Attributes for Agents.**

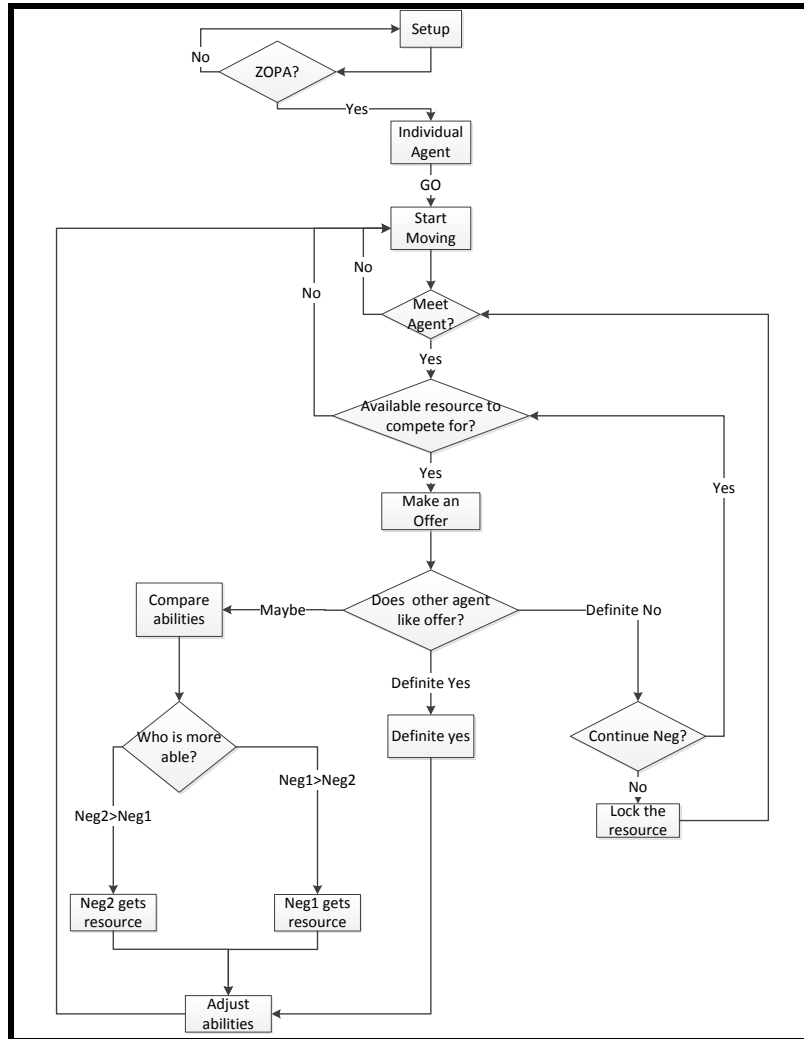
Each agent will have a *size* of 3. This is important to visually track down the agents. Each agent will have a different *color* so that the researcher can differentiate between the agents. The *shape* of each agent will depend on their BATNA's. If an agent has a strong BATNA, the shape will be a smiley face. If an agent has a neutral BATNA, the shape will be a neutral face. If an agent has weak BATNA, the shape will be a frowning face. Again, these choices are made to be able to

track down which agents are negotiating with each other, and their BATNA status. The user will be able to adjust the *number* of agents (one, two, three or four). Each agent has a pre-determined *location* with respect to each other. This is similar to sitting at a square table. When asked to *move*, all agents will move one step forward, then make a random 90° turn, and move one step forward again. The purpose behind the movement is to create a means of interaction for the agents.

## 4.2 Rules

There are three sets of rules that the simulation environment can contain:

- (1) *Rules that are common to all agents*, which are considered as “public” information. These rules are accessible and available to all of the agents.
  - All agents are created: size, shape, color
  - All agents are placed
  - All agents move
  - All individual agents interact with each other
  - All agents die (stop negotiating) if ability less than or equal to zero.
- (2) *Rules (characteristics) of the Agents*, which are considered to be “private” information, provided to each individual agent. These rules are stated such that they are ready to be input in the NetLogo environment, for agents to follow. They basically tell each agent what to do, and when to do it. These set of rules can be thought of as goals, or purposes that are provided to the agents, for them to achieve it, which is in line with the requirements Abrahamson and Wilensky (2005) discuss.
  - look for another agent
  - If find another agent, try to negotiate: the ability that was assigned to the individual agent in the beginning will change.
  - continue moving
- (3) *Rules for connecting the agents*, which is considered as coupling. This set provides the rules for agents to connect with each other; in other words, it will provide the conditions where one agent may hook up with another. These rules are shown in a functional flow block diagram (FFBD) below in Figure 5.



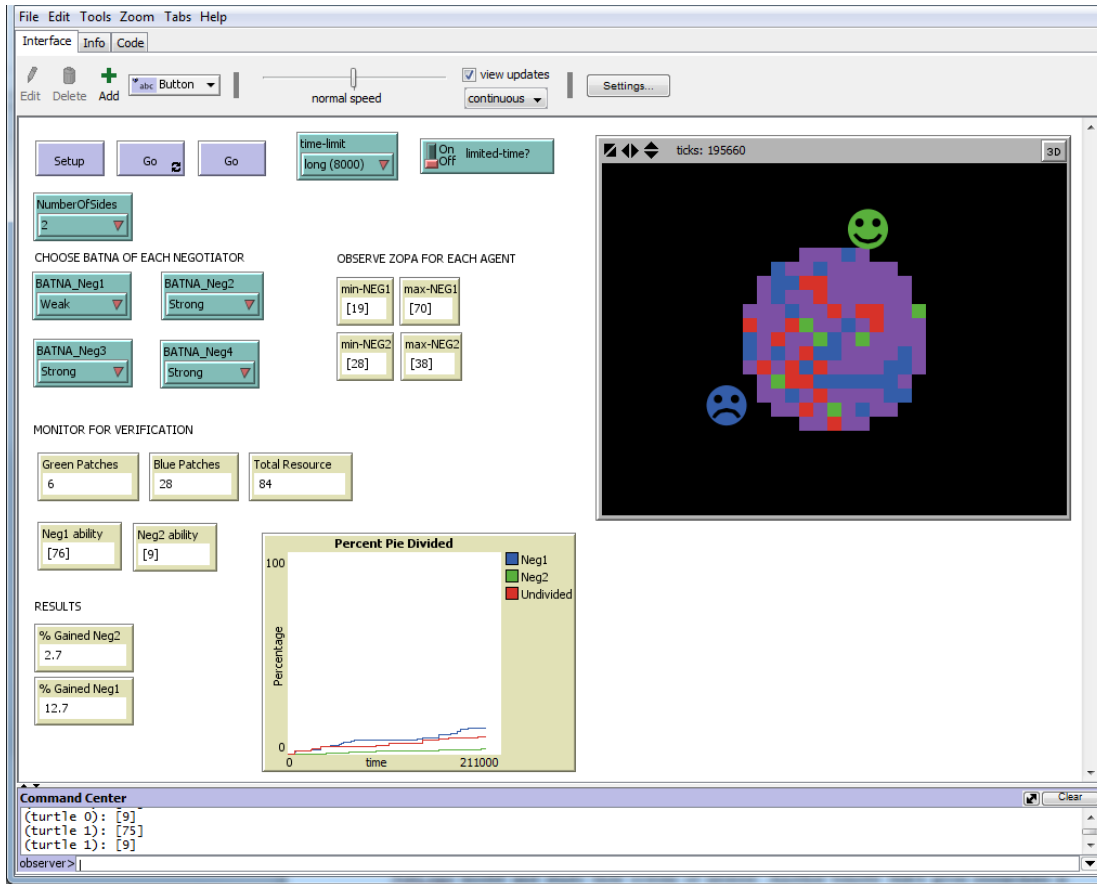
**Figure 5. Rules for Connecting Agents.**

When the agents are created in NetLogo, each agent will have a range with a minimum and a maximum value in their minds. If the minimum range of one agent is greater than the maximum range of another agent, there is no ZOPA, therefore the negotiation cannot proceed. NetLogo will give an error message in a pop-up window stating this situation, and the researcher has to start again.

### 4.3 Preliminary NegSim

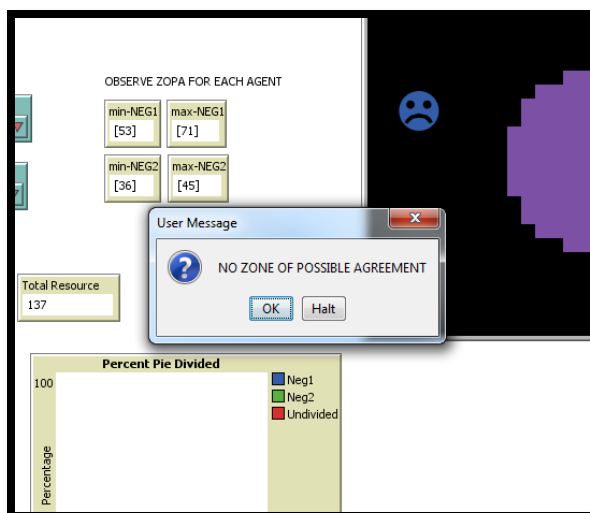
The purpose of this research is to develop a preliminary computer model and simulation for a basic negotiation process. The model, NegSim, is currently under development. The NetLogo model, as seen in Figure 6, is constructed using the methodology and concepts presented above. The code itself is developed using the rules developed in previous sections.





**Figure 6. NegSim NetLogoModel**

The user will start the simulation by choosing the number of negotiators, using the “Number of Sides” chooser. The above screenshot is from a 2-user negotiation. The user then has the option of choosing BATNA’s for each negotiator, using the chooser provided. In the example, Negotiator 1 has a weak BATNA (hence the frowning face), and Negotiator 2 has a strong BATNA (hence the smiley face). Once these are chosen, the user will click Setup. When Setup button is activated, according to the rules provided, each negotiator will receive a range of minimum and maximum values. These represent the range of a price, for instance, that a negotiator would have in their mind. These values can be monitored using the counters provided in the model (“Observe ZOPA for Each Agent”). If there is no ZOPA, NetLogo will give an error, as shown in Figure 7 below.



**Figure 7. No ZOPA error pop-up.**

In this case, the user clicks OK and goes back to Setup. Once the program is ready to go, the user will click on Go. This activates the rules in Figure 5 above, starting with “Start Moving”. In Figure 6, it can be seen that some patches are red, some are blue, some are green, and some are purple. The purple patches represent the percentage of the resources (or the number of issues) that is not negotiated yet. The red patches represents issues that are not resolved (i.e. neither party could agree on the issue). The remaining colors match the resources gained by respective agents. From Figure 6, via the monitors for results, we can see that Negotiator 1 so far has gained 12.7% of the resource, while Negotiator 2 has gained 2.7% of the resource.

When the agents meet on a particular purple patch, i.e. discuss a particular issue, one agent will make an offer, and the other agent will compare this offer with a specific “target” he/she has in his/her mind. If this offer is too far away, the resource will get locked, showing that the agents will come back to this issue at a later time. If the offer is not too far away to the target value, the agent with a stronger BATNA will be more able to gain the resource. One final parameter that impacts the decision-making process is the “ability” of each agent. The abilities are assigned randomly by NetLogo. According to Figure 5 above, if there is a situation where the offer made by an agent has a chance of being accepted, then the more able agent can convince the other party to make concessions.

#### **4.4 Future Research**

The main focus of this paper was on the methodology for developing an agent-based model and simulation for negotiations. NegSim provides the basic rules of a distributive negotiation, and is open to further development of the model. Since this is a preliminary model that is in its infancy, analyzing the results using statistical techniques will be the next step in the future. Using case studies and other literature, more rules and premises can be developed that may be used as input to the model. The results of the simulation may show researchers some insight on how more complex negotiations take place. Further parameters can be added to NegSim, such as events happening outside of the negotiation (in the environment), but having an impact on the

negotiation. Additions can be made to the general behavior of the agents when a particular event occurs in the environment.

## CONCLUSION

The main value in using modeling and simulation, and agent-based modeling in particular, is that every negotiation can be fit into this structure with particular assumptions. A distributive negotiation, regardless of the context, will have certain elements that have been modeled here. If researchers would like to study more complex elements, they can add more features in the NetLogo model and study their system of interest. Another benefit M&S gives researchers is being able to run different settings, what-if scenarios through the computer simulation. This may result in understanding situations that would be more difficult in real life to observe and study. One last value obtained is the advantage of being able to conduct temporal predictions. Simulating time is a crucial advantage when studying complex negotiations that may take a long time to finalize. Future research opportunities include simulating a well-known, and finalized, negotiation example, and validating the results obtained from NetLogo to the actual results. The NetLogo model can be further developed to allow for more complex settings, such as multiple parties, availability of information, a change in the external environment, among others.

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## **The Development of Nursing Care Observational Tool**

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### **Abstract**

In health care, one of the most significant costs to hospitals is nursing cost. Although patients enter the hospital for different reasons and require different amounts of time and level of skill/expertise from nurses while hospitalized, the majority of hospitals charge their patients - regardless of diagnosis or individual nursing level need based on daily “room and board” charges. The issue of “one size fits all” nature of room and board charging system has been long criticized. A research gap in the literature exists as to how to best understand the nature and intensity of nursing care. The purpose of this study is to develop a nursing care observational tool (NCOT) to capture time spent in nursing activities. This paper describes the process of the tool development, pilot test and data collection at a local hospital. The paper concludes with suggestions for using the tool in other specific healthcare context.

**COMPARING AGITATION AND ANXIETY RATING SCALES USING THE  
ANALYTICAL HIERARCHICAL PROCESS TO EXAMINE THE BENEFIT OF  
TIMESLIPS SESSIONS WITH DEMENTIA PATIENTS**

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**Acknowledgements**

The authors wish to thank Carol van Duynhoven, Saint Joseph's University and Thomas Jefferson University, Philadelphia, PA for her commitment and dedication in preparing this manuscript.

The authors wish to thank Kelsey Schranze, St. Joseph's University; Interdisciplinary Health Services 2013 Summer Scholar, for her commitment and dedication in preparing this manuscript.

**ABSTRACT**

Timeslips™ is a group storytelling program that encourages creative expression among dementia patients without the pressure to recall the past. Analysis of the literature was conducted to determine the nine most relevant agitation and anxiety scales most appropriate for use with Timeslips in patients with dementia, who experience agitation and anxiety. Qualitative assessment of the nine scales was conducted to identify six criteria to determine the most pertinent characteristics for implementation of Timeslips within this patient population: (1) validity/reliability, (2) observation period, (3) training required, (4) time to administer, (5) most appropriate administrator and (6) accessibility/cost. Utilizing these six criteria, quantitative assessment was conducted using the Analytical Hierarchical Process (AHP) to identify that the Overt Agitation Severity Scale (OASS) was optimal. A study is being planned to investigate use of the OASS with Timeslips in a long-term setting for patients with dementia, who experience agitation and anxiety.



## **PREVALENCE/IMPACT OF ANXIETY AND AGITATION**

The prevalence of anxiety and agitation associated with early onset dementia and Alzheimer's disease (AD) is common and affects up to 70 percent of patients (Teri, Logsdon, & McCurry, 2002; Lonergan, Luxenberg, & Colford, 2002). Additionally, agitation can occur in up to 90 percent of people with moderate to severe dementia (Swearer, Drachman, O'Donnell, & Mitchell, 1988). Both anxiety and agitation tend to increase as the disease progresses. Managing agitation and difficult behavior can be the most difficult part of treating patients with AD. In anxiety, there is association with other symptoms, such as depression, behavioral disturbances and increased cognitive impairment (Ferretti, McCurry, Logsdon, Gibbons, & Teri, 2001). This high prevalence of agitation and anxiety in AD patients has many effects on the patient as well as on the caregiver and quality of care. Agitation and aggression behaviors are often disturbing for the individual patient, provide risk to patients and others and present challenges for clinicians (Ballard et al., 2009).

### **Pharmacologic Treatment for Anxiety and Agitation**

Current treatments for agitation and anxiety in AD patients are most commonly pharmacological in nature, with the most widely prescribed being atypical antipsychotics. In one study about nursing home prescribing rates, the antipsychotic prescribing rate for patients with dementia was 32 percent (46 of 146 patients). While drug therapy has been shown to be beneficial, adverse effects can still be seen in patients, e.g., myocardial infarction in patients taking Donepezil (Howard et al., 2007).

Other side effects for antipsychotics include worsening of confusion and lower cognitive function. Increase in risk of falls due to hypotension and syncope has also been noted (Evans, 2003). Switching patients from one medication to another may result in a change in mental status (Devanand & Schultz, 2011). Consequently, it is crucial to consider non-pharmacological or counseling approaches for agitation and anxiety (Ballard et al., 2009).

### **Treating Agitation and Anxiety with Non-Pharmacologic/Counseling Approaches**

Non-pharmacological or counseling approaches have been shown to be successful treatments for patients with dementia. For example, dementia patients in chronic care, who were experiencing agitated behaviors, demonstrated improvement after undergoing bright light therapy (Lyketsos, Lindell Veiel, Baker, & Steele, 1999 and Burns, Allen, Tomenson, Duignan, & Byrne, 2009). Similarly, music therapy has been accepted as a safe and effective method for treating both agitation and anxiety in AD patients (Svansdottir & Snaedal, 2006). Additionally, individuals who completed art therapy over 40 weeks showed significant improvements, e.g., sociability and mental acuity (Rusted, Sheppard, & Waller, 2006). Utilization of visual art to give patients an opportunity to observe the art has been shown to lower agitation and anxiety levels in patients (Nanda, Eisen, Zadeh, & Owen, 2011).

Non-pharmacological approaches are a necessary treatment inclusion because some

patients may not respond to pharmacological interventions. Caregivers may be included in these forms of treatment (Mittelman, Ferris, Shulman, Steinberg, & Levin B, 1996). Psychoeducative group intervention with AD patients and their caregivers was effective in decreasing caregiver burden and patient agitation and anxiety (Haupt, Karger, & Jänner, 2000). Other types of non-pharmacologic interventions that have improved agitation and anxiety are creative expression in elderly patients with dementia include life story writing and sharing groups, Visible Lives Storyboards and Timeslips™ (Phillips, Reid-Arndt, & Pak, 2010).

### **Research Question**

The goal of this study is to evaluate the most commonly implemented agitation and anxiety scales and in conjunction, to determine what scale(s) are optimal for pre and post rating in concurrence with the Timeslips program. Evaluation will be accomplished by using the Analytical Hierarchy Process (AHP) to determine the most effective scale for use with Timeslips.

### **Review of the Literature**

A comprehensive review of the literature was conducted to explain the Timeslips Program and to identify and assess the agitation and anxiety scales that are candidate for use with Timeslips.

### **Timeslips**

Timeslips is a group storytelling program that encourages creating expression among patients with AD (Fritsch et al., 2009). Pressure to remember memories from the past can be frustrating for a person with dementia but the Timeslips program alleviates that pressure by relying on creativity and encouragement for imagination (Phillips et al., 2010). A trained facilitator presents a group of participants with an image and assists them to create a story with the utilization of open-ended questions and each participant is asked to provide creating input in their own way. The process of asking questions and answering them is repeated until the group decides the story is finished. The completed story is read to the group (Basting, 2003).

TimeSlips continues to be studied more extensively with findings that demonstrate its significance. Results include improved levels of expression, better communication in AD patients (Phillips et al., 2010), and increased medical student interaction (George, Stuckey, Dillon, & Whitehead, 2011) with improved medical students' attitudes towards people with dementia when they were included in the sessions with patients (George, Stuckey, & Whitehead, 2013). Furthermore, Timeslips has been shown to improve caregivers' attitudes toward dementia patients because it has improved the overall relationship between staff and residents (Farmer, 2012).

### **Agitation/Anxiety Scales**

Rating scales are utilized to evaluate the non-cognitive symptoms associated with Alzheimer's disease and dementia range from psychosis to mood disturbances (e.g., depression, anxiety) and agitation (Cummings & Masterman, 1998). Because these symptoms can be distressing and dangerous for patients, it is important to rate these behaviors (Lyketsos et al., 2000; Forester & Oxman, 2003).

A comprehensive literature search was completed and identified numerous scales that assess and rate agitation and anxiety. These included all scales used in the assessment of dementia, including the Mini-Mental State Examination (MMSE), the Alzheimer's disease Assessment Scale (ADAS), Behavior Pathology in Alzheimer's disease Rating Scale (BEHAVE-AD), Neuropsychiatric Inventory- Questionnaire (NPI-Q) and the Psychogeriatric Dependency Rating Scale (PGDRS). While these scales are frequently used to assess dementia symptoms (Forester & Oxman, 2003), they were not included because they were not specific enough for agitation and anxiety.

From the scales identified, nine were selected for evaluation. These nine scales include three variations of the Cohen Mansfield Agitation Inventory and two variations of the Neuropsychiatric Inventory. The scales are:

**<Insert Table 1 about here>**

### **Analytical Hierarchy Process**

The Analytical Hierarchy Process (AHP) is a multi-criteria decision support system developed by Saaty (1988, 1994) that allows a decision maker to structure a complex problem in the form of a hierarchy. The AHP model has been recently applied to a multitude of different corporate and non-corporate problems to improve decision making; Liberatore, Monahan, and Stout (1993), Hogan and Olson (2004), Ishizaka and Lusti (2004), Travana (2004), Vaidya & Kumar (2006), Dey, Hariharan, Kumar and Moseley (2004), and Hogan, Olson & Sillup (2006). The major advantage of the model is its ability to accommodate complex qualitative and quantitative information into the decision making process. Other advantages include its simplicity to use and its ability to apply consistency to the decision making process. Pairwise comparisons must be made to determine the relative importance of the criteria in achieving the goal. Table 2 depicts the criteria comparison table.

**<Insert Table 2 about here>**

### **Methodology**

Utilizing the nine (9) scales summarized in this paper's review of the literature, each scale was identified by its abbreviation and included for AHP assessment in the order in which they were reviewed: OASS, PAS, RAGE, CMAI, CMAI-SF, BARS, NPI-C, NPI-NH and BRSD. Each scale was then summarized and qualitatively assessed to identify the criteria that were the most significant determinants for a scale's use with the Timeslips program. These criteria would also become the basis of the pairwise comparisons for quantitative analysis the AHP.

### **Results**

#### ***Qualitative Assessment to Determine Criteria for Use with AHP***

Qualitative assessment of the nine agitation/anxiety scales was summarized in a comprehensive table that determined the six criteria that were most important to successful implementation of the Timeslips program. These six criteria are summarized in Table 3.

**<Insert Table 3 about here>**

### **Quantitative Assessment Using the AHP**

The AHP analyses consider the pairwise comparisons and computations using the six identified criteria for the six scales. So if V/R is moderately more important than OP, then a “3” is put into the matrix. Conversely, if V/R is significantly more important than TR, then an “8” is put into the matrix. Next, an adjusted comparison matrix and criteria were determined and followed by determination of criteria weights. Finally, evaluation of the six competing scales was completed and indicated that the OASS is the optimal scale for use with Timeslips. This is shown in Table 4.

<Insert Table 4 about here>

### **Discussion**

As shown in Table 5, the OASS, which has the largest weight, was determined to be the optimal scale to use with Timeslips by the AHP methodology (0.19988). Additionally, qualitative assessment indicated that the OASS had published reliability/validity, an excellent patient population fit, is easy to score, takes about 15 minutes to implement and is easily accessible as a free download. Second by AHP analysis (0.187367), the PAS is easy to use because it requires no further training. However because it is based on an observation time from one to eight hours, the scale is too long for practical implementation with Timeslips (Rosen et al., 1994).

The seven other scales had lower AHP evaluations that were too low to consider them for use with Timeslips.

### **Conclusion/Implications**

The AHP analysis of the nine published scales most applicable for anxiety/agitation patients has found that the OASS is the optimal scale for use with the Timeslips Creative Expressions Program based on administration time, ease of use and results obtained. The OASS has the ability to encompass both an intensity level and a frequency level, which form an overall severity score.

When compared to the most widely used scale, the CMAI, the OASS proved to be better in the conceptualization of agitation. The CMAI only measures behavioral symptoms and, therefore, lacks conceptualization of agitation. Consistent with the findings of this study that support the use of the OASS with the Timeslips Program, the OASS was a reliable and valid measure of agitation severity and motoric upper and lower body behaviors in adult psychiatric patients (Kopecky et al., 1998).

### **Future Study to Assess Benefit of Non-Pharmacologic Intervention**

Numerous studies have been conducted in patients diagnosed with dementia and Alzheimer's disease to investigate symptoms of anxiety, which include several aberrant behaviors, e.g., anxious or worried appearance, (Ferretti, McCurry, Logsdon, Gibbons, & Teri, 2001). These can result in depression, behavioral disturbances or increased cognitive impairment often treated by pharmacologic intervention.

Non-pharmacologic interventions have gained interest because the current use of pharmacologic treatment has been shown to include a various range of side effects and increased treatment costs. Alternatively, creative expression activities have demonstrated improved quality of life, communication and effect on patients' emotions (Phillips, Reid-Arndt, & Pak, 2010). To take the findings extracted from the literature one step further

and to generate empirical data to corroborate the findings, a study is being planned to use the Timeslips Program and the OASS in a nursing home setting with a cohort of patients, with dementia, impaired by anxiety and agitation.

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**Table 1 – Evaluated Agitation and Anxiety Scales**

1) Overt Agitation Severity Scale (OASS)	Kopecky et al.1998; Yudofsky et al. 1997
2) Pittsburgh Agitation Scale (PAS)	Aman & Thomas, 2009; Cummings et al., 1994; Rosen et al., 1994; Zieber et al. 2005
3) Rating Scale for Aggressive Behavior (RAGE)	Bakshi, 2004; Lam et al.1997; Patel & Hope, 1992; Sival et al. 2002
4) Cohen Mansfield Agitation Inventory (CMAI)	Finkel et al.1992; Majić et al., 2012; Smart et al. 2011
5) Cohen Mansfield Agitation Inventory Short Form (CMAI-SF)	Cooke et al. 2010
6) Brief Agitation Rating Scale (BARS)	Finkel et al.1993; Sommer & Engedal, 2011
7) Neuropsychiatric Inventory- Clinical (NPI-C)	De Medeiros et al., 2010; Starkstein, 2000
8) Neuropsychiatric Inventory- Nursing Home (NPI-NH)	Cummings et al., 1994; Iverson et al. 2002; Selbæk et al. 2007
9) Behavior Rating Scale for Dementia (BRSD), Consortium to Establish a Registry for Alzheimer’s disease (CERAD)	Mack & Patterson, 1991; Tariot et al., 1995; Tractenberg et al., 2000; Weiner et al., 1998

**Table 2 – Criteria Comparison Table**

Criteria Comparison Rating	Rating Description
1	“equally preferred”
3	“moderately preferred”
5	“strongly preferred”
7	“very strongly preferred”
9	“extremely preferred”

**Table 3 – Qualitative Determination of Criteria for Use with AHP**

Criteria	Abbreviation	Description of Criterion
Validity/Reliability	V/R	Validity/reliability for dementia patients with agitation or anxiety
Observation Period	OP	When/how long must a patient be observed
Training Required	TR	Time needed to prepare for administration of scale
Time to Administer	TTA	how long does it take to complete the survey
Administrator	MAA	Who implements the scale
Accessibility/Cost	A/C	Ease of getting the scale/cost to acquire it

**Table 4 – Evaluation of Competing Scales**

	Weight	V/R	OP	TR	TTA	MAA	A/C
OASS	0.199880	0.111111	0.41721	0.2195	0.144888	0.158588	0.141027
PAS	0.187367	0.111111	0.27347	0.254189	0.23065	0.28305	0.141027
RAGE	0.145031	0.111111	0.132016	0.199315	0.241959	0.13887	0.141027
CMAI	0.077658	0.111111	0.032121	0.042334	0.058999	0.05752	0.141027
CMAI-SF	0.077354	0.111111	0.032121	0.043572	0.055422	0.05752	0.141027
BARS	0.101044	0.111111	0.032121	0.145443	0.166259	0.082311	0.047971
NPI-C	0.074675	0.111111	0.032121	0.034598	0.042561	0.082311	0.11589
NPI-NH	0.074403	0.111111	0.032121	0.034331	0.040664	0.082311	0.11589
CERAD	0.062589	0.111111	0.016697	0.026718	0.018598	0.05752	0.015115

## **The Perioperative Management of the Emergency Surgical Patient: The Need of a Tool to Decide upon the Appropriate Seniority of the Anesthesiologist**

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### **ABSTRACT**

The aim of this abstract is to question whether personal experience of the on-call Consultant is sufficient for the decision on who should manage an emergency surgical patient. Consultant anesthesiologists in the UK serve their on-call routes as non-residents. Their role is to consult the anesthetic trainees from home and be present at hospital when appropriate. This decision -most of times-is made following an informal tool, which is consisted by common sense and previous experience.

National and European health organizations suggest the seniority of the anesthesiologist -and the surgeon-should be in accordance to the medical conditions of the patient and the severity of the surgical procedure. To be more specific, laparotomies and hip fractures are suggested to be managed by Consultants, as well as ASA III-IV patients and small children. Every hospital is responsible to create its guidelines and safeguarding. However, there is a significant grey area in which a great number of patients apply. In these cases, the management of patients is a result of a number of people who are on call, such as the anesthetic trainee and his threshold of calling the Consultant, the Operational Practitioner, the Theatre Team Leader, and their opinion about the efficiency of the anesthetic trainee, as well as the opinion of the surgeon.

In addition to these facts, previous national reports (1) have concluded that there is a great percentage of patients who receive substandard care, as they should have been managed by more senior medical practitioners. The UK government is planning to change the service delivery to a 24/7 Consultant based, which requires the recruiting of thousands of senior doctors. In order to keep the service cost-efficient, the Consultants' salary should be decreased. On the top of this, the trainees will be less confident, as the number of unsupervised cases decreases. The creation of an easy and safe tool, which could suggest the seniority of the present doctor, could possibly increase patient safety without the need of the service reconstruction.

(1) Confidential Enquiry Into Maternal Deaths, Triennium 2006-2009, Darzi Report, National Confidential Enquiries Into Patient Outcome and Death, EUSOS.

# Tutorial Videos as a Supplement in a Management Science Course

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## ABSTRACT

This paper describes the implementation and assessment of online video tutorials in an introductory management science course. Students were provided with review video tutorials covering basic math and Excel topics and topical tutorials covering alternative examples to selected topics in the course. The videos were a mix of existing videos curated from the web and new videos created by the instructors of the course. Students were encouraged to use the resources with grade incentives. Students who used more of the resources performed significantly better in the course. In addition, most of the students perceived the videos as helpful.

## Tutorial videos, management science

### 1. INTRODUCTION

Availability of free online resources for learning has increased dramatically over the past few years. Khan Academy offers thousands of high quality free tutorial videos on mathematics, science and other subjects. YouTube offers countless tutorial videos in every subject imaginable. Numerous other sources for educational videos can be found in websites such as Refseek [6] and Getting Smart [9]. In addition, a number of massive open online course (MOOC) platforms such as Coursera, Udacity, and edX offer free college-level courses with video lectures. Use of online videos and podcasts have become increasingly popular in traditional university courses as well, sometimes replacing face-to-face lectures (for example, in the flipped classroom model) and sometimes supplementing them. A potential beneficial use for such tutorials is to assist the underprepared students in a course that includes students of wide range of abilities. This paper describes such a remediation effort in an introductory management science course.

There have been a number of studies comparing the effectiveness of web-based tutorials to traditional lectures. Such comparisons have yielded a range of results with some web-based tutorials resulting in better outcome than lectures, some equal and others worse [2]. Supplementing lectures with web-based tutorials (instead of replacing lectures) tends to achieve better outcome than lectures alone. For example, in [11], Nutritional Science students who completed a web-based tutorial on diabetes in addition to attending the usual lecture achieved greater improvement in the post-test compared to those who only attended the lecture. In another example, Sargent, Borthick, and Lederberg [8] implemented short web-based video tutorials in Principles of Accounting courses. Twenty-seven three-minute tutorials were created, each covering one accounting topic with two or three exercises at the end. While the instructors encouraged use of the tutorials, the tutorials were not required and no grade incentive was given. Those who used the tutorials had significantly higher pass rate and a moderate increase in the exam

score. Similar positive impact in another accounting course is reported in [7] with exercise-based video podcasts.

In [1], Khan Academy proficiency was used in designated skill sets in business statistics and operations management courses. In each skill-set, proficiency is achieved when students correctly answer ten problems in a row. The 19 skill-sets included order of operations, word problems involving ratios, fractions, and percentage, and linear equations, among others. Viewing the associated Khan Academy videos was optional. The number of skill sets in which student achieved proficiency was compared to the exam scores. The effect of Khan Academy proficiency on the exam performance was mixed; there was a positive significant effect in an ordinary least square regression model, but the effect was insignificant in a fixed effects model which accounts for student heterogeneity.

Other examples in literature of effective online video tutorials include video tutorials being used as a supplement to analytical chemistry course [3] and for self-study of pre-calculus [5].

## 2. TUTORIALS PROJECT

The tutorial project in this paper was implemented in fall 2013 semester at a private metropolitan university with a student body characterized by a wide range of ability. The author regularly teaches a junior-level introductory management science course required of all undergraduate students in the business school. This course typically covers decision analysis, forecasting, linear programming, Monte Carlo simulation, and project scheduling with optional coverage of inventory models and queuing models. Students are the juniors and seniors who have taken a finite mathematics (a freshman level course covering introduction to probability concepts, linear programming and basic financial mathematics) and a statistics course as pre-requisites. Although these students have taken two college-level math courses, many of them surprisingly have difficulty with seemingly simple algebraic concepts such as inequalities and interpreting simple linear expressions.

As a part of business school's continuous improvement effort, a set of tutorial modules were developed to help the students who are underprepared. An extensive search on online videos provided a list of videos that could be helpful. For the topics for which appropriate videos could not be found, the instructors created a set of videos. The videos were in two categories: those reviewing basic math and Excel skills and those that provided alternative examples to some of the topics covered in the course. It should be noted that in the prior semesters, the author had been providing students with lecture videos student could view on the Blackboard course management system. In addition to attending the lectures, many students viewed the lecture videos to reinforce their understanding or to review as they did their assignments and studied for exams. The author continued to provide the lecture videos during the fall 2013; but the tutorial project now made more videos available for extra help.

### **Review Tutorials**

Johnson and Kuennen [4] found that an important student characteristic associated with success in an introductory business statistics class was the student's score on a test of basic mathematical concepts. Hence, the first recommendations from this paper is to include reviews of relevant math

concepts before introducing the statistics concepts, possibly with online math reviews to be completed outside of class. The same recommendation should hold for the management science course.

To maximize the number of students who have the basic math and Excel skills necessary to learn the material in the management science course, a review module was provided consisting of nine short videos curated from the web. The videos are listed in Table 1. The first three videos were from Khan Academy and the others were from YouTube. The total length was slightly over an hour.

**Table 1:** Review Tutorials

Number	Video	Length (m:s)
1	Order of Operations 1	4:36
2	Variables, Expressions, Equations	6:55
3	Inequality Examples	16:11
4	Interest Word Problem	4:13
5	Interpreting Slope and Intercept	4:07
6	Cumulative Probability	5:17
7	Excel for Beginners	12:38
8	The SUM and Average Functions	3:28
9	More about Cell References and Formulas	9:51

To encourage the underprepared students to view these videos, students were given a pre-review quiz and a post-review quiz covering the materials in the videos. Students were given a 10-question, 20-minute pre-review quiz on the Blackboard course management system the first day of the class. This quiz served as a diagnostic tool and did not count toward the course grade. As the online quiz was graded immediately in Blackboard, students were able to see which questions they missed. They were then given a post-review quiz a week later under the same conditions (which did count toward the grade) after having had a chance to view the tutorials covering the questions they missed. The post-review quiz was different from the pre-review quiz, but covered the same topics at a similar level. While they were not required to view the videos, the students were motivated to view many of them to prepare for the post-review quiz. Based on an anonymous self-reporting, the average number of videos viewed by students was 6.8 out of 9 with 46% of students reporting they viewed all nine videos. Fifty-one out of 54 (94%) viewed at least one video.

### Topical Tutorials

In addition to the review videos, students were provided videos with alternative examples for the course topics they tend to find challenging. From discussion with other instructors, it was decided tutorial modules will be provided for the topics of conditional probability, decision analysis and linear programming formulation. The other topics which tend to focus on Excel modeling did not seem to cause as much problem. (As students are already provided with lecture videos, they could



always review the in-class Excel demonstration before completing assignments.) A set of five optional tutorial modules were provided as shown in Table 2. Each module had one or two videos with an accompanying online quiz.

**Table 2:** Topical Tutorials

Module	Videos	Length (m:s)
1. Conditional Probability	Conditional Probability - Introduction	10:30
	Conditional Probability: Part 2 (Independence)	7:41
2. Decision Analysis 1	Decision Theory Basics	12:33
3. Decision Analysis 2	Decision Tree 1	13:55
	Decision Tree 2	7:27
4. LP Formulation 1	Linear Programming Formulation	7:11
5. LP Formulation 2	LP Bookstore 1	6:43
	LP Bookstore 2	13:00

The two conditional probability videos were found on YouTube (<http://youtu.be/UE8u7JZqyl4>, <http://www.youtube.com/watch?v=KIDplYpM4tM>). The others were created by two faculty members teaching MGT 355. Decision Analysis 1 covered an introductory example with one-step decision making and Decision Analysis 2 covered two-step decision making with a decision tree. Linear Programming (LP) Formulation 1 covered a simple example with two products and three resource constraints and LP Formulation 2 illustrated a translation approach with the bookstore example from [10]. As a sample, Decision Tree 1 video can be seen at: <http://youtu.be/ez4yTfUQXG8>. The quiz included in each module served to reinforce the concepts covered in the videos and to verify that students viewed the videos.

Extra credit of one percentage point was assigned for each module completed with minimum quiz grade of 80%. Each module deadline coincided with the timing of the topic. For example, the first decision analysis module that had a simple introductory example was due just before start of the decision analysis chapter, and the second decision analysis module was due after the lecture, at the same time as the assignment on decision analysis. The deadline for each module was clearly stated on the syllabus and announced in class on an ongoing basis.

### 3. ASSESSMENT

The effect of tutorials was evaluated in two sections of the management science course taught by the author in fall 2013. The total number of students enrolled in these sections was 69.

#### Performance on the Post-review Quiz

A total of 62 out of 69 students took both the pre-quiz and the post-quiz (mostly because some students were absent the first day of class). The comparison of performance is summarized in Table 3. The mean score increased from 61.1 on the pre-quiz to 72.4 on the post-quiz representing 18.5%

improvement. The paired-sample t-test indicated the difference was statistically significant with  $p$  value  $< 0.0001$ .

**Table 3:** Comparison of Pre-quiz and Post-quiz Performance

	Pre-quiz	Post-quiz	Improvement
Mean	61.1	72.4	11.3 (18.5%)
SD	18.3	16.7	18.2
n = 62			
p value $< 0.0001$			

### Performance on the Midterm

The effect of topical tutorials was measured by the midterm exam score. The midterm exam contained all the topics covered in the tutorials and was taken by 66 students after three students dropped the course. Fifty-three out of 66 students (80%) completed at least one tutorial. The mean midterm exam score was compared between the students who completed three or fewer tutorials and those who completed four or five tutorials.

Table 4 summarizes the results. The mean score of those who completed four or more tutorials was higher by 6.9 points. The difference had significance of 0.125. It can be argued that the students who did the tutorials are probably stronger students to begin with, hence achieving higher performance. To see if this is true, the pre-quiz results were used to divide students into groups for separate analysis. Those who scored lower than 70 on the pre-quiz were considered “remedial” and those who scored at least 70 were considered “non-remedial.” This yielded two groups with similar counts: 32 remedial and 28 non-remedial. (These values add to 60, not 66, because six students who took the midterm had not taken the pre-quiz.) The proportion of students who did four or more tutorials did not differ significantly between these groups with 53% (=17/32) for remedial students and 57% (=16/28) for non-remedial students. In each group, those who did four or five tutorials achieved higher average midterm exam score.

**Table 4:** Comparison of Mean Midterm Exam Scores

	No. of Tutorials	Mean	SD	n
Overall	0-3	74.1	15.8	32
	4-5	81.2	20.8	34
	Total	77.8	18.8	66
Remedial: Pre-quiz $< 70$	0-3	70.3	16.8	15
	4-5	75.7	21.1	17
	Total	73.2	19.1	32
Non-remedial: Pre-quiz $\geq 70$	0-3	81.1	12.0	12
	4-5	86.8	20.3	16
	Total	84.3	17.2	28

Another measure of interest is the percentage of students who did acceptably well on the midterm exam. We measured the percent of students who scored 80 (grade of “B”) or higher out of 100 on the midterm exam. The results are shown in Table 5. It is clear that higher percentage of students who completed more tutorials received at least a B on the midterm exam (74% vs. 41%). This difference is significant with chi-squared p-value of 0.007. Such a pattern persists when the remedial and non-remedial groups are analyzed separately.

**Table 5:** Comparison of Percentage of Students Who Received B or higher on Midterm

	No. of Tutorials	Midterm $\geq$ 80		
		Count	%	n
Overall	0-3	13	41%	32
	4-5	25	74%	34
	Total	38	58%	66
Remedial: Pre-quiz < 70	0-3	5	33%	15
	4-5	11	65%	17
	Total	16	48%	32
Non-remedial: Pre-quiz $\geq$ 70	0-3	7	58%	12
	4-5	13	81%	16
	Total	20	71%	28

There are other ways to separate the students into groups. Grouping students into math placement (placed into remedial math course vs. placed into a regular math course in the first semester in college) exhibits similar patterns as in Table 5 from separating students by the pre-quiz results.

### Survey of Student Perception

To measure students’ perception of the survey effectiveness, an anonymous survey was conducted with questions on helpfulness of individual tutorials. Fifty-four (out of 64 students still remaining after the midterm exam) students participated in the survey.

On the nine review tutorials that were curated (listed in Table 1), for each tutorial, students who viewed it were asked to choose among *helpful*, *not helpful*, and *unsure*. Table 6 summarizes the results. Average of 90% of the students who viewed the videos found them helpful. Similar questions were asked about the topical tutorials on conditional probability, decision analysis, and linear programming formulation. Table 7 shows that average of 64% of students who viewed the videos found them *definitely helpful* and 31% *somewhat helpful* with a total of 95% of students rating the tutorials definitely or somewhat helpful.

**Table 6:** Rating of Review Videos by Students, n = 54

Review Video	1	2	3	4	5	6	7	8	9	Mean
Total viewed	41	40	40	42	42	44	38	39	41	40.8
% viewed	76%	74%	74%	78%	78%	81%	70%	72%	76%	76%
	% out of those who viewed									
Helpful	90%	93%	98%	86%	83%	84%	87%	95%	98%	90%
Not helpful	0%	0%	0%	5%	2%	7%	5%	5%	2%	3%
Unsure	10%	8%	3%	10%	14%	9%	8%	0%	0%	7%

**Table 7:** Rating of Topical Tutorials by Students, n = 54

Topical Video	Tutorial	Cond. Prob.	Dec. Analysis 1	Dec. Analysis 2	LP Form. 1	LP Form. 2	Mean
Total viewed		48	49	49	47	47	48
% viewed		89%	91%	91%	87%	87%	89%
	% out of those who viewed						
Definitely helpful		63%	65%	61%	66%	64%	64%
Somewhat helpful		29%	35%	35%	26%	30%	31%
Not helpful		4%	0%	2%	6%	4%	3%
Not sure		4%	0%	2%	2%	2%	2%

As an optional question to the survey, students were given an opportunity to provide suggestions. Specifically, the last item in the survey stated: “Please feel free to provide any suggestion on tutorials or on anything else pertaining to this course.” Rather than providing a suggestion, many students commented on the helpfulness of the tutorials. Below is a sample of student comments:

“These tutorials were great!”

“Without these tutorials I would have been lost in the beginning of the semester.”

“I think that the tutorials were very helpful and the fact that the tutorials were there for me to access at any time while I was doing the homework was extremely beneficial.”

“Tutorials were very helpful. I watched a lot of them because I was struggling in this class. A lot of this class has to do with math and is very technical, which is two of my weakest areas. After watching these videos I was able to do homework and understand the material better in general. I wish there was tutorials for everything.”

“This is a tough class that I was nervous about taking, but the instructor has done a great job offering many resources to help the class learn.”

“I sincerely thought and still think that all of your extra videos and tutorials were great. Having been out of school for a while, it's harder to get into sync but you've made this somewhat difficult material seem easy. I appreciate the work put into it. I found it extremely helpful to be able to go back and re-listen and follow along.”

“I think the tutorials are an excellent idea. Definitely very helpful and easy to understand. Helps a lot when the coursework isn't really something that you seek to study. Keep doing them!”

#### 4. DISCUSSION

Overall, the tutorials were successful in helping the students. The participation rates for both review and topical tutorials were high with 94% of students viewing at least one review tutorial and 80% of students viewing at least one topical tutorial. The completion rate of topical tutorials was similar between remedial and non-remedial students with 53% of remedial and 57% of non-remedial students completing four or more tutorials.

As the original intent of the tutorial project was to help the weaker students, it would have been better to identify the remedial students and require them to complete the tutorials. However, this approach could be problematic since labeling some students as remedial and requiring them to do additional work can cause negative feelings among such students. Hence, a more practical way was to make the topical tutorials available to all the students for extra credit regardless of their ability. It should be mentioned there were also extra credit opportunities for solving more challenging problems on certain assignments to accommodate stronger students. As for the review tutorials, giving the pre-quiz for diagnostics and the post-quiz for grade encouraged the weaker students to view more of the review tutorials.

The improvement from the pre-quiz to post-quiz after the viewing the review tutorials was statistically significant with  $p < 0.0001$ . The average scores of 61.1 on the pre-review quiz and 72.4 on the post-review quiz represented 18.5% increase. While the improvement was significant, it was not as large as expected by the author. It could be the students did not have enough time to view the videos carefully between the first two class meetings when they already had to do the usual weekly assignment. Quiz or practice problems to reinforce the materials on the videos, in the style of Khan Academy videos, may help increase improvement. It will also be helpful to see if there is a relationship between the number of videos viewed and the improvement on the post-quiz. In this study, the survey asking the number of review videos viewed was anonymous, so it was not possible to see if there was such a relationship.

The students who viewed more topical tutorials tended to do better on the midterm exam with significantly higher percentage of frequent viewers (four or more tutorials) achieving a grade of B or better on the midterm exam, 74% vs. 41%. These tutorials had a positive effect on the midterm exam performance regardless of the preparedness of the students, as measured by pre-quiz and math placement.

Students' perception of the tutorials was positive with 90% of viewers rating review tutorials as helpful and 95% of viewers rating the topical tutorials as definitely/somewhat helpful. Students' comments further reveal they appreciated the tutorials and found them helpful.

#### 5. CONCLUSIONS

This paper described the implementation and assessment of video tutorials in a management science course. Students were encouraged to view review tutorials during the first week of the

class with a post-review quiz and was given additional tutorials in the weeks before the midterm for selected topics of the course with accompanying quizzes. Both the review tutorial videos and the topical tutorials were associated with improved student performance in the course. Some students who have trouble with the course material will seek online tutorials, but it is difficult for students to find the video with the level, context and emphasis that fit the course. Instructors supplying the appropriate tutorials fills the need of such students.

The tutorials were an additional resource in a course in which lecture videos were already supplied. It is possible that if lecture videos were not available already, the tutorials may have had a larger effect on student performance.

For further study, it will be helpful to increase the sample size and to test if there is a relationship between the number of review videos viewed and the improvement on the post-review quiz. While viewing tutorial videos between pre-quiz and post-quiz is helpful, adding exercises to accompany the videos may help students improve further on the post-quiz. It will be helpful to study the effectiveness of such exercises.

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## **“EN DOGUE”: A LOOK AT THE PRESENCE OF CANINES IN THE WORKPLACE AND THEIR EFFECT ON PRODUCTIVITY**

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### **ABSTRACT**

This pilot study will examine the effects of the presence of dogs at work on human emotions, specifically stress and happiness, as well as physical well being, including blood pressure and oxytocin levels. There is support for bringing an animal into the office [2]. Despite all the positive indications, however, there has only recently been an increase in the amount of research on the effect of dogs on workplace productivity and morale. Initial results from this study indicate that pet owners report higher levels of job satisfaction.

### **Workplace stress, dogs at work, productivity**

### **INTRODUCTION**

In recent years, companies have been investigating new methods to help increase workplace productivity. The presence of animals in the workplace is one of these methods being explored. This research paper will focus specifically on dogs. Past research indicates an increase in the number of workplaces allowing dogs, and more recent studies have explored the effects of their presence on productivity and morale [2] [7] [9] [20]. There are both negative and positive findings on the presence of canines at work [9] [18].

This paper will specifically explore the impact of having dogs at an organization, as one method to improve morale, thus reducing workplace stress [21] [22]. Additional effects of dogs' presence at work on human emotions, specifically stress and happiness, as well as physical well-being, including blood pressure and oxytocin levels will be examined [21] [30]. As managers seek more innovative ways to increase workforce productivity and morale, we will attempt to determine whether allowing dogs in the office may be one way to achieve these goals.

### **PRODUCTIVITY**

What exactly is workplace productivity? Workplace productivity is the level at which an employee is delivering on their assigned tasks [16]. Managers are always interested in improving



productivity, as it is key to the success of a business. Two essential factors in optimizing productivity are enabling work and deepening relationships [15].

## **MORALE**

Employee morale consists of the emotions, attitude, satisfaction, and overall outlook of employees during their time in a workplace environment [1]. Deepening relationships is a way of raising morale, and in turn, increasing productivity. The happier an employee is about the job, the more likely he/she is to perform at a high level. In addition to employee satisfaction, companies with high employee morale are also likely to have a significantly lower turnover rate than those with low employee morale [1]. Due to its relationship to increased productivity, in recent years, companies have been finding new ways to raise employee morale.

## **CURRENT METHODS TO IMPROVE PRODUCTIVITY AND MORALE**

There are many ways that employers have gone about increasing workplace productivity and morale in the past, some being more effective than others. These have included, and still do include, evaluations, warnings, and offerings of rewards such as bonuses or other financial incentives. Recently, companies have been trying to better adapt to the needs and wants of employees and are offering new methods to improve productivity and morale. These methods include: work-life programs [13] flexible schedules [13] [14] health-based programs [29] [31].

A new approach to improving the workplace environment has emerged from the field of evolutionary psychology. “Research has found positive physical and psychological outcomes for employees when factors from our evolutionary past are incorporated into the workplace” [8, p.771]. These factors include sunlight, exposure to greenery, sleep, exercise and physical activity, and social interaction. Sunlight penetration into office workplaces also increases feelings of relaxation in those who are sitting in the sunlight [8]. Many companies are starting to put images of greenery around the office and workplace because of the finding that “it increases one’s ability to concentrate and maintain attention” [8, p.772]. There have long been studies on the negative effects of lack of sleep. However, “only 16% of employers provide a place for employees to nap” [8, p.773]. Along with proponents of health-based programs, evolutionary psychologists also cite exercise as beneficial to the workplace. The endorphins released from exercising are a natural way of increasing employee happiness and morale. The last factor that evolutionary psychologists discuss is the factor of social interaction. In addition to the advantage of human interaction in the workplace, (i.e. lowered risk of burnout and increased support), they also mention bringing pets to work, specifically, dogs. The presence of a dog is said to “facilitate group cohesion, cooperation, intimacy, and interpersonal trust among participants working on a group task together” [8, p.775].

## **CANINES' EFFECTS ON HUMAN EMOTION AND MOOD IN THE WORKPLACE**

This brings us to the discussion of the presence of canines in the workplace. The support for bringing an animal into the office is seen in research done on the relationship between dogs and their effect on human emotions and mood [2]. Despite all the positive indications, however, there has only recently been an increase in research on the effect of dogs on workplace productivity and morale [9] [17] [18] [21] [26].

These studies support existing anecdotal evidence regarding the positive effect that owning a dog has on people [6] [22] [30] [31]. Barker found that “couples with pets had lower blood pressure and heart rate at rest and lower systolic blood pressure and heart rate during a mental test” [2, p.16]. Many studies have shown that dogs can lower stress levels. For example, after the attacks on the World Trade Center, therapy dogs were brought in to ease the stress and pain of the emergency responders [25]. Oxytocin “is a neuropeptide increasingly recognized for its role in bonding, socialization, and stress relief” [17, p. 31]. Research found that females had significantly higher oxytocin levels after interacting with a dog than did the control subject who was reading a book [17]. Research examining the relationship between having dogs as pets and happiness levels in humans indicates that people report feeling happier and more relaxed when with their dog [18].

## **THE PRACTICE OF BRINGING ANIMALS TO WORK**

This phenomenon started gaining recognition in the late 1990s. As with any of the methods to increase workplace productivity and employee morale discussed previously, this one has advantages and disadvantages. The inclusion of canines in the workplace has been gaining an increasing amount of support in the past few years, with the implementation of a National Take Your Dog to Work Day, as well as increased media coverage of people taking dogs to work [6] [9] [10]. There are many companies both large and small that have started dog policies and begun to welcome canines into the office.

The main disadvantage that surfaced in the discussion of dogs in the workplace is that some people are allergic to them. Another concern is that the dogs will make a mess and the workplace will be seen as unclean. Yet another complaint is that the dogs will be a distraction if they bark and/or they could potentially injure someone. To address these concerns, companies that have implemented dog friendly office policies have been sure to make them very specific. Companies may have rules that dogs must be on leashes. Others state dogs must be well behaved, quiet, and house-trained. There are, of course, employees who simply do not like dogs, or who are afraid of them. Those issues may be the hardest to address and it is ultimately up to management to decide what rules and limitations to set if they initiate dog policies.

## **RESEARCH QUESTIONS**

Based on existing research, this study will examine the following questions:

Research Question 1: What rules should be part of a dog at work policy?

Research Question 2: How should dog at work policies address coworkers who are allergic to dogs?

Research Question 3: How should dog at work policies address dogs that are disruptive or violent?

Research Question 4: How should dog at work policies address employees who dislike dogs?

Research Question 5: What is the effect on workplace morale of allowing dogs at work?

## METHOD

### Data and Measures

Data were gathered for questions 1-5 from the following blogs: Today's article, "Ruff Day at the Office? Take Your Dog to Work" [27], MNN.com's article, "10 Companies that let you bring your dog to work", USA Today.com's article, "With a Few Rules, Dogs & Offices can mix well" [28], NPR health blog post, "Take Your Dog to the Office & Stress Less", Huffingtonpost.com's article, "Take Your Dog to Work Day: Photos of Dogs at the Office" [11], blogintuit.com's post, "Should You allow Pets at Work?" [12], puppytales.com.au's post, "Dogs in the Office" [24], blogher.com's post [4], "Pets in the Workplace: Dog Day Afternoons", PsychCentral's blog, "Pets in the Office: Unexpected Resources" [23], and the blog "Dogs in the Office" on [www.peggyfrezon.blogspot](http://www.peggyfrezon.blogspot) [19].

Data for question 5 was gathered through online administration of the HSE Management Standards Indicator Tool, which measures workplace stress (<http://www.hse.gov.uk/stress/standards/step2/surveys.htm>). Because high levels of stress are highly correlated with low employee morale, this measure was used as a proxy for employee morale [3]. It consists of 34 items. Sample statements include: "I am clear what is expected of me at work", "I get help and support I need from colleagues." One additional question asked participants to provide the percentage of stress they attribute to work and personal factors. There were also demographic questions included.

### Survey Participants

Data was collected from 31 working adults (22 female, 9 male) who received the questionnaire via email. Most participants are married and within the age range of 40 to 65. As a part of our natural groups design, participants were assessed on the basis of pet ownership. Of the 13 pet owners, 12 were of Non-Hispanic white descent. The other pet owner was of African-American heritage. In addition, 23.07% of pet owners reported bringing their pets to work on occasion. Due to the incomplete validity, excluded were participants who omitted any additional responses.

## RESULTS

Results for RQ 1, asking what rules should be part of a dog at work policy, indicated that there are some basic rules to include. These are from Saint Louis University: One dog is allowed per employee; the dog must be fully house trained, the owner is solely responsible for all clean-up inside and outside the building, the owner will not bring their dog to work if it is ill or behaving

abnormally and will remove the dog from the premises if it becomes ill, the owner will not bring their dog to work if it has bitten or is aggressive or destructive, the owner will not bring their dog if it barks frequently or is excessively vocal, the owner will not bring their female dog to work during active mating season, and the owner must control their dog at all times using a leash while walking the pet and have some form of containment in their work area [5].

For the second research question about work policies addressing the issue of coworkers who are allergic to dogs, advice varied. Some suggest that coworkers alert management about any severe allergies. Many pet owners already have pet dander on them; so many employees are already exposed to allergens without animals being present. Another suggestion from the blogs was to allow only dogs that are hypoallergenic.

Research Question 3 asked about the manner in which dog at work policies address dogs that are disruptive or violent. According to the blog responses, many think that corporate management should interview and collaborate with employees to develop rules and policies for the dogs. Some employees want dogs on leashes, and most say that their jobs require the dog to be trained and show good temperament.

For Research Question 4 that asked how dog at work policies could address employees who dislike dogs, blog responses from those who dislike animals do not want dogs there regardless of the policy. In response, many said that there are many aspects of the workplace, such as employees with smelly perfume or breath that they don't care for, but have to tolerate. They say this is the same as being around a dog. Some suggest that those opposed to dogs should talk to their boss or simply learn to adjust to the changing work environment.

To answer Research Question 5 regarding the effect on workplace stress of allowing dogs at work, we used the HSE Management Standards Indicator Tool. The average score for job satisfaction in pet owners ( $M = 126.08$ ) was greater than that of non-pet owners ( $M = 125.44$ ). Due to the absence of a manipulating variable, no test of significance differences could be done. A normal probability plot was done to determine whether the distribution of the scores had any normality, with scores on the trendline indicating a strong, positive correlation. The data has a skewed distribution and the standardized residual plot shows the lack of homoscedasticity. The small sample size prevented the completion of a chi-squared test.

Table 1 provides a cross tabulation of the pet-to-work frequency and perceived level of work-related stress. Contrary to our expectations, 50% of non-pet owners possessed a work-related stress below 50%. Only 38% of pet owners reported work-related stress below 50%. However, in contrast to two non-pet owners, no pet owner attributed more than 75% of their stress to work.

**TABLE 1**

**Pet-to-Work Frequency & Work Related Stress**

Percent of stress attributed to work

		<b>0-24%</b>	<b>25-49%</b>	<b>50-74%</b>	<b>75-100%</b>	<b>TOTAL</b>
How frequently do you bring your pet(s) to work?	<b>Once a Week</b>	0	0	1	0	1
	<b>Once a Month</b>	0	0	1	0	1
	<b>Several Times a Month</b>	0	1	0	0	1
	<b>Never</b>	1	3	6	0	10
	<b>I am not a pet owner.</b>	5	4	7	2	18
	<b>TOTAL</b>	6	8	15	2	31

A possible confounding variable in our study is age. Below in Table 2 is a cross tabulation of the age and work-related stress. Interestingly, 68.42% of participants aged between 40 and 65 attributed work to at least 50% of the stress in their lives. Only 33.33% of participants under 40 reported the same sentiment. The lone participant aged over 65 reported 25-49%.

**TABLE 2**

**Age Range & Work-Related Stress**

Of the total amount of stress in your life, what percentage is attributed to work?

		<b>0-24%</b>	<b>25-49%</b>	<b>50-74%</b>	<b>75-100%</b>	<b>TOTAL</b>
Age Range	<b>18-25</b>	1	2	3	1	8
	<b>26-39</b>	1	3	0	0	4
	<b>40-65</b>	4	2	12	1	19
	<b>65+</b>	0	1	0	0	1
	<b>TOTAL</b>	5	9	15	2	31

**DISCUSSION AND FUTURE RESEARCH**

There are a few limitations to our pilot study. Due to the small sample size, our study was hindered by the level of analyses that could be completed. In addition, there is lack of external validity.

It is certainly apparent that there are sufficient benefits to the practice of allowing dogs at work for employers to consider using it. From personal physical health to employee camaraderie, it seems that dogs can positively influence the day-to-day workplace experience of all employees, not only for those who own them. Due to the increasing numbers of employers that permit dogs,

there are many resources for doing so in a way that is sensitive to the needs of all employees. As in all other policy development, employees should be involved in its creation and implementation so as to provide the best fit with the organization's needs and culture.

Regarding future research directions, since the majority of pet owners do not bring their pets to work, an experiment should be done using a between-group design in which the manipulated variable is the frequency of pets being brought to the workplace. While it could be a personal preference, there may be a preexisting work-related issue. For instance, the organizational environment may forbid the presence of animals. Furthermore, the level of occupational stress may differ due to job industry unrelated to the presence or absence of pets at the workplace. Therefore, future studies should be of workers within the same industry and/or within an organization where bringing a pet to work is allowed. In spite of our primary interest in the presence of pets at work, other variables factor into occupational stress. Though Michael, et. al (2009) were unable to find a significant difference between men and women of the same age, other studies could compare differences amongst between age groups. Overall, there are a plethora of directions for future research to provide more insight into stress and pets at work.

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*This project was supported by the Roger Williams University Provost's Fund for Student Research*

## **THE EFFECT OF RACIAL COLORBLINDNESS ON EMPLOYEE PRODUCTIVITY**

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### **ABSTRACT**

This paper will explain the negative impact that racial color blindness has on workplace stress, and productivity. With increased diversity in the workplace today, managers and employees need to understand the consequences of their actions, and how to handle ethnic and physical differences effectively. Although increased stress levels have sometimes been proven to increase productivity levels, stress derived from negative emotional labor due to interracial interactions decreases productivity in the workplace and creates a hostile environment. Ignoring racial differences is an ineffective ideology in the workplace, and should be replaced with a multiculturalist view.

**Workplace diversity, racial colorblindness, multiculturalism**

### **INTRODUCTION**

The purpose of this research paper is to show how racial ‘Color Blindness’ affects productivity in the workplace. Color Blindness has become a socially acceptable way of life. Today, people tend to ignore diversity in the sense that they *say* they do not notice any differences between themselves and others. When someone has an interaction with a person of another race, deep down they each feel and sense the unease of racial differences. More often than not, people in these situations feel uncomfortable, causing emotional labor, which causes stress. This, in turn, affects a person’s productivity. These interactions are known as microaggressions, which, as defined by Sue et. al “are the slights, indignities, putdowns, and insults that people of color experience in their everyday interactions with people” [20, p.330]. In life, and in the office, microaggressions are a subtle, unintentional form of discrimination that minorities face each day. Even subtle changes in posture and behavior, whether intentional or not, are noticed and felt by minorities. These subtle actions affect people in minority groups each day, and they generate long lasting effects. In many cases, people tend to let their emotions build inside until they cannot handle the stress anymore.

### **RACIAL COLOR BLINDNESS**

Racial color blindness is defined by Eduardo Bonilla-Silva as a way of approaching issues of race, but is described in nonracial terms [2]. The color blindness theory is seen in practice when

white people say that they do not see race, and accept everyone for who they are. This is impossible, even though it seems ideal. White people, without realizing it, subconsciously see race and end up making subtle gestures or statements that make people of certain minorities feel the discrimination even when unintentional. —This color-blind racism is institutionalized and structured in today’s society... while most Americans would never admit to having discriminatory ideas against an entire race of human beings, they endorse a system which accepts this color-blind racism” [3]. Ignoring race has become a social norm because there are negative connotations of being racist. —Whites are less attentive to race because they can afford to be,” [5, p. 973]. White people are unaffected by discrimination, so in most workplaces, whites do not have to think about race. White people feel that the past is the past and that today they are living in a post-racial society. They feel that everyone is treated as equals; therefore, racial differences should not be acknowledged.

In the past, minority groups were aware of racism aimed toward them because it was done openly and considered acceptable by many. When members of society enact the ideology of color blindness, minority groups have a more difficult time determining whether words or actions are racist or whether they are overthinking the event. The extra time and effort spent examining each racial encounter has made the psychological effects of racism worse than before. For minority groups, this new form of racism has become as emotionally draining as when racism was a norm of society. Whether intentional or not, these comments and indignities are damaging to minority groups, yet for whites, they go unnoticed.

## **RACIAL MICROAGGRESSIONS**

Racial Microaggressions, a term coined Chester M. Pierce in 1970, —are brief and commonplace daily verbal, behavioral, or environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial slights and insults to the target person or group” [20, p. 273]. —Perpetrators of microaggressions are often unaware that they engage in such communications when they interact with racial/ethnic minorities,” [20, p. 271]. The term microaggression is an umbrella term for several other transgressions that are committed against minority members. These three transgressions include: microassaults, microinsults, and microinvalidations. Microassaults are —conscious and intentional actions or slurs, such as using racial epithets, displaying swastikas or deliberately serving a white person before a person of color in a restaurant” [4, p. 42]. Microinsults are —verbal and nonverbal communications that subtly convey rudeness and insensitivity and demean a person’s racial heritage or identity. An example is an employee who asks a colleague of color how she got her job, implying she may have landed it through an affirmative action or quota system.” [4], p. 42]. Microinvalidations are —communications that subtly exclude, negate or nullify the thoughts, feelings or experiential reality of a person of color. For instance, white people often ask Asian-Americans where they were born, conveying the message that they are perpetual foreigners in their own land” [4, p. 42]. Each of these transgressions conveys ways in which white people may use microaggressions against people of color.

Sue is an Asian American himself, so in addition to the studies he has done on microaggressions, he has many examples from his own life. He often refers to an interaction he and an African

American colleague had with a white flight attendant. Sue explains that on that flight, there were few passengers so they were told they could sit where they please. Sue and his colleague made themselves comfortable near the front of the plane; right before doors closed, three white men entered the plane and sat closer to the front of the plane. Before takeoff, a white flight attendant asked Sue and his colleague to please move to the back of the plane. Sue could not understand why they were asked to move rather than the three white men who got to the plane late. This incident bothered Sue for the remainder of the plane ride [4, p. 42].

After explaining to the flight attendant what she had done, she became extremely defensive. She said that she would never do anything like that, and that she was merely trying to balance the plane. Sue then asked why she did not ask the white men to move but instead asked the Asian American and the African American to get up and change seats. She again was defensive and stated that she did not see color and it was wrong to accuse her of such a terrible act. Not only did the white flight attendant become defensive about her reasoning, Dr. Sue and his colleague began to question themselves. They thought that maybe they were overthinking the whole situation. These thoughts create emotional stress for a person in a minority group. Reactions like this tend to build over time and will not stop until the victim stands up for him or herself and make white people aware of the pain they are causing. The article explains the following:

It's a monumental task to get white people to realize that they are delivering microaggressions, because it's scary to them...It assails their self-image of being good, moral, decent human beings to realize that maybe at an unconscious level they have biased thoughts, attitudes and feelings that harm people of color [19].

If white people can understand that being blind to an individual's race is not the way people of color want to be treated, society would function much more efficiently. Going unnoticed in life is difficult, and the feeling of invisibility has powerful consequences. White people need to acknowledge and embrace racial differences and cultures as a first step toward acceptance of minorities and establishment of a truly multicultural society [21].

Another example Sue provides is of a third generation Asian American student who was told by the professor at the end of an after class meeting –you speak great English for an Asian student.” The professor did not mean this comment in a hurtful way, and he had no negative feelings behind it. To the contrary, the professor truly believed that he was giving the student a compliment when, in reality, the Asian American student took it much differently. Although this student looked Asian, he considered himself to be American. He did not understand why his English wouldn't be good, since, as an American, it was his first language. There are many questions that this student may have considered in this situation. According to Sue, a question that may arise after a situation like this could be, –do people see me as a foreigner?” A question like this cause extra stress to people who have to deal with this subtle form of racism. The worst part about these situations is that the victims are offended and/or hurt, but the perpetrators have no idea they offended anyone. To the perpetrator, it is just a routine interaction with someone of a different race.

In this second example, the Asian American student did not say anything to the professor, but instead kept to himself. With so many thoughts running through his head after the interaction, this young student must have felt out of place and looked down upon. This one interaction had a

negative effect on this student's everyday life. Racial encounters should be used as productive experiences rather than emotionally stressful ones.

### **EMOTIONAL LABOR**

Arlie Hochschild (1983) created the term 'emotional labor' to describe actions that service workers perform that go beyond physically or mentally required job duties. For example, showing a genuine concern for customers' needs, smiling, and making positive eye contact are all critical to a customer's perception of service quality. These types of activities, when they're essential to worker performance, are examples of emotional labor [8] [12].

Many studies of the consequences of emotional labor have found that it has harmful effects on employees. Emotional labor can be exhausting, and can “undermine a worker's sense of professionalism” [7, p.595]. In contrast, Pugliesi found that “emotional labor appears to have positive consequences when it is experienced as self-enhancing or when workers are in control of their emotion management” [14, p.128]. When employees have too much emotional labor to handle, work begins to take a back seat to their stress levels and their internalized emotions. Pugliesi found that different forms of emotional labor, have different effects on each employee and they concluded that “in each instance the effects of emotional labor are negative in character” [14, p.125].

Another way to look at emotional labor is that emotional labor is the effort exerted to separate oneself from a situation in order to get one's work done. For example, as a customer service representative, the 50th person asking the same question must be answered as thoroughly as the first person. Otherwise, the representative would not be doing his/her job of providing good customer service because that 50th person has no idea that the representative has answered the same question 50 times. In this situation, the customer service representative must swallow his or her irritation—separate him/herself emotionally from the situation—in order to do his or her job. Similarly, without emotional labor, the intimidated prison guard, the judgmental social worker, the panicky 911 operator, and the empathetic bill collector fail to do their jobs [10].

When facing angry clients, or people who are generally unpleasant, emotional labor can be particularly challenging. A large part of that challenge comes from the need to hide real emotions, and continue to 'smile and nod your head,' even when receiving negative or critical feedback [12]. In the workplace, we have been socially trained to leave emotions out of our jobs. However, when emotions are derived from within the workplace, employers should ensure that there is always an open space to talk about the issue. Keeping emotions bottled up has usually proven to be a poor decision, but in a work environment, it has always been uncomfortable to talk about our emotions. When these emotions are related to race, they are typically negative emotions. Although race is an uncomfortable subject to talk about, people should be encouraged to talk about it. At work, employers must be sure to not close off opportunities for interracial interactions or the emotions that come from them [5]. With opportunities at work to voice opinions and concerns, co-worker support is encouraged and enabled. “Co-worker support should help to create a positive working environment” which will increase productivity and decrease levels of emotional labor within employees [6, p.119].

The phenomenon of racial color blindness creates a type of emotional labor for both the white employee and the minority employee. This emotional labor has a negative impact on productivity because time is spent analyzing interactions and dealing with anxiety and stress. Talking about race and emotions in a work environment is a successful strategy for reducing this negative impact racial encounters entail. The Social Identity Threat theories –is a concern that one will be judged on the basis of or confirm the stereotypes associated with one’s group...” [5, p. 973]. This theory supports the experience that minority groups and whites encounter as they view biracial interactions with an \_informational lens.‘ For black people, they –expect whites to view blacks generally as untrustworthy, aggressive, and not hardworking” [5, p. 973]. Black people expect whites to hold stereotypes against them during interracial interactions. Whites on the other hand feel that blacks think they are racist and hold discriminatory biases. These social identities create negative emotions that come to the forefront during interracial interactions for both whites and blacks. These fears –translate into anxiety before and during interracial interactions” [5, p. 974].

### **RACIAL COLOR BLINDNESS, STRESS, AND REDUCED PRODUCTIVITY**

Ignoring racial differences, and/or pretending not to notice racial differences – racial colorblindness - can be emotionally draining and create a sense of personal invisibility. When feeling invisible, the person experiences a loss of character, personality, culture, and pride. An example of how racial color blindness causes emotional labor resulting in stress is as follows: A white woman is standing in an elevator by herself. The door opens and a black man enters. The white woman immediately clutches her purse and her necklace, and then subtly moves towards the corner of the elevator. The black male pretends he does not notice this subtle change in posture and grip of her purse, but he does. In this instance, the black male can feel many different emotions. Some of these emotions can be expressed by a question similar to, “I have never committed a crime, why is she afraid of me?” Hidden emotions such as this lead to negative stress. This negative stress occurs because people feel uncomfortable talking to someone of a different race, thinking about all the ways they could say the wrong thing to offend this other person. It also is experienced by people in minority groups who feel that their co-workers think less of them.

Negative workplace stress costs U.S. employers an estimated \$200 billion per year in absenteeism, lower productivity, staff turnover, workers' compensation, medical insurance and other stress-related expenses [11]. Stress is not always a bad thing, however. It can stimulate creativity and productivity. According to Ostermann, "No one reaches peak performance without being stressed, whether an athlete, an office worker or a manager," [11]. The natural pattern of human behavior is to experience a stress-causing event or situation, react to it with increased tension and then return to a normal, relaxed state. The problem occurs when stress is so overwhelming or constant that this pattern is broken [11].

This is type of stress induced by racial color blindness. Without open communication among employees of different races, the internalized stress continues at a constant level and employees have no way to reduce it. The stress level continuously builds until the employee is emotionally drained. The only solution to reducing this form of stress is to initiate open communication.

Many studies show that if a work environment is open about race and encourages communication among workers, that work environment is then less hostile, and more open to productive communication and successful teams [5].

## WORKPLACE PERCEPTIONS

In order to gain a sense of whether racism and its resulting stress is still occurring in the workplace, we reviewed contents of two blogs and responses to a You Tube video. Blog posts about racial colorblindness in the workplace proved to be an effective method to obtain open opinions from the average person. Being able to hide one's identity when posting allows people who have strong opinions to be able to voice what they feel more honestly.

Dr. Victoria Plaut, professor at the University of Georgia, and her colleagues worked extensively studying whether a colorblind society or a multicultural society was better for minorities [13]. Plaut's work was cited in the *Chicago Tribune* in a blog post titled, "Is colorblindness or multiculturalism better for minorities?" [13]. This blog post enlightened readers about Plaut's findings supported the view that a color blind society may not be the best approach to improving acceptance of diversity. Plaut's study found that "Workplaces that down play racial and ethnic differences actually make minority employees feel less engaged with their work. Minority employees sense more bias in these allegedly colorblind settings" [13]. Blogger Quifsha wrote the following in response to Plaut's findings:

So sick and tired of hearing about lost opportunities due to being black, red, yellow, white, brown, yada, yada. Same with the tired old, my ancestors were slaves. Guess what, some of mine were burned up in the ovens and my friends' ancestors were butchered in the Balkans. Use the same drive and determination on your schoolwork, and getting out of poverty (just like many blacks do for basketball/football and Hispanics do for soccer/baseball) and you'll succeed.

This post is not only an uneducated statement, but it is racist as well. Talking about using drive and determination in school, and working hard to get out of poverty is a sensible statement, but the examples Quifsha uses are racist. Stating that blacks succeed by working hard toward achieving in basketball and football, and that Hispanics perform well in soccer and baseball is stereotyping both of these minority groups. Quifsha believes that the only way blacks and Hispanics can come out of poverty is if they become successful in sports and sign professional contracts. Another post in this blog revealed a feeling of hatred coming from blogger Oscar. Oscar writes:

Minorities do not like a colorblind society, because that means they would be promoted or fired based on Merit, and not their skin color. That doesn't work in their favor. Calling in sick, coming in late, underperforming at their jobs, and if all else fails, crying Discrimination...Can you say, Cultural Underperformers?

Oscar ends his post by stating that we must "blame the Democratic Party, for promoting Socialism, lack of personal accountability, and Welfare for underachieving losers." This post reinforces the fact that racism is still alive and well in today's society. Oscar

strongly believes in the negative stereotypes held against blacks, and has no problem voicing his opinion in this blog.

In the blog, “5 new rules for dealing with race at work,” Rachel posted about how stereotyping arises from being part of a tribe.<sup>6</sup> She is referring to being similar in ideology, lifestyle, and norms. Rachel says that ~~tribe~~ tribalism survives on the perceived moral, physical, intellectual...superiority of one clique and the inferiority of the others.” Rachel goes on to say that today’s style of racism is covert rather than out in the open, and the majority of the hate<sup>6</sup> is underground. ~~It~~ It is no longer fashionable to espouse it unless online or via public radio” [15]. This again reinforces the fact that in today’s society, being openly racist is unacceptable, but the hatred still exists in some individuals

The YouTube video, “Microaggressions in Everyday Life”, portrays Sue’s research in a short 5-minute video using 3 examples of how microaggressions can go unintentional and unnoticed by the perpetrator [18]. Comments after the video are all by angry individuals with strong opinions who do not want to believe Sue’s findings. Many comments use biased language, referring to Sue as a chink.<sup>6</sup> Others state that his examples are pointless, and that they have nothing to do with the matter at hand [18]. Two months ago, Bleu Gumms posted, ~~Uh~~ Uh, saying some speaks good English is a compliment. Thinking a black guy will steal your purse means you have a good grasp on statistics. Stupid chink.” Bob Smith wrote, ~~What~~ What kind of cultural Marxist bull\*\*\*\* is this chink talking about?” mypostingcareer.com writes, ~~Notice~~ Notice how he doesn't even speak unaccented English and has the f\*\*\*ing gall to tell people how to behave in their own country...shut the f\*\*\* up back to chinkland, chinky” [17]. Finally, Inclincoln posts a comment saying, ~~By~~ By putting a white professor there you are implying that white people are inherently racist. Maybe you are the one with microaggressions.” All of these comments show people in denial who do not want to believe that Sue’s research is real. Similar to the idea stated in the title of Eduardo Bonilla-Silva’s book, *Racism without Racists*, all of these people are racist, but do not want to admit it [2].

Racist beliefs in today’s society are frowned upon and they are rarely stated openly because people know that it is unacceptable to have these beliefs. This does not stop bloggers and YouTube commenters from voicing their opinions, since they are protected by anonymity.

## CONCLUSIONS AND RECOMMENDATIONS

White people believe that equality has been instilled into our society and that racism no longer exists in our world. Although aware of the few racists who remain unchanged, the majority truly believe that racism is a thing of the past. White people need to know that even accidental, unintentional racist remarks, comments, and actions are hurtful. Minority groups experience microaggressions as emotional labor that causes stress that decreases workplace productivity. Racial colorblindness promotes incidents of microaggressions due to the lack of self-awareness on the part of the actors. ~~Leaders~~ Leaders and managers in any diverse organization need to understand [that] if you want people from different cultures to collaborate at their best, creating a common in group<sup>6</sup> is critical” [16].



Organizations can help reduce racial color blindness, thereby decreasing microaggressions and the accompanying stress and lost productivity they cause. One way to do this is to require a diversity training course for all new hires. In addition, annually, all employees should go to diversity training for a refresher. During this training, coaches should educate people about racial color blindness and microaggressions. These coaches should help employees develop behaviors that will reduce these tendencies. Successful managers do not need to be the most intelligent person in the room, but he or she should be one of the most emotionally in tune people in the room” [9, p.22]. Employers should allow open space for discussion and concerns to be voiced throughout the year and should always be able to relate to their employees and be emotionally understanding with individuals who are struggling. If employers discourage opportunities for discussions of diversity, including race, hostile and uncomfortable work environments are created.

Another way that employers can help their company become more aware of different cultures and diversity is utilizing the concept of Diversity Day in a productive, effective way. Today, most companies who practice a Diversity Day have a tendency to have everyone sit in a room and learn about minority employees. This segregates these employees from their coworkers and emphasizes their differences from the white employees. Although this is productive in the sense that all white employees will now be aware of their coworkers’ cultures and traditions and will be more accepting and understanding, Diversity Day should be used for all employees to share their family values and cultural ties. “White employees’ endorsement of multiculturalism—an alternative approach to diversity in which racial differences are acknowledged and even celebrated—led to the opposite pattern of results, predicting increases in engagement and decreases in perceptions of organizational bias among minority employees” [1, p.206]. If employees know about each other’s cultures and traditions, they will be closer to each other, and be more willing to share during the year when emotions arise over race and/or ethnicity. Having a comfortable and inviting work environment that provides space for open discussion of differences has been proven to create a more productive, less hostile workplace [13].

There is increasing diversity in today’s workplace, but this does not come without its challenges. It is imperative to overcome these challenges to ensure that organizations are obtaining the benefits of being truly multicultural rather than practicing the ineffective ideology of a colorblind workplace. Understanding diversity and employee differences will create a more productive work environment in which employees will feel comfortable voicing their opinions and discussing racial and cultural differences.

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*This project was supported by the Roger Williams University Provost's Fund for Student Research*

# **DERIVING THE UNDERLYING CSF CONSTRUCTS OF ERP SYSTEM DEPLOYMENTS**

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## **ABSTRACT**

This study develops and operationalizes ten critical success factors (CSFs) constructs. A two-stage process of scale development was adopted. In the first stage, we specify the domain of interest, generate a pool of items, and adopt purification measures. In the second stage, we refine and validate the CSF scales using data from a sample of 203 production firms in India.

## **ERP, CSFs, Performance**

## **INTRODUCTION**

The ability to effectively deploy ERP systems is crucial to maximizing potential performance benefits to the firm. Most firms reported success in their ERP system deployments; however, there are also many suboptimal implementations reported (Chen et al., 2009). The main reason for the inability of firms to successfully deploy an ERP system (e.g., Liu and Seddon, 2009; Maguire et al., 2010), is the inability to institute organizational changes that complement the ERP system deployment. Koh et al. (2011) indicates that significant performance benefits accrue to firms that focus on critical success factors (CSFs) while deploying their ERP systems. Past studies (e.g., Bendoly and Jacobs, 2005; Stratman, 2007) indicate that firms that effectively manage their CSFs reduce their ERP system deployment times and garner enhanced benefits from their ERP systems. The above suggests that the benefits of ERP system deployments are maximized when CSFs are leveraged to facilitate ERP system implementations. In this research study, we seek to advance this stream of research by developing theory-based CSF constructs and operational measures needed to deploy and leverage ERP systems.

## **LITERATURE REVIEW**

Rogers (2003) suggests that innovation diffusion is the process by which an innovation is communicated through certain among members of a social system. At the core of the innovation diffusion challenge is the need to address uncertainty. The technical deployment of the ERP system, by itself reduces uncertainty as it reduces the need as well as increases the capacity for information processing (Galbraith, 1977). However, the induction of the ERP system into the organization also induces uncertainty with regard to its diffusion. This diffusion is a kind of social change, which has to be directed and managed (Rogers, 2003),

without which organizations do not reap the business benefits of the ERP system deployment. In the context of ERP systems, the technical aspect represents the tools that embody the technology, and the social aspect represents the CSFs that embody organizational support for successful deployment. Past studies (e.g., Bendoly and Jacobs, 2005; Tsai et al., 2011) found that significant performance benefits accrue to firms that focus on CSFs while deploying their ERP systems. The above findings suggest that the benefits of ERP system deployments are maximized when CSFs are appropriately leveraged to facilitate ERP system deployment.

## METHODOLOGY

The scale development and refinement follows a two stage process. In the first stage, literature review across multiple domains yielded a pool of items that were subject to a four-step validation process. In the second stage, the items were further refined and the scales validated through empirical testing using data obtained from 203 production firms in India.

### Stage 1: Scale Development

The domain of the ERP constructs were initially specified; a mix of cross-domain literature, interviews with academicians and practitioners active in the ERP arena, and site visits to business units that had deployed ERP systems were undertaken. Items were drawn from a synthesis of management, systems, information technology (and more specifically ERP) literature as well as practitioner inputs. The questionnaire development went through a three stage process: focus groups of academicians and consultants, a graduate MBA class in ERP, a pilot test at a firm that had deployed ERP. Modifications and changes from each of the groups were incorporated into the questionnaire overall helped in the comprehensive development of the instrument. The final questionnaire had 64 items representing 14 CSFs.

**Table 1**  
**Domain Specification and Generation of Item Pool (74 Items)**

#### *Critical Success Factors*

##### 1. Top Management Support

- a. Top management has invested the time needed to understand how ERP will benefit the business unit.
- b. The need for long-term ERP support resources is recognized by top management.
- c. Top management mandates that ERP requirements have priority over unique functional concerns.
- d. Top management has clearly defined the ERP project's business goals.
- e. All levels of management support the overall goals of the ERP project.
- f. A cross-functional steering committee periodically reviews the ERP project's progress.

(Items adapted from: Stratman and Roth, 2002; Teltumbde et al., 2002)

##### 2. Planning

- a. We constantly review our ERP system capabilities against our business goals.
- b. ERP system plans are redesigned as required to meet evolving conditions.
- c. Written guidelines exist to structure strategic ERP planning in our business unit.
- d. Strategic ERP planning includes inputs from all functional areas.

(Items adapted from: Stratman and Roth, 2002; Kanungo and Bagchi, 2000)

### 3. User Support

- a. Employees understand how they fit into the new ERP defined business processes.
- b. Management actively works to alleviate employee concerns about the introduction of the ERP system.
- c. An ERP support group is available to answer concerns about ERP job changes.
- d. The change readiness of employees impacted by the ERP system is regularly assessed.
- e. Management actively ensures user participation and involvement to foster user support for the ERP system.

(Items adapted from: Stratman and Roth, 2002; Kanungo and Bagchi, 2000)

### 4. Project Management

- a. The tasks to be performed during the ERP project are clearly defined.
- b. There is a formal management process to track external consultant activities.
- c. Project tasks are reviewed on a periodic basis.
- d. The ERP project leader is experienced in project management.
- e. All ERP project changes are clearly documented.

(Items adapted from: Stratman and Roth, 2002; Weston Jr., 2001)

### 5. Training

- a. Specific user training needs were identified early in the implementation.
- b. A formal training program has been developed to meet the requirements of the ERP system users.
- c. Training materials target the entire business unit task and not just the ERP screens and reports.
- d. Employees are tracked to ensure that they have received the appropriate ERP system training.
- e. ERP system training review sessions are scheduled on an ongoing basis.

(Items adapted from: Stratman and Roth, 2002)

### 6. Learning

- a. Benchmarking is used to identify cutting-edge ERP techniques.
- b. Cross-functional groups meet regularly to discuss new uses for the ERP system.
- c. ERP improvement suggestions are regularly collected from multiple employee levels.
- d. ERP experimentation is encouraged even if the proposed improvements are unsuccessful.

(Items adapted from: Stratman and Roth, 2002)

### 7. Implementation Strategy

- a. A single go-live date was used to roll-out the ERP system across our business unit ('big bang' strategy).
- b. A single go-live date was used to roll-out a sub-set of modules across our business unit ('mini big-bang' strategy).
- c. Different modules were 'phased-in' on different live dates across our business unit ('phased-in module' strategy).
- d. Different modules were 'phased-in' by site/location across our business unit ('phased-in site' strategy).

(Items adapted from: Mabert et al., 2000; 2003a; 2003b)

### 8. Alignment

- a. The processes embedded in the ERP system correspond to our business practices.
- b. ERP data items correspond to those used in our business documents.
- c. The user interface in the ERP system is well designed to meet our business needs.
- d. Significant time and effort is required to customize the ERP system to our business practices.
- e. Significant time and effort is required to re-engineer our business practices to conform to the ERP system.

(Items adapted from: Hong and Kim, 2001)

## 9. Consultants

- a. Involvement of external consultants in the ERP system implementation is an ongoing effort.
- b. The role of external consultants should be phased out by capturing and transferring their expertise to the in-house team.
- c. External consultants help streamline our implementation effort and achieve quicker ERP project success.
- d. External consultants were changed during the course of the ERP project.

(Items adapted from: Bingi et al., 1999; Sousa and Collado, 2000; Teltumbde et al., 2002)

## 10. Implementation Team

- a. The implementation team has the ability to implement, maintain, and upgrade the ERP system.
- b. The implementation team actively builds relationships with business managers.
- c. The implementation team offers suggestions on how the ERP system can be used to achieve business goals.
- d. The implementation team is responsive to end-user needs.

(Items adapted from: Stratman and Roth, 2002; Gefen and Ridings, 2002)

## 11. Data Accuracy

- a. Data integrity in the ERP system affects the efficiency of our operations and the quality of our business decisions.
- b. Data integrity requires awareness and control of dirty data right from the pre-implementation stage of the ERP system.
- c. Maintaining data integrity is an ongoing process that needs to be ensured by all employees.
- d. All employees understand the concept and the value of integrated data available from the ERP system.

(Items adapted from: Vosburg and Kumar, 2001)

## 12. Communication

- a. Open and honest communication throughout the business unit facilitates the ERP system implementation process.
- b. Communication is an ongoing process among all employees throughout the ERP system project.
- c. Managing user input in the communication process results in greater understanding of organizational needs and quicker acceptance of the ERP system.

(Items adapted from: Tarafdar and Roy, 2003; Gulla and Brasethvik, 2002)

## 13. Organizational Culture

- a. It is very easy for my co-workers to access the ERP system to see the status of my work performance.
- b. The management is only interested in employees getting work done using the installed ERP system rather than addressing their concerns.
- c. Job descriptions and task procedures in our business unit is highly specific and detailed.
- d. The ERP system enables tight control by providing very reliable information on how well or badly employees do their work.
- e. The ERP system has enabled our business unit to be more market-driven and customer-oriented.
- f. The ERP system has enabled me to more clearly identify myself with my job.

(Items adapted from: Hofstede et al., 1990; Krumboltz and Maiden, 2001; Sia et al., 2002)

## 14. National Culture

- a. The ERP system facilitates close supervision of employees to ensure that they conform to standard work procedures established.
- b. Management relies a great deal on me to ensure proper operational processing when I use the ERP system.

- c. The ERP system has resulted in changes in job roles that tends to make employees work more individually and not in groups.
- d. The short-term results obtained from ERP system implementation is more valuable than it's long-term results.
- e. I do not mind my increased workload resulting from the ERP system implementation as it would prove beneficial to my career.

(Items adapted from: Hofstede et al., 1990; Krumboltz and Maiden, 2001; Sia et al., 2002)

## Stage 2: Scale Development

To obtain data on the implementation of ERP systems, 900 production firms that formed part of the Confederation of Indian Industry (CII) member directory were identified as the population for this study. The questionnaire was mailed out in two waves and a total of 203 effective responses (response rate of 22.56%) were received. The data were examined and no non-response and common method biases were detected.

## Firm and Respondent Characteristics

The number of employees over 1,000 is the category most frequently represented and accounts for 41.4% of the sample; this, together with the number of employees in the 500 to 999 category, represents 66% of the sample. The majority of the respondents possessed more than 10 years of work experience accounting for 92.1% of the sample. A majority of the respondents worked in the information technology/information systems area and represent 86.2% of the sample.

## Factor Analysis of Individual CSFs

The data for the CSFs were first examined and found suitable for conducting factor analysis. The implementation strategy CSF pertaining to the rollout of the ERP system was measured by four items developed from the Mabert et al. (2000; 2003a; 2003b) studies. The analysis of the sample data revealed inconsistencies in the respondents' responses to these 4 items measuring the implementation strategy CSF. Hence, the implementation strategy CSF was dropped from further analysis. The results of the factor analysis for each of the remaining 13 CSFs is shown in Table 2.

**Table 2**  
**Factor Analysis of Individual CSFs (64 Items) and Performance (10 Items)**

CSFs	Items (Factor Loadings)					
Top Management Support Planning	1a (.875)	1b (.853)	1c (.813)	1d (.878)	1e (.855)	1f (.796)
	2a (.834)	2b (.843)	2c (.851)	2d (.872)		
User Support	3a (.809)	3b (.843)	3c (.736)	3d (.775)	3e (.843)	
Project Management Training	4a (.881)	4b (.858)	4c (.862)	4d (.864)	4e (.889)	
	5a (.892)	5b (.886)	5c (.884)	5d (.888)	5e (.885)	
Learning	6a	6b	6c	6d		



	(.792)		(.833)		(.850)		(.702)			
Implementation Strategy	dropped									
Alignment	8a	8b	8c	8d	8e					
	(.889)	(.903)	(.854)	(dropped)	(dropped)					
Consultants	9a	9b	9c	9d						
	(.691)	(.842)	(.749)	(dropped)						
Implementation Team	10a	10b	10c	10d						
	(.847)	(.890)	(.923)	(.821)						
Data Accuracy	11a	11b	11c	11d						
	(.757)	(.871)	(.768)	(.498)						
Communication	12a	12b	12c							
	(.839)	(.925)	(.867)							
Organizational Culture	13a	13b	13c	13d	13e	13f				
	(.657)	(dropped)	(.653)	(.830)	(.786)	(.708)				
National Culture	14a	14b	14c	14d	4e					
	(.663)	(.706)	(.745)	(.644)	(.462)					
Performance	1	2 3 4 5 6 7 8 9 10								
	(.740)	(.734) (.735) (.763)	(.757) (.799)	(.788) (.751)	(.751)	(.756)				

The data for the 56 items comprising the 13 CSFs were first examined and found suitable for conducting factor analysis. The 56 CSF items were factor analyzed using a varimax rotation. Interpretation of the scree test suggests that there are 10 factors. The total variance extracted by these 10 factors is 64.33%. The results of the factor analysis are presented in Table 3.

**Table 3**  
**CSF Scale Refinement – Factor Analysis of CSF Items (56 Items)**

CSF Items	(Factor Loadings)									
	1	2	3	4	5	6	7	8	9	10
1a	<b>.819</b>	.095	.163	.143	.159	-.063	.118	.085	.133	.053
1b	<b>.781</b>	.165	.186	.138	.224	-.003	.010	.050	.003	.095
1c	<b>.774</b>	.270	.038	.094	.070	.006	-.055	.065	.020	.111
1d	<b>.754</b>	.221	.230	.274	.077	.072	.079	.069	.077	.050
1e	<b>.636</b>	.319	.263	.123	.139	.120	.212	.076	-.053	.228
1f	<b>.747</b>	.200	.206	.024	.132	.065	.199	.222	.014	.025
3e	<b>.555</b>	.137	.268	.087	.300	.209	.371	.040	.065	.065
3a	<b>.472</b>	.083	.390	.135	.110	.170	.393	.214	.024	-.144
5d	.	.155	<b>.803</b>	.193	.152	.139	.122	.142	.037	.009
5c	.	.167	<b>.780</b>	.173	.149	.133	.060	.171	.127	.168
5a	.	.306	<b>.775</b>	.200	.072	.134	.150	-.014	.214	.037
5b	.	.312	<b>.753</b>	.185	.066	.166	.087	.012	.146	.074
5e	.	.182	<b>.752</b>	.280	.148	.192	.033	.166	.003	.124
6a	.	.124	<b>.534</b>	.316	.310	.086	-.018	.189	.083	.117
4b	.	.276	.318	<b>.696</b>	.102	.017	.094	.115	.071	-.022
4c	.	.283	.268	<b>.692</b>	.214	.179	.085	.050	-.002	.075
4e	.	.193	.362	<b>.690</b>	.168	.127	.065	.153	.094	.132
4a	.	.343	.294	<b>.662</b>	.276	.152	.147	.059	.189	-.011
4d	.	.344	.262	<b>.644</b>	.130	.284	.058	.120	.171	.069
6b	.	.253	.376	<b>.484</b>	.172	.088	-.053	.303	.099	-.088
13f	.	.008	.039	.102	<b>.734</b>	.112	.002	.047	.098	.119
13d	.	.193	.182	.098	<b>.646</b>	.103	.067	-.019	.132	.026
13e	.	.313	.216	.170	<b>.637</b>	.017	.096	.078	.060	.021
2a	.	.395	.228	.162	<b>.551</b>	-.038	.109	.392	.042	-.009
14a	.	.068	.171	.200	<b>.549</b>	.178	-.057	-.132	.199	-.082
14b	.	.148	.092	.230	<b>.416</b>	.348	.267	-.130	-.116	-.041
10a	.	.115	.127	.205	.078	<b>.758</b>	.169	.041	.111	.064
10b	.	.222	.163	.030	.98	<b>.711</b>	.213	.114	.199	.103
10c	.	.110	.215	.161	.101	<b>.705</b>	.328	.161	.223	.109
10d	.	.148	.254	.086	.116	<b>.600</b>	.164	.127	.253	.049

6c	.195	.286	.210	.157	<b>.476</b>	-.052	.363	.155	-.013	.062
12b	.072	.134	.042	.044	.206	<b>.833</b>	.156	.062	.124	.115
12c	.058	.137	.049	.020	.196	<b>.764</b>	.126	.075	.233	.048
12a	.032	.29	.146	.139	.156	<b>.740</b>	.020	.034	.137	.124
3c	.168	.213	.113	-.038	.2503	.127	<b>.740</b>	.091	.045	.130
3d	.184	.395	.177	.227	.276	.112	<b>.519</b>	.096	.152	.093
2d	.333	.293	.300	.385	.061	.117	<b>.481</b>	.110	.066	.217
8a	.200	.100	.258	.210	.213	-.022	.178	<b>.791</b>	.009	-.035
8b	.182	.22	.067	.229	.256	.096	.026	<b>.728</b>	-.002	.025
8c	.164	.279	.079	.093	.338	.165	.087	<b>.619</b>	.150	.043
11b	.073	.108	-.040	.093	.191	.198	.012	.056	<b>.806</b>	.116
11a	.122	.014	.034	.015	.141	.037	.166	-.007	<b>.752</b>	.089
11c	-.041	.069	.112	-.034	.095	.270	-.070	.046	<b>.729</b>	-.030
9c	.129	.162	.134	-.020	.149	.128	.043	.114	.076	<b>.766</b>
9a	.068	.111	.054	.117	.088	.005	.172	-.081	.011	<b>.713</b>
9b	.099	.084	.142	.000	.022	.363	-.110	-.013	.150	<b>.531</b>

Four factors accounting for 10 items dropped

A brief description of each of the factors obtained from the factor analysis is given below.

Factor 1 – top management support – consists of top management CSF items 1a to 1f and also includes two user support CSF items 3a “employees understand how they fit into the new ERP defined processes” and 3e “management actively ensures user participation and involvement to foster user support for the ERP system.” Factor 2 – training – consists of training CSF items 5a to 5e and also includes a learning CSF item 6a “benchmarking is used to identify cutting-edge ERP techniques.” Factor 3 – project management – consists of the project management CSF items 4a to 4e as well as a learning CSF item 6b “cross-functional groups meet regularly to discuss new uses for the ERP system” from the learning CSF. Factor 4 – culture – consists of three organizational culture CSF items 13f, 13d, 13e; two national culture CSF items 14a, 14b; and one planning CSF item 2a. Factor 5 – implementation team – consists of implementation team CSF items 10a to 10d as well as a learning CSF item 6c “ERP improvement suggestions are regularly collected from multiple employee levels.” Factor 6 – communication – consists of three communication CSF items 12a to 12c. Factor 7 - user support - consists of two user support CSF items 3c and 3d and a planning CSF item 2d “strategic ERP planning includes inputs from all functional areas.” Factor 8 – alignment – consists of three alignment CSF items 8a, 8b and 8c. Factor 9 – data accuracy – consists of three data accuracy CSF items 11b, 11a and 11c. Factor 10 – consultants – consists of three consultants CSF items 9a, 9b and 9c. Internal consistency analysis was undertaken and the Cronbach’s Alpha for each of the 10 CSF scales is presented in Table 4.

**Table 4**  
**Reliability of CSF Scales**

CSFs	Fi	nal Number of Items	Cronbach’s Alpha
Top Management Support	8	.9	.22
Training	6	.923	
Project Management	6	.91	.7
Culture	6	.818	
Implementation Team	5	.8	.68
Communication	3	.848	
User Support	3	.818	
Alignment	3	.853	

Data Accuracy		3		.730
Consultants	3		.6	.33
		Total	<u>46</u>	

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## DISCUSSION

In this study, ten CSF constructs were developed and operationalized. A two-stage process of scale development was adopted. The results indicate high reliability for the ten CSF scales. Content validity was assessed in this study using a representative collection of items and sensible methods of test construction. Construct validity measures whether a scale measures the theoretical construct that it was designed to measure (Flynn et al., 1990; Hair et al., 1998). In this study, factor analysis was used to establish construct validity. Criterion-related validity concerns the extent to which a scale is related to a relevant criterion variable (Flynn et al., 1990; Hair et al., 1998). In this study, the criterion-related validity was evaluated by examining the multiple correlation coefficients computed for the ten CSF scales and performance.

Though ERP systems have been around for more than two decades and there is a plethora of studies on ERP implementations, there still exists a paucity of rigorously developed instruments to measure various facets of ERP deployments. In this study, we have sought to fill this gap by developing theoretically anchored constructs and field testing them to come up with a survey instrument that could effectively be used to assess the organizational aspects of ERP system deployments. Future research could move this research stream forward by coming up with more theoretically-based interventional factors that could help firms realize the business potential from their ERP system implementations.

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“References available upon request from Arun Madapusi.”

**Self-other Perceptions in User Judgments of Internet Computing Risks**

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## **ABSTRACT**

Users, particularly home users, have been identified by many in the security community as the weakest link in the Internet security chain. Methods for understanding and solving user-related security issues have begun to draw on findings from psychology, economics and other social sciences. Though prior research has implicated factors such as one's knowledge and awareness of information security events in developing models of risk perception, there has been no attempt to measure the probability judgments of users themselves concerning these risks. The present exploratory study examined how users make judgments about these risks by measuring the risk perceptions of a group of users, both in terms of how they view their own risks and controls, and how they view the susceptibility of others to the same risks.

The findings suggested that when evaluating the likelihood of Internet-related risks, participants saw others as more likely to be the victim of those threats than themselves, particularly anonymous Internet users, and also perceived others as less well protected than themselves. The implications of this study for how we solve the end user problem are not very encouraging. If users, in general, view others rather than themselves as the source of security problems on the Internet, there is not much incentive for anyone to improve their online behavior or to be better educated about security. In order to change behavior, security professionals would need to change the way users view themselves, as more risk seeking than risk averse.

## **1. INTRODUCTION**

There has been an ongoing debate in the information security literature over the contribution of end users toward our computer security problems, particularly as they relate to the use of the Internet and Internet-based applications. End users (particularly home users) are often identified as the weakest link in the security chain (Anderson, 2007; Anderson & Agarwal, 2010; Herley, 2009). A recent Symantec study (Symantec, 2009), for instance, reported that 95% of attacked vulnerabilities in 2008 were client-side vulnerabilities, aimed at end users. Some in the security community have suggested that social science disciplines, particularly economics and psychology, will play an important role in understanding and solving this problem (Anderson, 2007; Cranor & Garfinkel, 2005; Schneier, 2007; Shostack & Stewart, 2008). The purpose of the present project is to contribute to our understanding of user psychology by examining how users make judgments about the risks of Internet-based computing, and the choices they make regarding the implementation of controls.

## **2. BACKGROUND**

Huang, Rau, and Salvendy (2007) developed a factor analytic model of the perception of information security-related events. The data were gathered through a survey in which people rated each of 12 common threats (e.g., acts of human error or failure, deliberate acts of theft, deliberate software attacks) along a series of 20 dimensions (e.g., familiarity, personal exposure, immediacy of effect, catastrophic potential). Their findings indicate six factors that influence information security perceptions: knowledge, impact, severity, controllability, possibility, and awareness.

Farahmand, Dark, Liles, and Sorge (2009), as part of research in progress, developed a model of risk perception in information security, along with a psychometric instrument.

The two main characteristics of their model are knowledge about the risk and the consequences of being exposed to the risk. Knowledge includes familiarity and experience with a particular risk, and perception of its consequences includes an assessment of the risk's seriousness, perceived dread, and duration.

In a recent study, Anderson and Agarwal (2010) developed a profile of the "conscientious cybercitizen." Using a survey method, the authors sought to understand the underlying factors behind a person's intention to use security measures to protect their own computer as well as the Internet as a whole. The authors used protection motivation theory, public goods theory from economics (because the Internet can be represented as a public good), and the concept of psychological ownership to develop their model. In summary, the model suggests that one's attitude toward security behavior, along with subjective norms (what I believe others believe I should do) and descriptive norms (what I believe others actually do) determine intentions to perform security-related behavior (to protect the Internet and to protect one's own computer). Attitudes toward security-related behavior are in turn determined by concern regarding security threats, perceived citizen effectiveness, and self-efficacy regarding security behavior. Their findings suggest a somewhat complex role for social norms. On the one hand, subjective norms (what I believe others believe I should do) determine whether one intends to protect one's own system, but not the Internet; while descriptive norms (what I believe others actually do) determine whether one intends to protect the Internet, but not one's own system.

While the studies described above and other work related to privacy (Aquisti, 2009), phishing (Dhamija, et al., 2006), and mental models (Camp, 2006) have contributed to our understanding of the risk perception process, these papers have focused largely on the internal (cognitive) factors in the judgment process, in order to create models of this (risk

perception) process. It has been suggested that people do not always use cognitive information effectively to estimate the probabilities of an event (Camerer, et. al, 1989; Camerer, et al., 2004), or its consequences for themselves or for others (REPHRASE). Security-related events may be judged by users as relatively low probability events (Herley, 2009), and the software in use (e.g., web browsers) may provide information of limited usefulness to users about these security-related events. Individual users may then utilize other unrelated personal or situational factors in order to make decisions about how threatened they feel, and about how to protect themselves from Internet-based attacks. Thus, it is important to investigate these other factors that may be relevant to how users understand and make decisions about these events. Emotion may be one such underlying factor in this process.

Slovic has labeled affect as a “heuristic,” or a type of mental shortcut that people use when making judgments about risky events for which they have limited information (Finucane, 2002; Hastie & Dawes, 2001; Keller, et al., 2006; Slovic, 2000; Slovic, et al., 2004). In a series of studies, these researchers have presented evidence that affect plays an important role in judgments of societal risks such as nuclear power and food safety.

The ‘risk as feelings’ approach has also been proposed as an explanation for judgments involving risk (Loewenstein, et. al, 2001). In this approach, affect plays a direct role in determining the choices made in judgments involving risk, rather than a more indirect role, as a byproduct of a risky choice or as an anticipated part of the experience.

Loewenstein, et al. (2001) and Hsee and Weber (1997) presented evidence in support of the ‘risk as feelings’ approach. Their research involves the creation of choice scenarios involving risky behavior (e.g., deciding whether to ride in a taxi in which the driver is obviously drunk). Participants are then asked to indicate what they would do in this



situation, and what the average student at their university would do. Their findings suggest that participants are more risk averse when judging their own behavior than when judging another person's. They reason that in judgments about our own behavior or a person known to us, we tend to be more risk averse, and thus influenced by the negative feelings (anxiety, dread, fear) that we have associated in the past with behaving in a risky manner. When asked to evaluate the behavior of an abstract 'other' (e.g., average student at a university, or, in the present context, an anonymous Internet user), we are less able to use the affect that we have experienced in the past as a guide, but perhaps fall back on a more simplistic cognitive heuristic (e.g., "Most users are stupid, and they don't protect their computers.") to determine our decision, and thus behave in a more risk neutral manner.

**Research questions.** Though prior research has implicated factors such as one's knowledge and awareness of information security events in developing models of information security risk perception, there has been no attempt to measure the probability judgments of users themselves concerning these risks. Are others more or less susceptible to Internet-related threats than I am? The puzzling findings of Anderson and Agarwal (2010) regarding the role of social norms in determining the locus of one's protection efforts also needs further investigation. If the Internet is a public good that needs protection, how do people actually protect their own systems; and how do they perceive others' protection efforts? Do others do as good (or bad) a job of protecting their systems as I do? This assumes people can make accurate judgments about others' behavior, and about risk preferences in particular. As suggested above, Hsee and Weber (1997) found that participants in their studies consistently predicted that others were more risk seeking than themselves, and Loewenstein, et al. (2001) obtained similar findings. If I as an

Internet user view others' efforts at protection negatively (risk neutral to risk seeking<sup>1</sup>), I should be more willing to invest the time and effort to ensure that my own system is adequately protected (risk averse). But if this is the case, it would seem that we should have fewer Internet-based security problems than we do because users would be making more of an effort to gain more knowledge of security issues and implement appropriate controls. However, Anderson and Agarwal's (2010) findings suggest that while my beliefs about what others do are related to an intention to protect the Internet, they are unrelated to the intention to protect one's own system. In order to clarify this issue, the present exploratory study will investigate the perceptions of a group of users, not only in terms of how they view their own risks and controls, but how they view the susceptibility of others to the same risks. In making these judgments, participants will utilize affect in their decision process, in the same manner as the participants in Loewenstein's (2001) and Hsee's (1997) studies did. The consequences in the present study mean that participants will view others as more susceptible to threats from the Internet, and that their systems will be judged as less well protected.

Thus, in the present study, I am primarily interested in three things. One, what are the perceptions of the probability of different types of Internet-related security threats? Two, do people perceive a difference between the likelihood of threat to themselves and the threat to others – if the Internet is a public good are others viewed as more threatened than I am? Third, what kinds of behaviors are people engaging in to protect themselves, and do they perceive differences in protection measures between themselves and others?

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<sup>1</sup> By using the term risk-seeking in the current context, I am asserting that a user's system is less well protected, and that it is more likely that they will suffer attacks.

*Hypothesis 1: Participants will report higher levels of perceived threat likelihood for others than for themselves among potential security threats.*

*Hypothesis 2: Participants will report greater levels of use of security protection measures for themselves than they report are used by others.*

### **3. METHOD**

**Participants.** The questionnaire constructed for this study was administered to undergraduate students enrolled in two different sections of an Information Systems course at a regional university in the southeastern United States. Extra credit was offered to students as an incentive for completing the questionnaires.

Sixty four students participated in this investigation. Seventy one percent of the participants were male and 29% were female; the average age of the participants was 22.16. This sample is not representative of the population at large, in fact, the participants represent a higher level of knowledge about the Internet and its security problems. Nonetheless, the present investigation is exploratory in nature, and the primary goal is to gather some preliminary data about differing perspectives in the perception of Internet-related risks. It will be necessary at the next stage of the investigation to sample more broadly in the general population.

**Research Instruments.** Measurement items were grouped into two categories (The measurement scales have been included in Appendix A). First, a set of items was constructed in order to measure the participants' perception of the likelihood of a set of common Internet-related threats to happen to them, to a person in the current class, and to an anonymous Internet user, on a scale from zero (will not happen) to ten (certain to happen). The threats included the likelihood of one's system (or a person in the class, or an anonymous user) being infected by viruses, becoming part of a botnet, or having one's

personal information stolen as a result of a phishing e-mail. Threats were chosen after consultation with multiple instructors in Information Systems, based on their tendency to be discussed in introductory courses in computer concepts. The security-related content of these courses thus represents something of a consensus among professionals concerning which threats a common user should have some knowledge about.

A second scale (See Appendix A) measured self-reported behavior related to protection from Internet-related threats. These behaviors were chosen in a similar manner to the threats above. These protection behaviors were also measured from three perspectives: Oneself, another person in this class, and an anonymous Internet user. Participants were asked to indicate whether they currently Use, Don't Use, or Don't Know if they use each of the protective measures. The protection measures included the use of anti-virus and anti-spyware software, operating system updates, and personal firewalls.

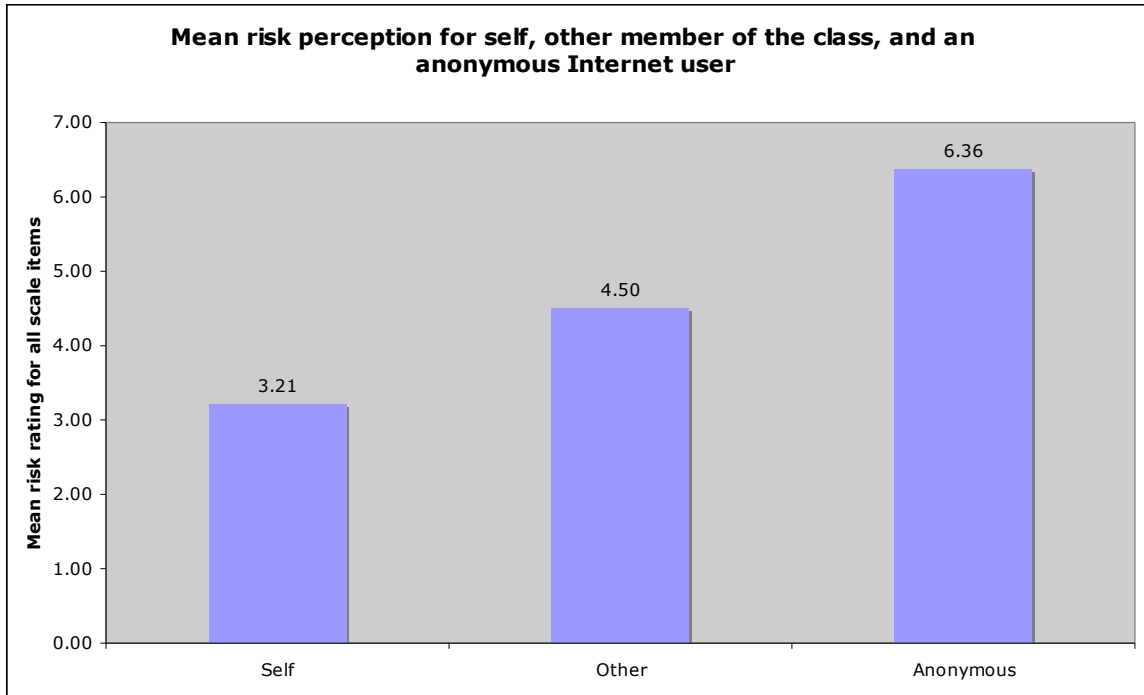
#### **4. RESULTS**

Sixty three usable surveys were included in the following analyses. Table 1 reports summary descriptive measures for all Internet-related threats evaluated from each of three perspectives: Self, Other (person in the class), and an Anonymous Internet user.

	N	Minimum	Maximum	Mean	Std. Deviation
SelfPhish1	63	.00	7.00	1.6349	1.83428
SelfPhish2	63	.00	9.00	2.5556	2.35398
SelfHack1	63	.00	9.00	3.0000	2.42301
SelfScam1	63	.00	7.00	1.2381	1.82910
SelfVirus	63	.00	10.00	6.0952	3.01456
SelfBot1	63	.00	10.00	3.9048	2.68036
SelfHack2	63	.00	10.00	4.6032	2.80288
SelfHack3	63	.00	10.00	3.0317	2.39602
SelfTrust1	63	.00	10.00	3.2857	2.95901
SelfBot2	63	.00	9.00	2.7619	2.39431
Other1Phish1	63	.00	10.00	3.4762	2.24224
Other1Phish2	63	.00	10.00	3.9206	2.21652
Other1Hack1	63	.00	10.00	3.9365	2.69332
Other1Scam1	63	.00	10.00	3.1905	2.54544
Other1Virus	63	.00	10.00	6.5397	2.85581
Other1Bot1	63	.00	10.00	4.7143	2.72046
Other1Hack2	63	.00	10.00	5.4603	2.91174
Other1Hack3	63	.00	10.00	4.4921	2.58328
Other1Trust1	63	.00	10.00	4.7619	2.84953
Other1Bot2	63	.00	10.00	4.5397	2.70499
AnonPhish1	63	.00	10.00	5.9365	2.27095
AnonPhish2	63	1.00	10.00	6.2540	2.08658
AnonHack1	63	1.00	10.00	6.0317	2.42944
AnonScam1	63	.00	10.00	5.3175	2.53253
AnonVirus	63	.00	10.00	8.2063	2.19353
AnonBot1	63	1.00	10.00	6.3968	2.26858
AnonHack2	63	1.00	10.00	7.0635	2.11655
AnonHack3	63	2.00	10.00	6.2381	2.33289
AnonTrust1	63	1.00	10.00	5.9683	2.77645
AnonBot2	63	.00	10.00	6.2222	2.54916

Table 1: Descriptive statistics for all scale items tabulated across all participants.

Figure 1 presents the means for each perspective (Self, Other, and Anonymous) calculated from all responses for all threats. When compared to oneself, others are perceived to be more susceptible to the Internet-related risks, particularly anonymous others. Support was obtained for Hypothesis 1, as reported in Table 2, through an analysis of variance conducted on the combined risk rating responses across rating perspectives (Self, Other, and Anonymous). As shown in the tables below, the overall test (Table 2) as well as all paired comparisons (Table 3) were highly significant ( $p < .001$ ).



**Figure 1: Mean risk ratings tabulated across all scale items for each perspective.**

RiskRating					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3164.220	2	1582.110	218.231	.000
Within Groups	13680.176	1887	7.250		
Total	16844.396	1889			

Table 2: Results of analysis of variance for risk ratings across perspectives (Self, Other, Anonymous).

	(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
	Self Anon	Other Anon				Lower Bound	Upper Bound
Tukey HSD	Self	Other	-1.29206*	.15171	.000	-1.6479	-.9362
		Anon	-3.15238*	.15171	.000	-3.5082	-2.7965
	Other	Self	1.29206*	.15171	.000	.9362	1.6479
		Anon	-1.86032*	.15171	.000	-2.2162	-1.5045
	Anon	Self	3.15238*	.15171	.000	2.7965	3.5082
		Other	1.86032*	.15171	.000	1.5045	2.2162
LSD	Self	Other	-1.29206*	.15171	.000	-1.5896	-.9945
		Anon	-3.15238*	.15171	.000	-3.4499	-2.8549
	Other	Self	1.29206*	.15171	.000	.9945	1.5896
		Anon	-1.86032*	.15171	.000	-2.1578	-1.5628
	Anon	Self	3.15238*	.15171	.000	2.8549	3.4499
		Other	1.86032*	.15171	.000	1.5628	2.1578
*. The mean difference is significant at the 0.05 level.							

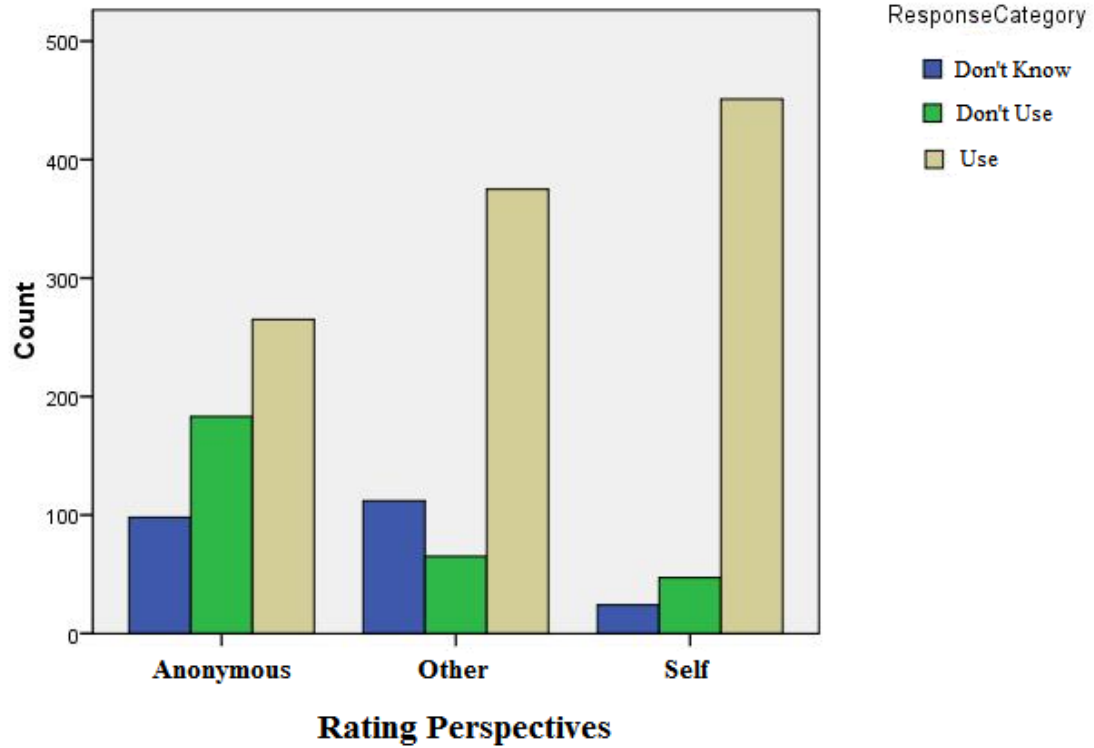
Table 3: Results of Post-Hoc Comparisons on Results in Table 2 (Dependent Variable: RiskRating).

Hypothesis 2 was tested by first tabulating the frequency of occurrence of the response categories for each protective measure (Use, Don't Use, Don't Know) across each risk rating perspective (Self, Other-in class, Anonymous Internet user) to create Table 4 below (Figure 2 presents a graphical perspective). The resulting frequencies were evaluated with a chi-square test of independence, and as reported in Table 5, the result was highly significant ( $p < .001$ ), thus supporting Hypothesis 2.

Rating Perspectives * ResponseCategory Crosstabulation						
		ResponseCategory				
			Don't Know	Don't Use	Use	Total
Rating Perspectives	Self	Count	24	47	451	522
		Expected Count	75.4	95.1	351.5	522.0
	Other	Count	112	65	375	552
		Expected Count	79.7	100.5	371.7	552.0
	Anon	Count	98	183	265	546
		Expected Count	78.9	99.4	367.7	546.0
	Total	Count	234	295	1091	1620
		Expected Count	234.0	295.0	1091.0	1620.0

Table 4: Crosstabulation of frequencies of behavior related to the use of protective measures (Don't Know, Don't Use, Use), across rating perspectives (Self, Other-in class, Anonymous user).





**Figure 2: Display of crosstabulation frequencies for all protective measures across rating perspectives from Table 3.**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	216.687	4	.000
Likelihood Ratio	221.792	4	.000
N of Valid Cases	1620		

Table 5: Chi-square tests of the differences among frequencies for each protective measure across rating perspectives from Table 4.

## 5. DISCUSSION

The findings of this exploratory investigation suggest that when evaluating the likelihood of Internet-related risks, participants saw others as more likely to be the victim of those threats than themselves, particularly anonymous Internet users. They also perceived others as using the same protection measures less often than themselves. This parallels the findings of earlier investigations in the 'risk as feelings' literature (Hsee & Weber, 1997; Loewenstein, et.al, 2001) in which 'others' were predicted by research participants to make more risk seeking choices in decision-making situations than the participants themselves. In the present context, the participants saw others as mostly more risk seeking in the choices they made for protecting themselves from attack via the Internet. The other person is thus seen as less likely to protect themselves through the use of antivirus software, or through the use of updates for the software they have installed on their computer for example (though whether participants saw this as a conscious choice of the anonymous user cannot be determined – this could be an interesting line of future investigation). This then leads to others being perceived as more susceptible to Internet-related threats. In contrast to the findings of Anderson and Agarwal (2010), descriptive norms (or what I believe others actually do) seem to be associated with greater levels of protection on the part of participants for their own systems.

These results however, could be explained by factors related to the sample. The participants are all college students majoring in a computing discipline (either Information Systems or Information Technology), and thus have a much higher level of sophistication and knowledge than the average home user. This could explain the degree of the difference between perceived risk ratings for Self and, in particular, the

Anonymous Internet user. However, this factor does not explain the consistent differences between ratings of Self and another class member on both susceptibility to threats and protective behaviors. The next phase of this investigation will involve collecting similar data from a more representative sample of users.

The implications of this exploratory study for how we solve the user problem are not very encouraging, and complement other work on the relationship between security and economics (Anderson, 2007). Along these lines, Herley (2009) claimed that we should not be surprised that users ignore our security advice (he was speaking of organizational users as well as home users). He suggests that it is in a user's rational self-interest to ignore most of this advice because the cost, in terms of time and effort to understand and implement protection measures, does not generate enough benefit for such low probability events.

In the context of the present study, if users, in general, view others rather than themselves as the source of security problems on the Internet, there is not much incentive for anyone to improve their online behavior or to be better educated about security. But are users actually as well protected as they reported here? Perhaps as suggested by Loewenstein, et al. (2001), the negative affect associated with one's knowledge of the consequences of security events (e.g., identity theft), in this case might cause users to report greater use of protection measures and lower threat levels than are actually the case. However, without independent confirmation of the actual levels of protection used by the participants of this study, this remains conjecture. Yet even given their reported protection levels, participants still felt that the likelihood of being affected by a virus was high (6 out of 10 on average on the threat scale).

These findings present the security community with a challenge when it comes to communicating the risks of Internet-based computing. In order to change behavior, security professionals would need to change the way users view themselves. Thus, while the user community may see itself as risk averse, they may actually be more risk seeking. Changing the way users perceive their own risk would be a very difficult task, given that we generally have negative emotion associated when judging the riskiness of a situation, and therefore tend to view our own behavior as risk averse. The present study, unlike Anderson and Agarwal (2010), did not investigate the notion of protection of the Internet as an abstract entity – or as a public good. Disentangling this notion from that of protection of a personal system would allow researchers to explore how users understand the relationship between their own systems and the collective resource represented by the global Internet. How do users understand the nature of collective risk in this context? The role of subjective norms (what I believe others believe I should do) would seem play a role – though Anderson and Agarwal’s findings suggest that this only influenced intentions to protect one’s own system. Continued research into the nature of the user’s perceptions of risk should help provide answers to these questions, and perhaps in addition will allow developers to take these factors into account when attempting to build security into the next generation of Internet-based applications.

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November 15, 2010).

## Appendix A. Questionnaire used in the study.

Read each of the following statements and indicate the likelihood that they would occur to ***you personally***. Use a scale from 0 (would not happen) to 10 (certain to happen) to make your judgment, and write the number next to each item below.

- \_\_\_\_\_ Having my user name and password stolen from my banking site by a fake web site I visited through a link in an email message.
- \_\_\_\_\_ Having my user name and password stolen from my personal email account by a fake web site I visited through a link in an email message.
- \_\_\_\_\_ Someone gaining unauthorized access to personal information (e.g., social security #, credit information, banking information) stored on your computer, and using it to impersonate you.
- \_\_\_\_\_ Being the victim of a phony charity scam through an email solicitation.
- \_\_\_\_\_ Getting a virus on my computer.
- \_\_\_\_\_ Becoming part of a large network of infected computers that are used to carry out attacks against popular web sites on the Internet (e.g., CNN, Amazon, eBay), (because of malicious software being installed without my knowledge on my computer?).
- \_\_\_\_\_ Having software installed on my computer by a site on the Internet without my knowledge or permission.
- \_\_\_\_\_ Having software installed on my computer that would allow someone to steal my credit card number or other personal information.
- \_\_\_\_\_ Having my credit card number stolen from a web site where I have it stored for my convenience (e.g., Amazon).
- \_\_\_\_\_ Using your computer to send spam and spread viruses to your friends and family because malicious software has been installed on your computer.



Read each of the following statements and indicate the likelihood that ***you believe*** they would occur to ***the person sitting next to you now***. Use a scale from 0 (would not happen) to 10 (certain to happen) to make your judgment, and write the number next to each item below.

- \_\_\_\_\_ Having the user name and password stolen from their banking site by a fake web site they visited through a link in an email message.
- \_\_\_\_\_ Having the user name and password stolen from their personal email account by a fake web site they visited through a link in an email message.
- \_\_\_\_\_ Someone gaining unauthorized access to personal information (e.g., social security #, credit information, banking information) stored on their computer, and using it to impersonate them.
- \_\_\_\_\_ Being the victim of a phony charity scam through an email solicitation.
- \_\_\_\_\_ Getting a virus on their computer.
- \_\_\_\_\_ Becoming part of a large network of infected computers that are used to carry out attacks against popular web sites on the Internet (e.g., CNN, Amazon, eBay), (because of malicious software being installed without my knowledge on my computer?).
- \_\_\_\_\_ Having software installed on their computer by a site on the Internet without their knowledge or permission.
- \_\_\_\_\_ Having software installed on their computer that would allow someone to steal their credit card number or other personal information.
- \_\_\_\_\_ Having their credit card number stolen from a web site where it is stored for their convenience (e.g., Amazon).
- \_\_\_\_\_ Using their computer to send spam and spread viruses to their friends and family because malicious software has been installed on their computer.

Read each of the following statements and indicate the likelihood that ***you believe*** they would occur to ***an anonymous Internet user***. Use a scale from 0 (would not happen) to 10 (certain to happen) to make your judgment, and write the number next to each item below.

- \_\_\_\_\_ Having the user name and password stolen from their banking site by a fake web site they visited through a link in an email message.
- \_\_\_\_\_ Having the user name and password stolen from their personal email account by a fake web site they visited through a link in an email message.
- \_\_\_\_\_ Someone gaining unauthorized access to personal information (e.g., social security #, credit information, banking information) stored on their computer, and using it to impersonate them.
- \_\_\_\_\_ Being the victim of a phony charity scam through an email solicitation.
- \_\_\_\_\_ Getting a virus on their computer.
- \_\_\_\_\_ Becoming part of a large network of infected computers that are used to carry out attacks against popular web sites on the Internet (e.g., CNN, Amazon, eBay), (because of malicious software being installed without my knowledge on my computer?).
- \_\_\_\_\_ Having software installed on their computer by a site on the Internet without their knowledge or permission.
- \_\_\_\_\_ Having software installed on their computer that would allow someone to steal their credit card number or other personal information.
- \_\_\_\_\_ Having their credit card number stolen from a web site where it is stored for their convenience (e.g., Amazon).
- \_\_\_\_\_ Using their computer to send spam and spread viruses to their friends and family because malicious software has been installed on their computer.

Indicate which of the following methods of securing a computer for use on the Internet or ensuring safe financial or other transactions over the Internet that **you personally** use currently.

1. Anti-virus software  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
2. Anti-spyware software  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
3. Operating System Updates (e.g., Microsoft Windows Update)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
4. Software Updates, including your web browser and anti-virus and anti-spyware software (e.g., Adobe Acrobat, Java, Firefox, Symantec, Adaware)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
5. Personal Firewall installed and enabled on your computer  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
6. Firewall installed on the device that connects your computer to the Internet (e.g., router)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_

Indicate which of the following methods of securing a computer for use on the Internet or ensuring safe financial or other transactions over the Internet that **you believe the person sitting next to you now** uses currently.

1. Anti-virus software  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
2. Anti-spyware software  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
3. Operating System Updates (e.g., Microsoft Windows Update)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
4. Software Updates, including their web browser and anti-virus and anti-spyware software (e.g., Adobe Acrobat, Java, Firefox, Symantec, Adaware)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
5. Personal Firewall installed and enabled on their computer  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
6. Firewall installed on the device that connects their computer to the Internet (e.g., router)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_

Indicate which of the following methods of securing a computer for use on the Internet or ensuring safe financial or other transactions over the Internet that **you believe an anonymous Internet user** uses currently.

1. Anti-virus software  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
2. Anti-spyware software  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
3. Operating System Updates (e.g., Microsoft Windows Update)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
4. Software Updates, including their web browser and anti-virus and anti-spyware software (e.g., Adobe Acrobat, Java, Firefox, Symantec, Adaware)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
5. Personal Firewall installed and enabled on their computer  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_
6. Firewall installed on the device that connects their computer to the Internet (e.g., router)  
Use \_\_\_\_\_ Don't Use \_\_\_\_\_ Don't Know \_\_\_\_\_

## CORPORATE SUSTAINABILITY AND GROWTH THROUGH INTRAPRENEURSHIP: A SWEDISH APPROACH

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### ABSTRACT

The approach a specific firm has made to renew itself is examined through two lenses commonly used to analyze such efforts – 1.) as a platform project and 2.) as an intrapreneurship effort. Three interrelated projects were run by a special product development organization that supported two brands with product development. The platform project approach emphasized the special importance the effort had and the attendant organization that developed. The intrapreneurship insight provided appreciation for the processes that developed for implementation. It is argued that, flagship projects as studied here, in particular, infuse *parallel* and *collective* activities since such projects call for significant organizational self-renewal.

**Keywords: Intrapreneurship, flagship projects, self-renewal**

### INTRODUCTION

“Business is a contact sport. Companies win. Companies lose. That won’t change. Our goal instead, is to help avoid failure.” [10, p.12] Put another way, in order to survive, companies must find a way to renew themselves. Just as authors from Schumpeter [30, pp.81-86] to Collins [12, p.11] had similar visions, so it is with this paper. It is the self-renewal type of activities that are of interest in this paper. Clearly, these activities are important. In fact, Drucker [15, p.37] asserted their importance in discussing the basic functions of a firm. It is often claimed that such activities are vital for the organization, although there are few empirical studies illustrating self-renewal processes. This paper therefore focuses on considering the research question:

How do large organizations perform self-renewal activities?

Consequently, the purpose of this paper is to explore the relationship between projects and intrapreneurial self-renewal activities. In particular, the approach a specific firm has made to renew itself is examined through two lenses commonly used to analyze such efforts – 1.) as a platform project and 2.) as an intrapreneurship effort. The objective is to show that large organizations perform multiple parallel self-renewal processes and that these processes are realized through collective efforts. Special accommodations must be made, however, to be successful in these efforts. These accommodations are reflected in this paper.

## BACKGROUND

### Platform Projects

Product platforms have become a prerequisite for profitable product development in almost every industry because the approach tends to reduce complexity and better leverage investments in new product development [19][32]. In this paper focus is on an inter-organizational platform project in the transportation industry. Researchers [6][7][32] illustrate that inter-organizational vehicle platform projects are crucial for the company strategy and they are complex to organize because they engage a multitude of stakeholders at all levels of an organization. In the study of multi-branded platform development Sköld and Karlsson [32] identified three distinctively different strategic forces that must be handled in such multi-branded platform development: (1) the creation of a common architecture; (2) accomplishing product differentiation within an expanded and multi-branded product scope; and (3) corporate responsibility in the transition from single-branded to multi-branded platform development. The managerial challenge involved balancing commonality and distinction through a mixture of common and distinctive components, systems, and knowledge. Stakeholders may often have to deal with conflicting objectives [6]. All of these stakeholders should also have their saying in the creation of requirement specifications. Thus it is expected that the creation of requirement specifications may be challenging to perform in such settings. Recently, Chai et al. [11] conducted a large-scale survey in the United States with 242 firms. The study found empirical evidence to support the existence of knowledge sharing across platform-based products (among other factors) significantly enhances product platform competency and the existence of a champion has a significant ( $p < .05$ ) positive relationship with platform cost efficiency. This finding suggests that the existence of a product champion in platform-based product development has a significant influence on cost savings in successive products.

There are also other reasons to believe that the creation of requirement specifications is challenging in an inter-organizational vehicle platform project. De Brentani [13] proposed that the character of the development process is dependent on the type of innovation being created. That is, De Brentani [13] describes that when developing novel products the role of individuals become more important than when working with incremental innovation. The process becomes less controllable and there will be issues of authority and decision making. Decisions need to be made concerning technology, the entire business case, the organizational arrangements and multiple coordination and integration mechanisms [27]. Such multi-actor decisions cannot be made, anchored or implemented in a simple and routine manner. Therefore in this paper, due to its degree of novelty, the effect on the participating organizations and the need to engage a multitude of various stakeholders, the inter-organizational vehicle platform is defined as a radical type of innovation.

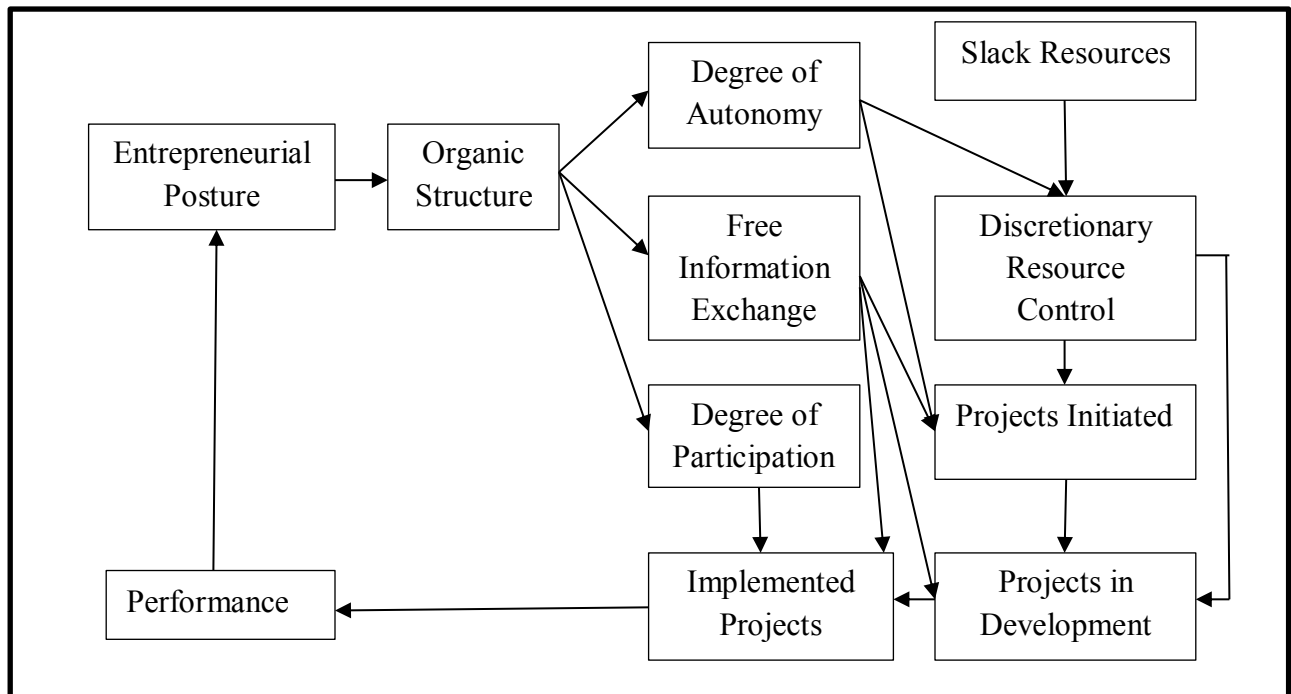
### Intrapreneurship

It has been suggested that corporate entrepreneurship (intrapreneurial activity) is vital for organizational survival [17]. Such activities are performed by both shop floor workers and managers who initiate organizational change in daily activities [3][4][14] and demand interplay between the organization and the intrapreneurs [29]. Further, intrapreneurship can be a vital element in organizational development since intrapreneurship has a beneficial effect on revitalization and performance of large firms [20][25][26]. Therefore organizations need to be

committed to support intrapreneurial activities [18], since both organizational support and combined individual competencies are central for achieving high quality intrapreneurial activities [2].

Over the years there have been various definitions of intrapreneurship. The original concept is commonly traced to Pinchot and Pinchot [28]. “What is needed in the large corporation is not more semi-independent departments run by hard-driving yes men, but something akin to free market entrepreneurship within the corporate organization. Such a new way of doing business would be a social invention of considerable importance, both for the individuals in it, and for the productivity and responsivity of the corporation”. Subsequently there has been a move away from the implication of individual focus to one of group and/or team appreciation. “Intrapreneurship is organizational entrepreneurship, in which teams of employees band to develop new technology and produce new products. It appears to combine the individualistic trait of being able to work independently to generate create ideas with the collectivistic ability to collaborate in teams (in-groups) for new product development” [1, p.179]. Sharma and Chrisman [31, p.18] define intrapreneurship as “the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization”. More contemporary researchers state that “intrapreneurship is defined as entrepreneurship within an existing organization, referring to emergent behavioral intentions and behaviors of an organization that are related to departures from the customary” [3, p.9]. This paper concerns the relationship between a flagship project and the organization. As projects typically departure from the ordinary, this paper draws on the intrapreneurship definition made by Antoncic and Hisrich [3].

Figure 1 – The structure of intrapreneurship, after Russell, [29]



Russell [29] used a cognitive mapping approach to build a model of corporate entrepreneurship (intrapreneurship) from an organizational perspective. This approach analyzed corporate entrepreneuring from a systems viewpoint and facilitates an understanding of the process through which entrepreneurial firms generate innovation. There are four characteristics of organic structure that facilitate intrapreneurial processes (Figure 1), which commonly are accepted as undergirding intrapreneurship: (1) Increased levels of autonomy permit lower-level managers to propose and test more new ideas (related to both informal and decentralized structure). (2) Increased discretionary control over resources by lower-level participants facilitates the "championing" of innovative ideas; therefore, more new ideas can be initiated and more development projects started since resources available to potential champions are more widely dispersed (related to decentralized structure). (3) The informality of communication facilitates the unfettered exchange of information, which may result in the generation of more new ideas, more effective project development, and easier implementation (related to informal structure). (4) Increased participation in the decision process regarding the initiation and development of new ventures may increase the commitment of organizational members to innovation projects, thereby facilitating the implementation of successful ventures (related to both decentralized and informal structure).

### **Culture's Potential Impact**

The study was conducted in a manner that the contextually sensitive, empirical research for which Nordic studies are known, *cf.* [21]. The common denominator in these studies is a fascination on the practitioners. In other words, what the project managers say and do are of particular interest. For instance, it has been argued that project leadership should be seen as socially constructed [24], which provided the following definition of project leadership in their paper:

*processes of social interaction where people interact around issues related to governance, coordination, policy making and change in projects.*

By following this definition we acknowledge that national culture may have played a role in observation, so we reference Kreiser et al's [23] cross-national study on entrepreneurship. This research contributes to existing theories of national culture by suggesting that the various dimensions of cultural values and several of the institutions that are representative of national culture impact the willingness of entrepreneurial firms to display risk taking and proactive behaviors. Although the work was on SMEs, it is worth referencing for two reasons, 1.) undoubtedly some aspect inherent in study and 2.) Sweden was one of countries covered in study. Cultural differences were found to be significant. Data from 1,048 firms in six countries were utilized to assess the impact of national culture and certain institutions that are representative of national culture on two key dimensions of entrepreneurial orientation: risk taking and proactiveness. Uncertainty avoidance and power distance were both found to have a significant negative influence on risk taking; uncertainty avoidance, individualism, and power distance are found to negatively influence proactive firm behaviors.

## **METHOD**

The approach used in this study is described in more detail elsewhere [8]. The study was conducted in a manner that the contextually sensitive, empirical research for which Nordic



studies are known, *cf.* [21]. The common denominator in these studies is a fascination on the practitioners. In other words, what the project managers say and do are of particular interest. Initially, 68 in-depth interviews were performed. Three of these interviews were made with requirement managers directly; in each of the other 65, respondents (for example one department manager, chief project managers, time managers, quality managers, sales managers, marketing managers, design managers, IT managers, cab managers, purchasing managers, project controllers, and engine managers) were asked about their collaboration with requirement managers and their view on requirement management. Through the interviews it was possible to access personalized information, *cf.* [5] and create a picture describing both the setting and the activities performed by actors on a daily bases. During the interviews respondents were encouraged to describe their formal role and their daily activities.

Observations were a component of data collection; these observations made it possible to compare respondents' activity descriptions with what they actually did during daily work efforts, *cf.* [16]. Further, a total of 32 meetings were observed that included project team coordination meetings, concept decision meetings, and financial controlling meetings. There were also studies of documents such as the development process, development instructions, prerequisites, requirement specifications and technological specifications. The combined studies of these documents in addition to the observations made it possible to comprehend how the same instruction in practice could take on different routines, produce reasons to re-organize, and/or lead to the difficulties in translating targets into requirements.

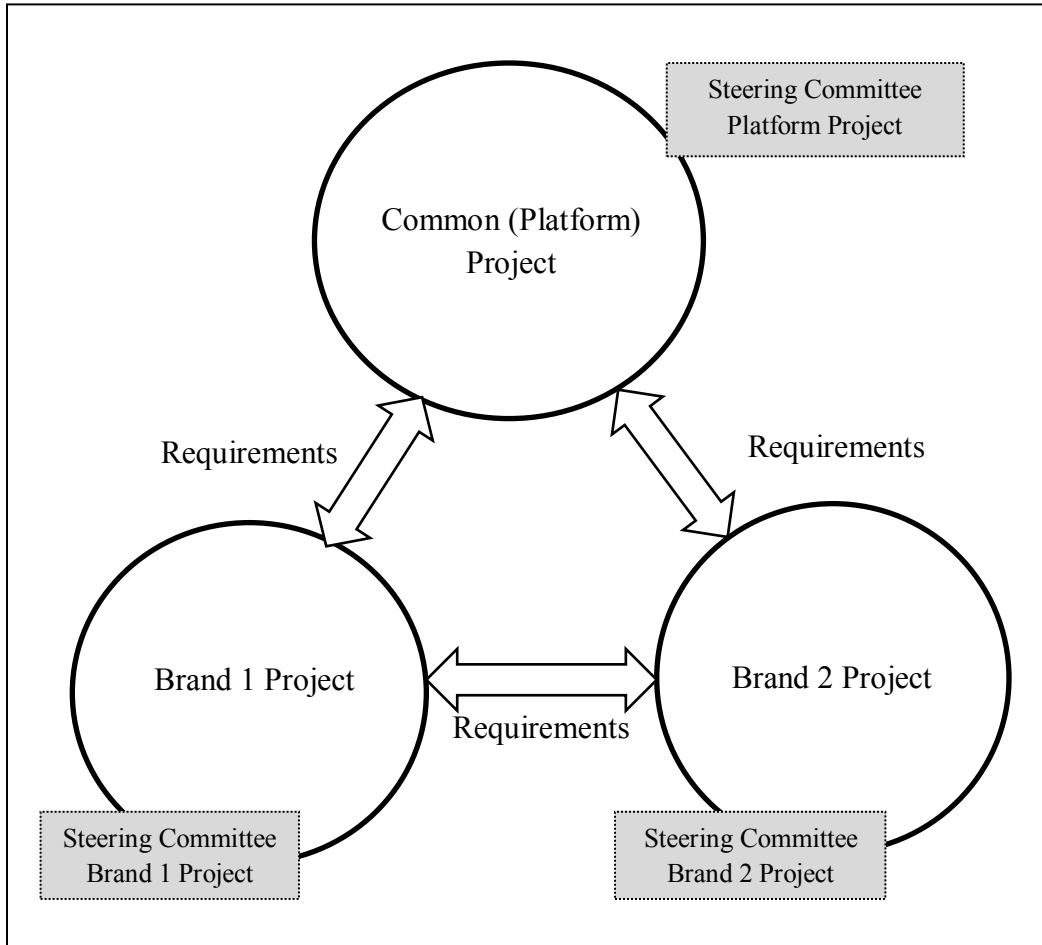
Data from the interviews were analyzed in the following manner. Given the opportunity to freely talk about their experience, respondents discussed some of the activities they had encountered in setting up their positions. There tended to be commonality across the responses, which was acknowledged in interviews with other staff, activity observations, meeting attendance and ancillary documents. Generally speaking, major groupings of these comments could be identified. Specific literature available as background for the field study suggested that these observations had been made in other studies. These activities are described and discussed in the following section.

## **OBSERVATIONS**

### **The Nature of the Project**

We were told that the industry under consideration was so competitive that competitors of the featured firm bought its units and reverse engineered them to try to figure what was being done. Consequently, the company had expressed a desire to remain anonymous and disclosure of extensive, specific material would be injurious to its competitive position. Briefly speaking, however, this was a strategic move by the organization. The background for the study involved a parent company with two separate brands, one special product development organization, one major supplier, three projects, and a dedicated staff that measured in the hundreds. The two brands were changing their relationships, moving from a very competitive type of relationship to a relationship that allowed for both profound collaboration and competition at the same time. The goal was to create a shared vehicle platform.

Figure 2 – Projects and the requirement management process – Objective: One platform shared by two brands



Three interrelated projects were studied, which we call a multi-project grouping or flagship project: a common (platform) project and two related branded projects. These projects were run by a special product development organization that supported brands with product development. The purpose of the product development organization is/was to offer innovative and customer-tailored products. In general, the primary actors involved in the project worked within the framework of the product development organization. However, due to ongoing organizational changes, where some functions were integrated and other functions were not, there was a sense of working in a hybrid type of organization. To a large degree it fell on CPMs (chief project managers) to interpret and understand consequences of all these changes. Hence there was a need for intense intra- and inter-organizational communication and interaction. The sum and substance of these factors produced a project that was fuzzy in structure, conduct and context.

The project setting is illustrated in Figure 2. In Figure 2, the three boxes with the appropriate descriptions represent the three projects. The shadowed rectangles represent the steering committees. Each project was governed by its own unique steering committee as suggested in the diagram. All projects were interdependent, yet they also maintained their unique boundaries

in relation to the permanent organization, which held itself responsible for the actual product development work. It was also the responsibility of the permanent organization to develop the requirement management process.

The three projects had different foci. Their common aim was to create a shared vehicle platform. The two branded projects focused on creating brand-unique parts while the platform project focused on creating commonalities. Thus, the major strategic challenge was to create two unique brands while at the same time sharing technology and vehicle architecture. Put another way, this development was focused on the work of creating a totally new type of vehicle platform, while developing a functional organization. The project setting therefore had a transformational nature, seen both from a functional and a strategic perspective.

### **The Rise of Management Specialists**

When beginning the study of the project setting we had expected to find project managers (PMs); instead we found a combination of chief project managers (CPMs) leading the work of multiple PMs. It was explained that the product development organization in some earlier situations of new product development had used CPMs. However, CPM responsibilities in this new project setting were not what they referred to as classical CPM positions. The size of the project setting in itself had called for the creation of more novel CPM positions. Therefore the CPM role had to be developed and defined as product development continued. Upon reflection, we assessed that a significant evolution of responsibility was to take on the role of service managers for the project. That is, these individuals were responsible for tying together actors working at strategic, operational and functional organizational levels in multiple organizations. To a large extent, their activities could be described in terms of communicators and implementers of the SERVQUAL constructs – Reliability, Responsiveness, Assurance, Empathy and Tangibles, *cf.* [33, p.82]. A major contribution of these individuals, however, was to reduce the fuzziness inherent in developing the project cluster [9].

Under the leadership of the CPMs, there was general and complete agreement with the strategic approach to the development of a common platform for the two brands. In the process, however, requirement managers were recognized as essential elements in development [8]. The requirement manager's role fulfillment was performed through five major activities. These activities were essential in order to manage working with a large flagship project:

1. Positioning: The newness of this function in the organization meant that other functional representatives were stressed and pressured in attending to their traditional work routines. One of the challenges for the requirement managers was therefore to position their function in relation to all other functions in the project.
2. Developing a practice: A gap existed in clearly describing the relationship between technological specifications documents and the targets described in prerequisites. Traditionally, design engineers introduced a concept and then that concept was evaluated by the customer. If it was accepted, the requirements were created. There was thus a need to modify the process since the traditional way of working was in conflict with the logic of the requirement management process.
3. Anchoring: Requirements had to be considered and discussed in relation to several modules and components. For requirement managers the aim was to create requirement specifications for each new product development target. Therefore a need evolved to

perform iterations explaining the requirement process as such, and what effect it would have on different functions.

4. **Re-organizing:** The development process in this case was made more complex than usual because the two brands collaborated and competed at the same time. Project team members had to understand what information that could be shared or not since some information would be seen as brand confidential. Requirement managers and their project teams provided steering committees with bottom-up suggestions to complex collaborative issues. This was a new work procedure that had to be adjusted through multiple re-organizing efforts.
5. **Routinizing:** The requirement management process. First, it concerned the work routines at a strategic level. Engineers and requirement managers therefore tried to work out a new routine, allowing for an engineer's freedom of action in the development process, but still connected with the requirement management process in such way that conflicts would not appear. In order to deal with the problem, requirement managers and the other project team members created a more compact 30 page high-level prerequisites document where they also prioritized targets.

These roles are put into perspective in the upper section of Table 1.

### **Through the Intrapreneurial Lens**

Recall the self-renewal focus of activities that are of interest in this paper. The second portion of this research thus dealt with considering the intrapreneurial aspects of the project grouping. In particular, recall our preference for the Antoncic and Hisrich (2003, 9) definition, "intrapreneurship is defined as entrepreneurship within an existing organization, referring to emergent behavioral intentions and behaviors of an organization that are related to departures from the customary". As can be understood, since the flagship project grouping brought new challenges to the organization, internal service processes needed to be renewed in order to support the situation. These internal services needed to serve participants on the strategic, operational and functional levels of the organization.

In particular, Russel's [29] concept of increased levels of lower-level managers' autonomy to propose and test more new ideas (related to both informal and decentralized structure) seemed important. Consequently, four renewal processes (project controlling, system engineering, time management, and decision making) stood out in the study; each had a profound impact on organizational performance. These four processes should be seen as entrepreneurial since they influenced organizational performance. They were not initially part of the project scope, but instead were developed within the progress of the project.

1. **Project controlling** - Managers in the organizations agreed on the need to perform shared efficient project controlling during the product development process. It was seen as essential to understand how cost would develop depending on the choice of different product strategies. Furthermore, the development of a shared platform also demanded a shared project controlling process so that cost issues could be shared and discussed on common bases.
2. **System engineering** - Overall, the work in creating a system engineering process had several managerial and organizational implications. For example; inter-organizational collaboration reached a higher level of competency since participants were able to

describe each collaborative effort in more detail. Actors in the organization served each other with vital information creating a higher quality in cross-functional collaboration.

Table 1 – Corporate Sustainability and Growth: A Swedish Approach

Approach	Classic Definition	Areas of Agreement	Deviation(s)	Observations
<b>Platform Project</b>	In multi-branded platform development three distinctively different strategic forces that must be handled: (1) the creation of a common architecture; (2) accomplishing product differentiation within an expanded and multi-branded product scope; and (3) corporate responsibility in the transition from single-branded to multi-branded platform development.	There was general and complete agreement with the strategic approach to the development of a common platform for two brands.	In the process, however, the requirement manager was recognized as an essential element in development. Further, there was no obvious champion in the project.	The requirement manager's role fulfillment is performed through five major activities described as <i>positioning, developing a practice, anchoring, re-organizing, and routinizing</i> . These activities were essential in order to manage the change from working with small incremental project into working with a large flagship project.
<b>Intrapreneurship</b>	“the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization”, or “as entrepreneurship within an existing organization, referring to emergent behavioral intentions and behaviors of an organization that are related to departures from the customary”.	Definitely renewal. There was a form of discretionary control since the progress of each sub-project was in the hands of for example requirement managers, project controllers, time managers, and as in the case with the decision making process - it was in the hands of no one and everyone.	We missed out on the “slack resources” issue, rather the project came out of a formal strategic approach.	The service processes that we illustrate were not initially part of the project scope. Development of the decision making process was a necessity in order to make project progress. The three other processes rather became add-ons as it was found suitable to integrate these processes in the new project as some sort of complementary sub-projects. 1. Project controlling 2. Systems engineering 3. Time management 4. Decision making

3. Time management - The flagship project lasted over a period of seven years. This meant that actors in the project setting had to coordinate and integrate activities stretching between multiple actors in three organizations over a significant amount of time. When working in the projects, time managers created and maintained digital and physical charts

illustrating critical issues from a cross-functional and inter-organizational perspective with both long- and short-term planning in mind.

4. Decision making – Of most importance in internal service development was the decision making activities. There was a shared collective understanding of the need to manage the complexity of the new decision making process. Because of the three project cluster, shared decision making processes had to be developed and defined as project development progressed. Intra-project decision making processes were developed in collaboration with project members, and inter-project decision making processes were developed in collaboration between the CPMs. Finally, each CPM developed a shared decision making process in collaboration with their steering committees. The main point is that people in the organizations had to learn how to make decisions in the new context. For people in the organizations complexity was at its peak, and an approach to decision making was needed in order to make project process. All functional strategies were dependent on decision making. Therefore the decision making process became a form of meta-process that had an effect on all other processes. Nonetheless, since the decision making process had the character of being a meta-process (without a functional owner) it also meant that no one, but everyone had the responsibility to create the process that contributed to progress.

These processes are put into perspective in the lower section of Table 1.

### **Some Observations Unanticipated and Anticipated**

Of course one cannot generalize from case studies, but the ability they have to provide in-depth understanding frequently leads to further studies. Such was the case in this research. Perhaps as cultural peculiarities neither champions nor slack resources played a role in project conduct. That is, the observations of Chai et al. [11] and the relative importance that champions played in significantly enhancing performance in platform projects had led us to believe that a champion would be observed in this multi-project effort. In the study here, we found no evidence of a champion. We had thought that perhaps one of the CPMs or the requirement managers might fulfil the role, but the lead researcher put it succinctly – “no champions, just highly motivated individuals in a group”. Along the same lines, Russel’s [29] model suggests that intrapreneurship starts with an individual and is dependent upon having slack time in an organization (see Figure 1) – basically, a bottom-up initiation. In this multi-project case, indications suggested that it was a rather formal, top-down initiation. Further, we observed the interesting importance of developing a decision making formalism suitable for the project.

Our premise is that there is a cultural effect in both these observations along the lines suggested by Krieser et al. [23]. Present models tend to be U.S. developed and thus there is a natural tendency to compare results with these models. Actually, although U.S. Hofstede indices tend to be higher for each of the indices, the large difference is in masculinity (US 62, Sweden 5). This is what Hofstede [22] writes about that. “Sweden scores 5 on this dimension and is therefore a feminine society. In feminine countries it is important to keep the life/work balance and you make sure that all are included. An effective manager is supportive to his/her people, and decision making is achieved through involvement. Managers strive for consensus and people value equality, solidarity and quality in their working lives. Conflicts are resolved by compromise and negotiation and Swedes are known for their long discussions until consensus

has been reached. Incentives such as free time and flexible work hours and place are favoured. The whole culture is based around 'lagom', which means something like not too much, not too little, not too noticeable, everything in moderation. Lagom ensures that everybody has enough and nobody goes without. Lagom is enforced in society by “Jante Law” which should keep people “in place” at all times. It is a fictional law and a Scandinavian concept which counsels people not to boast or try to lift themselves above others”.

On the other hand, we found it attractive to look at this activity through both the lenses of platform project and intrapreneurship. In fact, most observations could be rationalized through one or the other of these models. A platform project model explained the dedication and seriousness with which these projects were conducted – the company was betting its future on them. Similarly, an intrapreneurship approach rationalized the degree of autonomy and upward push with which these projects were conducted.

As a postscript, we would argue that, in general, any type of business project would infuse intrapreneurial activities; however, flagship projects as studied here, in particular, infuse *parallel* and *collective* intrapreneurial activities since such projects call for significant organizational self-renewal. That is, Russel [29] defined characteristics of organic structures that generally undergird intrapreneurship:

1. Increased levels of autonomy
2. Increased discretionary control over resources
3. Informal communication in order to generate more ideas
4. Increased participation in decision making processes

From our point of view, these four items are generally linked to the characteristics of projects as described by Lindgren and Packendorff [24]. Nevertheless, the present tendency is to see projects as functioning within their own temporary organizations. Thus, although projects in general may add to the profitability of a firm, they may or may not affect its underlying structure and operations. On the other hand, a *flagship* project in the form of a platform project goes even further. They call for self-renewal in *all* parts of the organization. Among others, it demands changes in the organization’s technological approach, in the way people think of the organization, in the way engineers create the product, in the procedures of how manufacturing produces the product, in the way the purchasing department buys products, in the way aftersales functions are organized, in the way managers run the organization, and in the way the organization makes money. This significant amount of change is rarely seen in other types of projects.

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# **A COLLABORATIVE APPROACH TO FOSTERING MANAGEMENT TALENT STRENGTH FOR SMALL TECHNOLOGY AND TECHNICAL ENTERPRISES**

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## **ABSTRACT**

Small businesses are an engine for productivity and innovation in the US and world economies. But small technology firms also have challenges. With few managers or executives, they are faced with a dilemma: compete both technically and commercially with large firms through incorporating new developments and leveraging new management approaches, while carrying out everyday responsibilities and managing personnel. The need to keep up-to-date and be competitive can obviate the advantages of lean, agile management, such as self-organizing teams and effective management styles that boost morale and encourage innovation. We propose collaborations between small enterprises—in related fields but not directly competing — in an ongoing “loose” joint venture to enhance and develop the firm’s knowledge base of technical, management, and other capabilities, with the possibility of further collaboration in other areas.

**Collaborative education, SME management, incubators, industry-university collaboration**

## **INTRODUCTION — THE PROBLEM**

In interviews with small business managers and key personnel in technology or technical firms, drilling down to real concerns repeatedly reveals common shared issues: locating and keeping technical and management talent; team-building and morale; awareness of developments in technology, management practices, and business domains; developing market visibility (beyond websites and brochures) and relationships; and attracting capital. For technology or technically-oriented firms, these issues expand or refine the usual concerns in starting, establishing and growing a small business [2, 3].

Managers and executives in small enterprises are faced with a dilemma. On the one hand, there are developments in management practice and in other disciplines that need to be understood and incorporated to better attract and manage key personnel, stay competitive, and establish working and collaborative relationships with other businesses, institutions and researchers. On the other,

time, capital, and energy must be devoted to the ongoing multiple business activities, and cannot be committed to a time-intensive academic courses or an expensive third-party workshops.

This problem is exacerbated in small-to-medium engineering- or technology-based companies, typically founded by experts in the pertinent technologies, often with minimal business background, yet in which there are sound reasons not to transfer control to management specialists. These technology experts typically have deep knowledge in specific technical or scientific area and developed learning capabilities. They also have a strong drive to bring their product and passion to the market. Other start-ups are founded by creative types — self-described visionaries, idea-people or problem-solvers, often without experience in dealing with technical aspect or the nuances of sales and maintenance for technical, manufacturing or construction products and services.

Such enterprises have many advantages. They are focused on a perceived market niche or needed service, and are small and typically nimble, receptive to and reacting more quickly to change of which they are aware, and with a workforce that is fresher if less experienced, ambitious, and less ossified. In addition, these companies do not have the burden of historical pension and benefit obligations nor major replacement costs for outdated equipment. But, as they attempt to scale up and address more, larger or more complex projects, the lack of employee experience and the inherent lack of breadth of employee background, together with time constraints, pose problems that may be difficult to overcome. Growth also will require new and more sophisticated approaches to management of projects, personnel, and infrastructure. To stay competitive with larger firms, a small enterprise needs to keep abreast of developments, not only in core management and business domain, but in areas such as business analytics or the technological environment beyond the founders' and key employees' initial expertise and knowledge.

In a small company, moreover, time horizons are necessarily short, and more energy is used being reactive rather than in creating a vision, strategic planning or developing a knowledge and human resources base. Four problems dominate. First, there is a need to locate, recruit, maintain and motivate technologists and knowledge workers, and to promote their continued learning and development. Second, the small enterprise must, to remain competitive with larger corporations, be even more informed of new technological and methodological developments, and understand, evaluate and as appropriate acquire or incorporate these. Third, marketing, sales and maintenance (of both products and relationships) differ in several ways from the same activities, either for more standard products or for services and require expertise in these areas as well. Finally, while these other issues are critical, the leadership and management dimension cannot be ignored, which in turn means that executives must develop relevant business skills and be aware of new developments in that field as well.

Interviews with several entrepreneurs and managers confirm these observations, though with different perspectives depending on background. Sauber [14] suggests an important problem for managers is balancing their marketing, management and technical responsibilities. Schaffer [15], who approaches these problems as a visionary and problem solver, identifies both business and technical problems: developing sufficient engineering knowledge to introduce a technical product, locating and acquiring engineering talent, finding interested investors, and marketing a technical product. Mehta [7], who began in marketing and finance, identifies visibility, credibility and customer contact as important marketing and sales issues, and recruitment and even more retention of the best personnel as at least equally significant, with risk tolerance and resilience/flexibility as critical management dimensions. Vallone [16], with an accounting and finance background, calls issues with attracting, retaining and allocating technical talent key.

Lam [5], who began as a registered architect, sees his firm as technology brokers. Money is a key issue, not only for market competitiveness, but staffing and expertise even more so. Since salaries may not be competitive, and job security is substantially less, small business entrepreneurs must offer flexibility, interesting assignments, and contingent financial incentives (deferred payments, stock options and commissions for marketing and sales).

Mohtashami [8], with a technical background, identifies two problems as most important: first, attracting, maintaining and motivating talent as a major issue; second, maintaining a niche, by offering the unique or advanced services and/or products with high market desirability and demand. Others are awareness of technological developments and worker flexibility, not only within technical or business domains, but across that boundary. Further, there is clearly an overarching concern with leadership championing enterprise absorptive capacity and innovation. One final (anonymous) interviewee, a technical director of a defense company, believes that small technology companies must in the long run bring in an executive to help manage the overall business. Such an executive must be a domain expert, but also must understand the market and people management. In the absence of clearly defined and clearly communicated rules and expectations, employees develop their own interpretations and practices in conflict with company culture and policy. Beyond this, attracting and preserving talent is of tremendous importance; however, a highly motivated competent employee may be preferable to a brilliant but indifferent mind.

## **CONSTRAINTS AND DEMANDS ON SMALL BUSINESS LEADERSHIP**

Entrepreneurs running a small technically-oriented business has overwhelming and varied responsibilities — not just for management, but often lapping over into technical, administrative and even clerical tasks. They have too many demands on her time, with the potential lack of enough intellectual challenges and “no pause” to reflect and review priorities and no time for running and

participating in team retrospectives [4]. They face major overarching tasks focused externally and internally: securing funding and marketing on the one hand, and at the same time recruiting and managing technical knowledge workers and keeping the organization focused, efficient and delivering value.

Where the entrepreneur does not herself/himself come from a marketing background, marketing cannot rely entirely on specialists—both because the enterprise typically cannot afford a high-paid employee devoted strictly to marketing activity, and because the company is most often still in the process of establishing its reputation, and so will not benefit from a salesperson who is not acquainted with the technical aspects of company products or methods, and who cannot contribute to other activities when marketing is slow. (On the other hand, if the marketers are experienced in the field, they will demand higher compensation than the company can afford, especially if they also have active contacts. And the threat of such an employee leaving introduces high risk, no matter how careful both sides have been with contractual arrangements.)

On the other hand, if the entrepreneur doesn't have both a technical and a management background, managing knowledge workers also introduces problems. Knowledge workers' responsibilities may include research, ongoing learning and growth, informal marketing and developing relationships, selection of equipment or materials or support for such purchases, field work and customer contacts, analyses and documentation, and more. Since good knowledge workers are typically in short supply, budgeting time becomes quite tricky—there is often more work than people to do it, but focusing exclusively on task shortens the time that should be devoted to learning, growth, and developing relationships, which in turn leads to a shortage of projects and billable work. Further, knowledge workers often have different attitudes toward work incentives—valuing autonomy, intellectual freedom and flexibility, often as much as compensation and benefits, and being less than impressed with the traditional systems of awards and recognitions.

Marketing has its own flavor and requirements. These requirements becomes considerably more specific/rigid when the client the military or government or large organizations with rigid organizational culture. Moreover, capable marketing professionals are veterans, with a strong appreciation of the market needs, and its major players/interested entities who may be willing to utilize and pay for the product/services — but with less expertise on business, management or technical requirements, artifacts and processes. Their implicit, undocumented knowledge and informal contacts give them high value — but also high cost, typically beyond the reach of small enterprises, especially those in the technical field, where quality technical personnel and technical managers are in equally high demand. This introduces a dilemma: either marketing personnel need to get involved in technical and project activities, or market professionals or market insight and expertise must be shared.

Finally, the lack of time to explore and reflect means that the entrepreneur will have difficulty keeping up fully with trends and developments, including technical innovations, management

practices, and market and policy changes, and so may fall behind in marketing and/or technical management. The entrepreneurs, management and technical workers in the organization all need time, resources, environment and contacts to learn and develop further, in order to stay competitive and to be able to drive the company forward..

These challenges, however, are often not sufficiently recognized in most organizations. This is in part because of a perception that internal interactions, plus section/chapter meetings of professional organizations, and continuing education courses where required, suffice. The problem with this view is that in small organizations, there are often not large enough groups of specialists in any one area to create communities of practice [18] or promote discussion, while section/chapter meetings often have a technical focus that only partially matches the needs of small organizations. Moreover, all employees, and particularly managers, will need to perform a diverse set of tasks and address multiple problems. Managers in particular need to deal with tasks and activities from policy and personnel decisions to supplies and maintenance of the equipment. Further, technical managers also often need to address “clerical” mistakes, place orders, resolve financial problems, solve budgetary needs, institutionalize new regulations, and many more.

## **A SOLUTION**

Developing small enterprises can make use of university resources, from individual faculty or research groups through workshops to incubators such as the NJIT Enterprise Development Center [9, 12]. This can be supplemented with free or low-cost on-line webinars or free online courses [1], self-study, followed by brainstorming sessions, focus groups, or team learning activities or using resources such as [13]. However, as one interviewee notes, “the 10% guidance that I get from NJIT is invaluable and effective. But I need much more” [15]. University and related resources and support can be helpful in four main dimensions: management knowledge, infrastructure knowledge (particularly relating to the computing and software environment), domain knowledge, such as civil engineering, conference organization, or device manufacturing, and last but not least knowledge about legal, regulatory and standards requirements and processes related to any of the above.

In many locales and domains, however, there is a critical mass of enterprises that can share in workshops and seminars, either sharing insights and expertise from inside the organizations, or leveraging academic or professional contacts. The mix of executive background and talent—business, technical and creative—can be a distinct benefit when the emphasis is on developing broad-based expertise. This must be complemented by the support from experts across a spectrum of knowledge domains, including experts resident at each of the participating institutions. Depending on the needs and situation of an enterprise as well as the expert domain involved, the greatest benefit can come by hiring or contracting experts or outsourcing expert tasks from

exclusive short-, or medium-term access to an expert or consultant, or from shared workshops and ongoing interaction with an expert or team by a group of cooperating businesses.

While this kind of collaboration or ad-hoc consortium has occurred regularly for years for groups of public libraries (see for example [6, 10]), and is not unknown in academia — though usually addressing a specific subject or administrative concern — it is much less common in for-profit situations. It is however much easier in the library world, since public libraries are not in competition for customers and in only limited competition for funding—their interests are best served by acting together in interacting with municipal and state governments—and academic libraries likewise are not in competition although their institutions may be. Even in these settings, however, there is a tendency to complement and partially replace cooperative workshops and seminars with webinars and tutorials [11, 17].

Nonetheless, there are evident advantages to this approach. The additional focus and knowledge, together with savings in time and effort and gains in morale and effectiveness, will allow companies to achieve and maintain a market niche, and companies and consortia to develop critical knowledge, personnel and resource bases.

## CONCLUSIONS

Small firms, especially those that are technology-driven or producing technology, are under many challenges. One of the most serious is that entrepreneurs and managers must understand management, infrastructure and domain, including processes and relevant rules and standards, and keep up with relevant developments on all fronts. In this paper we have summarized a set of challenges identified through a series of local interviews. We have analyzed the data, looked for patterns and commonalities and have proposed a combination of collaborative and university-driven activities and resources that can ease this burden, while supporting coalition-building, creation of relationships and market visibility.

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## **A Proposed Framework for a Two-Stage Process to Design and Implement a Business Strategy**

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### **Abstract**

This study proposes a framework combining the Five Forces and Value System models of Michael Porter with the management and implementation methodologies advocated by Norton and Kaplan in the Balanced Scorecard. Using a two-stage framework for combining business strategy with a management and implementation strategy, we first utilize the five forces model to determine a value proposition based on the specific industry's competitive structure. We then combine that with Norton and Kaplan's Balanced Scorecard and create a value system that effectively and efficiently can deliver the product or service to the market. While Porter designs a conceptual model, Norton and Kaplan propose an implementation strategy which maps, measures, and communicates both operational and financial targets throughout the organization. The combination of these models has the potential of enhancing the competitive position of the organization in an industry.

# Comparative Studies of Health Care Systems: Taiwan and the United States of America- Past, Present, and Future

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## Abstract

The healthcare system of Taiwan was developed after analyzing the top healthcare systems from around the world. The result is a very successful system with high effectiveness and user satisfaction. However, Taiwan is still facing many of the same problem of balancing cost as other developed nations. U.S. observers can see how effective implementation of organization and equity of the health care system can be maintained while maintaining a free-market approach.

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## Overview

Table 1. Comparison in health related statistics between the USA and Taiwan (CIA, 2013; Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009).

	USA	Taiwan
<b>Population</b>	314 million	23 million
<b>GDP per capita</b>	\$48,386	\$16,353
<b>Health Care Costs per capita</b>	\$7,146	\$1,126
<b>HCC/GDP</b>	17.6%	6.9%
<b>Administrative Costs</b>	15-20%	2%
<b>Uninsured</b>	16.3%	1%
<b>Public Approval</b>	Public Dissatisfaction: 72% for access, 50% for quality	Public Satisfaction: 85.2%
<b>Life Expectancy</b>	76.05(M)/81.05(F), 50 <sup>th</sup>	75.66(M)/81.53(F), 51 <sup>st</sup>
<b>Infant Mortality Rate</b>	5.98/1,000 live births, 49 <sup>th</sup>	5.10/1,000 live births, 44 <sup>th</sup>

## Introduction

In 2010, the U.S. spent 17.9% of GDP on healthcare (WHO, 2013). In 2010 U.S. census bureau reported 16.3% of people without insurance, 49.9 million. Even by the year 2022, 8 years after the implementation of Patient Protection and Affordable Care Act (PPACA), commonly called “Obamacare”, the number of uninsured will still be around 30 million, or just under 10% of the population (Bureau, 2013; Wikipedia, Health care in the United States, 2013). Also, many of those covered will be covered under Medicaid, which many consider to shift the number of uninsured to a growing number of underinsured. Despite the U.S. system's exorbitant spending and highly advanced acute care system for the affluent, the poor job of treating chronic disease and the gap in care from the high socioeconomic class from the low socioeconomic class leaves the overall health picture to be average when compared to other developed nations. The

U.S. system is fragmented and has many different special interests which prevent the health care system from taking organized steps in improving efficiency to rein in costs.

In determining how the U.S. can lower costs and improve care, there are many examples from around the developed world who, while not perfect, have achieved such a goal. The graph below shows health care spending as a percentage of GDP for some developed nations from the CIA Factbook (CIA, 2013). As it can be easily seen, the U.S. is vastly outspending it's the nearest countries by a significant margin. One country with an interesting health care system is that of Taiwan, seen on the right side of the graph. As compared to the U.S. which spent 17.6% of GDP in 2010, Taiwan only spent 6.9% (CIA, 2013). This paper will explore the Taiwan healthcare system and determine if there are any lessons to be learned with application to the U.S. healthcare system.

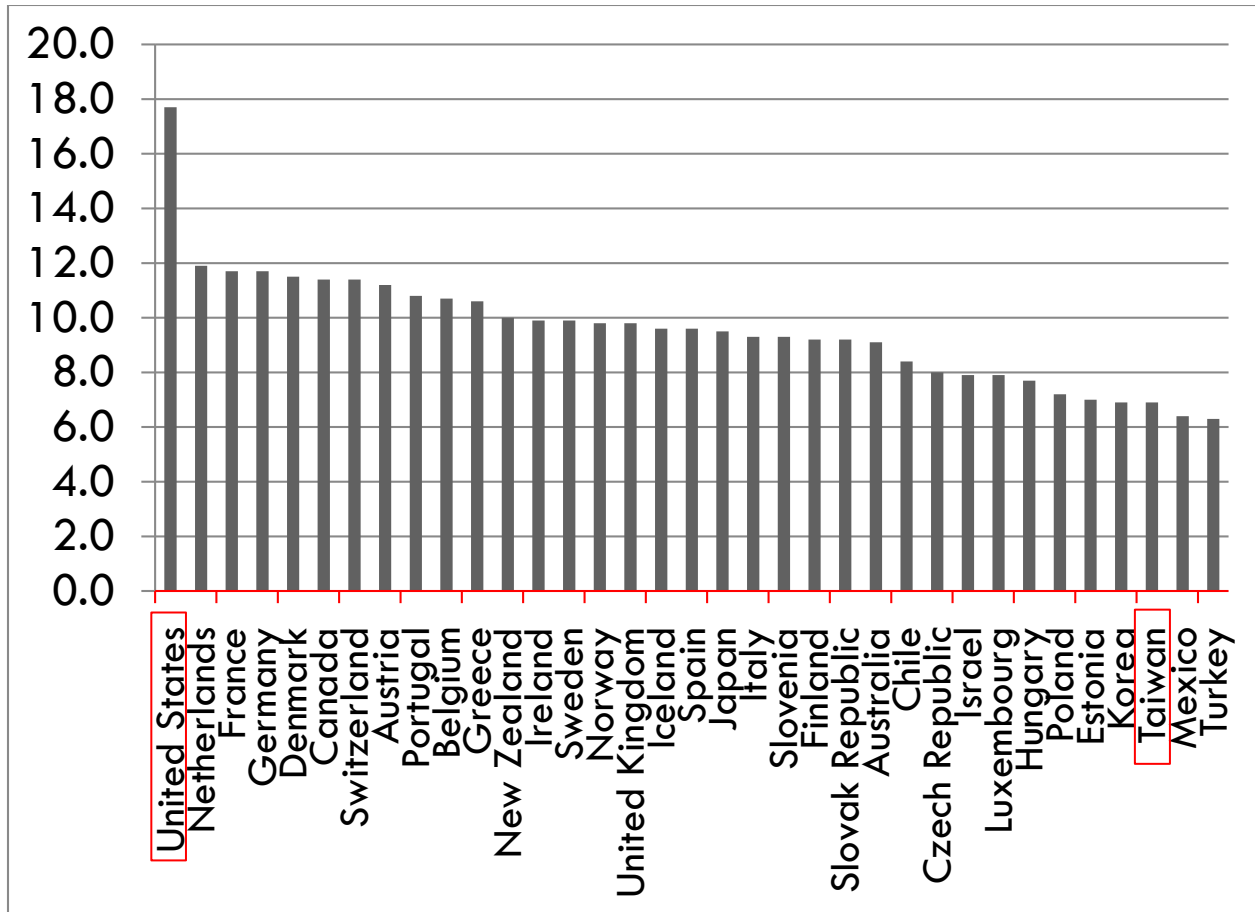


Figure 1. Health care spending as a percentage of GDP for industrialized nations.

## Overview of Taiwan

Taiwan, officially the Republic of China, is a small island state off the coast of China (including some smaller islands that make up 1% of its territory). The 'state' has had a tenuous status since its inception in 1947 through the Chinese Civil War with mainland China considering it under its authority. The island's population is 23.3 million people, on 36,193 km<sup>2</sup>. Taiwan's capital of Taipei, the most populous city of 2.6 million people, is located in the north of the island. The small island is home to the 19<sup>th</sup> largest economy of the world and ranks highly in terms of public education, health care, human development, freedom of press, and economic freedom (Manthorpe, 2008; Wikipedia, Taiwan, 2013).

## History of Taiwan

From 1895 to 1945, Taiwan was under the rule of the Japanese Empire. Its people were a mix between the native populations, Japanese, and Chinese. Following the end of World War II, Taiwan remained under Japanese rule (Manthorpe, 2008). China at the time was still undergoing a civil war between the Kuomintang (KMT) and the Communist Party of China (CPC). The war started in 1927, with a hiatus from 1937 to 1946 wherein both sides joined forces in fighting the Japanese invasion of mainland China during that period. In 1946, the civil war resumed between the KMT, led by Chiang Kai-shek and the CPC, led by Mao Zedong (Manthorpe, 2008). By 1949, the CPC had overrun the KMT forces and Chiang Kai-shek. With 2 million of his supporters and much of China's wealth, Chiang Kai-shek fled to Taiwan, declared martial law and established a new capital on Taipei with the intentions of regrouping and retaking the mainland. In 1952, Japan formally renounced all territorial rights to Taiwan in the San Francisco Peace Treaty (Manthorpe, 2008).

Taiwan was run by a single party system for 40 years. It was not until Chiang Kai-shek's son, Chiang Ching-kuo, who in 1972 succeeded him as Premier, that authoritarian rule was relaxed. He allowed for political dissent and allowed for native Taiwanese to enter the ruling party. His successor, Lee Teng-hui, a native Taiwanese, followed Chiang Ching-kuo and became Premier in 1988. It was under his rule that Taiwan changed from an authoritarian regime to a democracy. He led the first democratic election for president in 1996 (Manthorpe, 2008). Democracy has flourished in Taiwan since 1996 and remains strong.

## Economy of Taiwan

WWII along with the Chinese Civil War led to very poor economic conditions in Taiwan from the early to mid 20<sup>th</sup> century. There was severe inflation as well as corruption. To take

control of the situation the KMT took over the Japanese monopolies in Taiwan, quickly nationalizing around 91% of Taiwan's GNP. Also, the KMT was able to take the entire gold reserve from mainland China with them to Taiwan to back the newly-issued New Taiwan Dollar, stabilizing the new currency and preventing hyperinflation (Chan, 1997) (Manthorpe, 2008). The KMT were also given a boost from the United States of America through the China Aid Act and the Chinese-American Joint Commission on Rural Reconstruction, providing financial and military assistance as well as economic cooperation. From 1950 to 1965, Taiwan received \$1.5 billion in economic aid and \$2.4 billion in military aid from the USA. By 1965, aid from the USA ended as Taiwan was deemed to have a solid financial base (Chan, 1997) (Manthorpe, 2008).

In the 1950's, the KMT worked on far-reaching land reform through two major acts, which alleviated the tax burden on peasants and redistributed land among small farmers. The large landowners were compensated with stock in state-owned industries and commodities certificates. These acts were successful as it elevated the lower class and gave incentive for the large landowners to use their compensation to begin commercial and industrial enterprises. Taiwan also invested heavily in universal education to help engage all parts of the population, whether they be from the higher or the lower class. Coupled with the businessmen who had fled with the KMT, this group was able to transition Taiwan's economy from agricultural to a commercial-industrial (Chan, 1997; Manthorpe, 2008).

In the 1970's, the KMT surveyed Taiwan and its position in the world and came to the conclusion that there were ten key areas of infrastructure that needed to be addressed for Taiwan to succeed as an export driven economy. In 1974, under Chiang Ching-kuo, Taiwan introduced the Ten Major Construction Projects. These projects were comprised of six transportation



projects, three industrial projects, and one nuclear power plant construction project (Chan, 1997) (Manthorpe, 2008). These projects as well as other national directives helped Taiwan's economy to grow at in excess of 7% from the 1960's to the 1990's (Kuo & Liu, 1999).

Taiwan's economy has shifted from labor intensive industry, such as toys and textiles to heavy industry and infrastructure in the 1970's to advanced electronics in the 1980's. In the 1990's, 2000's and 2010's, Taiwan has continued a focus on the tech industry, currently being the leading LCD panel, DRAM computer memory, networking equipment, and consumer electronics manufacturer (Greene & Ash, 2007; Manthorpe, 2008).

With such solid growth and strength as an exporter, Taiwan was dubbed one of the Four Asian Tigers, along-side Hong Kong, South Korea, and Singapore. With its entrepreneurial strengths, expansion of its trade partners, and a conservative and stable financial policy, Taiwan managed both the Asian Financial Crisis of 1997-1999 and the Global Recessions of 2001-2002 and 2008-2009. In 2011, the GDP of Taiwan was \$466.8 billion, with a per capita GDP of \$21,900 (CIA, 2013).

## **Development of National Health Insurance**

Health care has always been seen as a right in Taiwan. Some attribute it to their culture, with Confucianism promoting the idea that the government has to take care of its people, no matter what (Adams, 2009; Zhang, 2010). After enjoying decades of double digit economic growth, Taiwanese citizens entered the 1990's at a point where they could make this ideal a reality. Before 1995, there were a range of insurance schemes covering around 57% of Taiwanese citizens, leaving 43% uninsured. Also, these schemes were varied and often had high copayments (Lu & Hsiao, 2003; Adams, 2009; Wu, Majeed, & Kuo, 2010). This time period

coincided with political developments which were leading to the first presidential election for Taiwan, set to take place in 1996 (Manthorpe, 2008). Before the election, the ruling KMT wanted to ensure the passage of a national health care system (Adams, 2009).

In the early 1990's, under the KMT, the government realized they had a blank canvas to use to develop their ideal health care system. This ideal system had two main goals: providing equal access to health care for all of Taiwan's citizens and controlling health care spending to reasonable levels (Lu & Hsiao, 2003). Thus, they spent more than 7 years consulting experts from around the world and visited more than 10 countries to determine which elements of these health care systems would work for Taiwan's goals. After years of analysis, the government decided on a government-run, single-payer system with universal insurance coverage and titled it the National Health Insurance (NHI), to be run by the Bureau of National Health Insurance (BNHI) (Cheng, Taiwan's new national health insurance program: Genesis and experience so far, 2003).

The single-payer system allowed Taiwan to retain its fondness for the free market for providers. By having the NHI set prices for treatments, price-competition was removed from health care, pushing the focus competition on quality. Also, by having a single entity insuring all citizens and setting all standards, administrative costs are an astonishing 1.5% of health care spending. Furthermore, with a high level of coverage for all citizens, total healthcare spending as a percentage of GDP is only 6.9% (Adams, 2009; Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009).



Figure 2. Photos of an outpatient clinic, a small hospital, and a pharmacy selling both Western and traditional Chinese medicines all advertising the NHI as all types of care are covered by the system.

## Coverage

One of the founding principles of the NHI was equal access to health care for all of Taiwan's citizens. Yet, before its inception, only 57% of citizens enjoyed insurance coverage (Lu & Hsiao, 2003). Under the NHI, enrollment is compulsory for all citizens and legal residents, and coverage rates have reached and maintained 99% of Taiwan's 23 million citizens (Adams, 2009; Wu, Majeed, & Kuo, 2010; Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009). Taiwanese citizens who live abroad are also covered by NHI, though they must pay the

premium. Also, foreign nationals with legal residence in Taiwan are allowed to join the NHI through their employer (Wu, Majeed, & Kuo, 2010; Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009).

## **Benefits**

In accordance with the founding goals of the NHI, a uniform package is afforded to all citizens. This package includes inpatient care, outpatient care, prescription drugs and certain over-the-counter drugs, dental services, Traditional Chinese Medicine, daycare for the mentally ill, and home nursing care (Bureau of National Health Insurance, 2012). The NHI also covers 60 days of end-of-life care, either at home or in a hospice or hospital (Adams, 2009). Furthermore, the NHI benefits are very extensive within each area. Patients expect and are able to see a physician (including specialists) on the same day or within a few days without having to obtain a referral. Also, elective surgeries are booked within a few weeks (Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009).



Figure 3. Photographs taken from Taipei Medical University Hospital Department of Traditional Chinese Medicine including the entrance, the pharmacy, and the treatment room.

## Providers

NHI coverage has also been successful in being able to enlist 92% of providers to accept NHI patients at the NHI universal fee schedule. Physicians, hospitals, pharmacies, and any other health provider is not able to charge more than the universal fee schedule. By controlling access to the nearly all of the patients in Taiwan, the NHI hold significant leverage to keep most providers in line. While some may argue that this stifles competition, the purpose put forward by the NHI is that it redirects competition from prices to quality as the major way left for providers to compete for patients is quality (Bureau of National Health Insurance, 2012; Cheng, Interview:

Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009).

### **Administration**

The NHI has one of the lowest administrative costs in the world. As a result of being a single-payer system run by the government, administrative costs are only 1.5% of total health care spending (Adams, 2009; Wu, Majeed, & Kuo, 2010). The administrative costs go into many functions such as maintenance, innovation, and the function of a panel review system of medical records and new treatments to keep costs down. While the low administrative costs are a major success of the system, some argue it is too low and could do more if it had more funding, which will be discussed in a later section (Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009).

### **Financing**

Revenue for the NHI comes from 4 main sources. The first a "sin tax" on tobacco products. Although the rate of smokers in Taiwan is just over 20%, there was not much backlash from the imposition of the tax on tobacco products (Wikipedia, Healthcare in Taiwan, 2013; Adams, 2009; Wu, Majeed, & Kuo, 2010). The next revenue source is from lottery revenues, which do not all go towards NHI. The next source is copayments, which are generally modest, but with the high utilization rate of services adds up. For example, copayments for clinic visits, are extremely low at <\$2 US. The last and main source is from a payroll-based premium. This premium is shared by differing combinations of employers, employees and government through a payroll tax. An example of this breakdown for private sector workers, the employer covers 60%, the employee covers 30%, and the government covers the remaining 10% (Bureau of

National Health Insurance, 2012). The total insurance premium for employed workers is 4.6 percent of wages. That's much lower than in the United States, where the average is between 12 and 20 percent of wages for those who are covered by their employers (Bureau of National Health Insurance, 2012; Cheng, Taiwan's new national health insurance program: Genesis and experience so far, 2003; Wu, Majeed, & Kuo, 2010). The most important factor in the financing of the NHI is that it has its own revenue streams that are not under direct control of the government. The developers of the NHI were very cautious of allowing the revenue for the NHI to be shared with other programs for fear that under times of economic strain, the NHI would face funding cuts.

## Payment

As discussed previously, the NHI was able to put together a uniform fee schedule under their global budget. The fee schedule is revisited every two years for analysis and updates, the various providers are included in the process as it relates to them. The payment system is mostly fee-for-service with some bundled payments similar to the U.S. DRG system for certain hospital admissions, known as Tw-DRG. As discussed previously, the premiums are divided amongst the employer, employee, and government. Copayments were instituted to generate revenue and discourage overuse, however, the rates are so low they do not contribute much to either goal. A typical emergency room visit holds a US\$5 copayment, a clinic visit holds a US\$1.70 copayment, and for hospitalizations, there is a ceiling of US\$933 copayment per stay and total of US\$1,567 copayment for the entire year for the same disease. For those patients that are of low income households, veterans, or children under 3, they pay no contributions for insurance and there are premium and copayment subsidies for the disadvantaged (Bureau of National Health Insurance, 2012; Cheng, Interview: Lessons From Taiwan's Universal National Health

Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009; Cheng, Taiwan's new national health insurance program: Genesis and experience so far, 2003).

## **Innovations**

One major innovation is the NHI Card smart card, which contains patients' basic medical data and the data from their last few visits (Adams, 2009). The card is also used to schedule appointments, and can be used in any clinic or hospital in Taiwan (Adams, 2009). When swiped at a clinic or hospital, the card accesses a unified national database. This database can then be used to track health trends, such as outbreaks, collect statistics, or monitor quality metrics and patient usage (Adams, 2009; Wu, Majeed, & Kuo, 2010).

## **Taiwanese Culture**

One asset of the Taiwanese health care system is the Taiwanese culture itself. Being of East Asian decent with strong influences of Buddhism, Taoism, and Confucianism. These influences share a common theme of moderation and compassion (Zhang, 2010). These qualities were only strengthened by Taiwan's contentious history. Overall, the Taiwanese have incorporated frugality into their culture. One major example is their emphasis on public transportation. The public transportation infrastructure is excellent. There are trains that can transport people all around the island. Within the cities there are a well developed subway system and public buses with their own lanes which allow them to be much quicker than a personal car or cab during heavy traffic. They have also introduced YouBike, a bike rental system that uses the same card as the subway and the buses (Lin, 2009).

Also, in regards to lifestyle, they avoid excess. In reviewing the literature, the reported obesity rate in Taiwan is 17.9% (Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009; Lu &



Hsiao, 2003). While this is only half of the U.S. rate of 35.9%, walking the streets of any city in Taiwan, it would be a challenge to corroborate this rate. The reason for this discrepancy is that Taiwan uses a different cutoff of body mass index for obesity (25, as opposed to 30 used in the U.S. and much of the rest of the world). Therefore, in Taiwan, while 17.9% of people are overweight, only 4% are obese (by U.S. standards) (Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009) (Lu & Hsiao, 2003). This low rate reflects how the population's culture has such a positive effect on health, as with lower rates of obesity, there are lower rates of diabetes, heart disease, and other diseases.

The public's involvement with physical activity and healthy living is supplemented with mental health through meditation. Taiwan has many nondenominational buildings available for people to meditate at any point during the day, in efforts to spare a few moments to improve their mental health. Furthermore, the Taiwanese people are more willing to be inconvenienced in the hopes of having efficient health care. This difference allows the healthcare system to work in a more pragmatic manner without resistance at every step.

## **Current Issues and Future Directions**

The NHI enjoys an 85% satisfaction rate among the Taiwanese (Adams, 2009; Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009). Such a high approval rating is a source of pride for the NHI and the Taiwanese government. However, such a high approval rating has made it extremely difficult to make any changes on the beloved system. Since becoming a democracy, many politicians see it as detrimental to their careers to make significant changes to

the system that would be portrayed as negative on the NHI, either limiting services or increasing premiums or copayments.

While Taiwan's health care system has done an excellent job at providing care for the entire population, there are some issues that the NHI must address in the coming years to maintain the success. The first issue is that the system is over burdened. On average, patients have 14.59 outpatient visits per year in Taiwan. This rate is even higher in the elderly, so much so that clinics have become lively social scenes for them (Adams, 2009; Wu, Majeed, & Kuo, 2010; Bureau of National Health Insurance, 2012; Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009). It has gotten to the point of social satire, there is a popular joke: "A bunch of elderly patients are sitting in a clinic; one looks around and asks 'Where's Old Mr. Lin?' Another responds: He couldn't make it today, he's sick" (Adams, 2009). This has also led to physicians such as primary care physicians seeing up to 50 patients in a morning with visits lasting as short as 2-5 minutes (Adams, 2009; Chang, Lin, & Aron, 2012; Wu, Majeed, & Kuo, 2010). There is also, no gatekeeper system, so there is also a high volume of patients seen by specialists (Wu, Majeed, & Kuo, 2010). There is, however, no plan to implement a gatekeeper system in the NHI. The Taiwanese are very tied to the idea that they can see any physician at any time without preapproval.

Another set of issues stems from the low level of spending on the system. Many argue the administrative costs may be too low, leading to missed opportunities for research and development (Adams, 2009; Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009). The low costs of the system have also had an impact on nurses and physicians, which are at rates of

4.5 nurses per 1000 population, compared to 9.6 per 1000 in wealthy OECD nations and 1.7 doctors per 1000 population, compared to 2.64 per 1000 in wealthy OECD nations (Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009). These rates reflect the dissatisfaction of both nurses and physicians under the current reimbursement system. The shortage of nurses has led to closure of wards of hospitals due to lack of staffing.

Underfunding has been found to be partially the result from an unintended consequence of the premium payment scheme, which currently favors of some individuals from higher socioeconomic classes. To correct this issue, the payment scheme for the premium will be modified to include all monthly income, not just salaried income, i.e. income from rent, capital gains, etc. This modification will not only ensure greater equity, but improve revenue for the NHI (Bureau of National Health Insurance, 2012). Another source of increasing revenue and reducing overuse being considered by the NHI is increasing copayments. The proposed changes would increase copayments for clinic visits, which would not impact the disadvantaged as their copayments would still be waived (Bureau of National Health Insurance, 2012). The issue is that the NHI must contend with their 85% approval rating. The last time premiums and copayments were increased, approval dropped to below 70% (Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009).

Another set of issues facing the NHI stem from the reliance of the Taiwan health care system on a fee-for-service model. While there are some methods in place to disincentivize providers from trying to increase volume solely for the interest of payments, these methods have not had enough of an effect. One example of these methods, which is directed to primary care

physicians, reduces payments on subsequent patients after they reach a certain number of patients in one day (Bureau of National Health Insurance, 2012). To address this issue, another method for reimbursement being explored is the pay-for-performance model. Under this model, payments are aligned with specific health care goals to improve the delivery and quality of care. While pay-for-performance programs have not been clearly shown to be beneficial in patient outcomes, as providers quickly learn how to "game the system," however, they are accepted as a step in the right direction. Currently, there are trials of such a system, however, the NHI is facing the same challenges of determining which diseases to monitor, which patients to include, and which outcomes measures for those diseases (Bureau of National Health Insurance, 2012; Chang, Lin, & Aron, 2012).

### **Application to the U.S. System**

When considering what can be learned from Taiwan's health care system in hopes of improving the US' system, there are many fundamental differences that prevent implementation of a variety of elements of NHI. Firstly, the U.S. system is encouraging the development of accountable care organizations (ACOs) through incentives under the Patient Protection and Affordable Care Act (PPACA). One goal with ACOs is to establish capitation as a more common reimbursement scheme in efforts to remove the incentive of fee-for-service for volume and replace an incentive for quality and maintaining health. To maintain the free-market in the U.S. system with capitation, the competition will be between ACOs (Wikipedia, Health care in the United States, 2013). In Taiwan, with a single payer, implementation of capitation would essentially turn their system into one similar to that of the UK's NHS, thus the NHI has not utilized capitation to any significant degree.

Though the U.S. has taken a divergent view of health care reimbursement than Taiwan, there are still important lessons to be learned. The first is that for any health care system to work well, all citizens need to enter the risk pool for cross-subsidization among diverse groups with not only different health status, but also socioeconomic status. Another principle to be appreciated from Taiwan and the NHI is the ability and effectiveness for a single payer system to reduce much of the waste from the fragmented and disorganized system the providers must navigate to function (Cheng, Interview: Lessons From Taiwan's Universal National Health Insurance: A Conversation With Taiwan's Health Minister Ching-Chuan Yeh, 2009). Also, the single payer system allows for setting a standard pricing schedule for care, removing much of the inconsistencies that plague the U.S. system and afford it the ability to collectively bargain with suppliers in lowering costs for pharmaceuticals and other medical supplies.

The changes made through PPACA take some steps in the proper direction in meeting some of these principles. However, with the health care industry accounting for nearly one third of the U.S. economy, there are many formidable industries that are not interested in any change that may have a negative impact on their current financial success. If the U.S. wants to have a sustainable system for coverage of all of its citizens, major changes are necessary and most of these large industries must be overruled by the voting public.

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# **THE JAPANESE HEALTH CARE SYSTEM: STRENGTHS AND WEAKNESSES FROM THE AMERICAN PERSPECTIVE**

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## **ABSTRACT**

Japan's health care system is analyzed with focus on the iron triangle of costs, access, and quality. Special analysis is made on Japan's pricing and insurance regulations, as well as factors affecting quality outcomes throughout the nation. A critical analysis is made of the system with recommendations for reform that would result in reduced utilization, reduced costs, and a greater focus on preventative medicine. Strengths of the Japanese system are noted as opportunities for reform within the health care system of the United States.

## **INTRODUCTION**

Health care reformers excel at committing the *post hoc ergo propter hoc* logical fallacy when comparing health care systems to that of the United States. The thinking goes that 'because many industrialized nations spend far less on health care, and because many of these nations have longer life expectancies, reduced infant mortalities, and lesser incidence of obesity, therefore, their health care systems must be superior to that of the United States'. A nation's health care system is a major variable in determining a population's health, but not the only one. Researchers should be careful not to over-attribute and commit a post hoc fallacy. This paper studies the health care system of Japan, with specific analysis of the iron triangle of cost, access, and quality. In each of these discussions, careful analysis is made as to Japan's strengths and weaknesses with emphasis on how that nation's health care system relates to the health care system in the United States. Following this, a critical analysis is made of the system as a whole, with recommendations for reform that would fulfill the second iron triangle of health care -- the iron triangle of reform. Most industrial nations' health care systems can be made stronger by focusing on the three areas that complete this second iron triangle: 1.) reduced utilization, 2.) reduced costs, and 3.) a greater focus on prevention. For example, even a nation that spends half as much as America on its health care system is facing a cost crisis that is placing major strain on its providers. Each of the sides to this second iron triangle is well illustrated by examining the Japanese model.

Note that many monetary figures are used in this paper. In most instances, I have converted Japanese yen to American dollars (November, 2013 conversion rates); however, there are some instances when it is proper to discuss a topic in terms of yen, in which cases the conversions have not been made.



## **COSTS: HOW HEALTH CARE IS PAID FOR IN JAPAN**

When a Japanese citizen goes to the doctor for a routine service, she goes to a private sector provider and her treatment is paid for from a mix of public and private accounts, depending on her employment and financial situation. This routine is not all that different from the experience of an American citizen, yet the price this Japanese citizen will pay is astonishingly less. This is due to two unique features of the Japanese health care system. The first is a complete lack of competition in the Japanese health care marketplace which is caused in part by the second feature: tight governmental controls over the pricing of care. A careful analysis is necessary from the perspective of the Japanese insurance industry, medical providers, and a mixture of central and local government actors:

### **Insurance Pricing**

The Japanese insurance industry operates in private hands. Insurance plans are exclusively non-profit. Despite government's heavy hand in regulating pricing and forbidding insurance profits, the Japanese have over 3,500 health insurance plans at their disposal [14]. Coverage typically falls within three categories:

1. Citizens employed in the private sector by large corporations (as well as some public sector employees working for large agencies) split their insurance premiums with their employer. Employees kick in around four percent of their salary as a premium, but max out at \$6,000 per year. The average employee's annual premium is \$1,931. This is much less than the \$3,354 average premium that exists in the United States [3]. The employer typically pays for 55 percent of the cost of medical procedures and services. These plans receive no public subsidy. Many large employers such as Toyota and Sony save on health care costs by operating hospitals exclusively for their employees. This practice is similar to the strategies adopted by businesses in the United States during and after the industrial revolution [18].
2. Coverage for employees of small companies is split by the employer and the employee with a limited government subsidy that averages to around fourteen percent.
3. All other citizens who are self-employed, retired, or unemployed are enrolled into the Citizens Health Insurance Plan (also called the National Health Insurance plan or "NHI"). Costs for this insurance plan are shared by the citizen and the local government [14].

Public subsidy for health insurance coverage varies from plan to plan, but is based at the local level of government. This is unique among developed nations. Each local government can make tweaks and offer optional coverage depending on its financial ability. For example, many local governments fully subsidize care for children [3]. Pregnancy and childbirth, which are not covered by health insurance in Japan, are typically paid for with the help of local government grants given to pregnant women that average around \$3,000 [14].

Japan's individual mandate means that every citizen has health insurance. Each person must select a plan. If someone fails to enroll into a health plan, his local government will assign him one. If he does not pay his share of the premium, the insurance company may pursue an aggressive collections process. If he loses his job, he stays enrolled in the plan and government picks up the employer's share of the tab until he is employed once again [14].

### **Provider Reimbursements**

In an age where exploding health care costs are choking public budgets globally, the Japanese central government has managed to restrain growths in health care costs to less than two percent annually. This stands in stark contrast to the health care cost inflation being experienced in the United States, where Medicare and Medicaid budgets are experiencing unsustainable growth rates of six to eight percent and outpacing the growth of revenue generation or the growth of the GDP [12]. Japan has achieved this modest growth rate through very aggressive and risky measures taken by the central government, including maintaining a vice-like grip on provider reimbursements. These strategies are proving to be short-term quick fixes and come at a very detrimental cost to the provider community [7].

Pricing for health services in Japan is determined through biennial negotiations between the central government's Ministry of Health and Welfare and medical stakeholders. These negotiations result in the publication of the *Shinryo Tensu Hyakumihyo* or "Quick Reference Guide to Medical Treatment Points" [14, p. 90-91]. This guide sets the reimbursement rate for every medical procedure, treatment, technique, and therapy that providers can legally provide within the country. This list is hard fast, non-negotiable, and applies to every provider whether they are a pharmacy in Tokyo or a general practitioner in Kyoto. If the reimbursement for a procedure or service is set at ¥100, for example, then that same price is paid to a provider in a large city or in a rural island off the mainland without regard for differences in cost of living. There is no variation in pricing for a specialist or a general practitioner to perform a given a service. Regardless of who it is, the price is standard and tied directly to the service being offered.

Insurance companies reimburse medical professionals for services based on the price points appearing within the *Quick Reference Guide to Medical Treatment Points*. This means there is no need for negotiations to take place between insurers and providers. It means there is no competition for who can provide the lowest rate. Most importantly, it means that significantly less money is spent on the administration of health plans [3].

T. R. Reid found that a total shoulder replacement in a Tokyo hospital including a five-night inpatient stay and meals will cost around \$10,000, which is less than one quarter the price of the same procedure in the United States with only one night in a U.S. hospital [14]. Of course in the United States that procedure may be reimbursable with one bundled payment for the entire episode of care. This incentivizes the hospital to minimize the length of the inpatient stay and decrease some auxiliary services, procedures, equipment it may have used had it been able to

charge for each individual item in a fee-for-service system. In Japan, that fee-for-service system and very low reimbursement rates incentivizes the hospital to maximize utilization -- hence the unnecessary five-night stay. Broken down, we find that a one night stay in a Japanese hospital with a private room and meals is reimbursed by the central government's standard rate of \$105 as printed in the Quick Reference Guide [14]. This is pennies compared to a night in a U.S. hospital.

Patients in Japan are responsible on average for thirty percent of a provider's bill. The other seventy percent is covered by a combination of the employer or the government depending on the situation of the patient [6]. Children, the elderly, and individuals with disabilities pay less -- usually around ten percent. In the rare instance that someone seeking care is uninsured, the government picks up the employer's portion of the tab and then automatically assigns the person to a health plan if he refuses to select one. Patients are capped at out of pocket expenses of \$650 each month [14]. Even if the patient is seeking an expensive surgery that costs \$12,000, their co-pay is still no more than \$650.

A patient's trip to the doctor's office in Japan is very different than the experience of an American patient. Much of this difference centers on the pricing controls present within the Japanese health care system. A patient will be one of about 150 individuals who see that doctor on any given day [5]. She will show up to the doctor's office without having made an appointment first. She will park in the parking lot beside her doctor's office. In the waiting room there is likely to be multiple vending machines or other auxiliary products and services for sale. She will be one of dozens in the waiting room. The wait may last several hours. Once her name is called, she will get between just three and five minutes with the doctor [14]. After her three-minute appointment, the doctor will rush her out to see the next person. Her visit may also include more face time with a nurse or other non-physician practitioner if her condition requires it. After her visit, she will take the prescription scripts to the front desk in the lobby. From there, a receptionist will likely refer her down the hallway to the pharmacy that is collocated within the doctor's office. There, she will get her medicine and be on her way.

Viewing this same interaction from a cost perspective helps shed further light on the rationale behind all of this. First, her office visit may cost as little as \$25, of which she is responsible for thirty percent, or \$8.25. The physician maintains a heavy patient load in order to maximize his revenue, which is generated from a fee-for-service reimbursement model. The very low reimbursement rate for services forces him to supplement his income. So she will pay \$4 to park in his parking lot and during her long wait, she will use the vending machine(s) located in the waiting room or maybe put a coin in one of the massaging chairs available for patients to use. After her appointment, her visit to the pharmacy located down the hall generates the physician further revenue. In Japan, it is common practice for physicians to write prescriptions and then directly sell the medication to the patient. This obvious conflict of interest is evidenced by the fact that the Japanese are the most heavily medicated population in the world. [13].

Providers are the biggest losers in the Japanese health care system. The central government's aggressive cost controls represent outright limitations on provider income [5]. When biennial negotiations commence for future reimbursement rates, the government has continually chosen to further squeeze providers in order to save money instead of instituting broader reforms aimed at reducing utilization. This current path is unsustainable. Prices can be limited only so much before the quality of services is affected. With doctors already seeing 150 patients per day and at three minutes per person, something has got to give. Cuts in reimbursements do nothing to reduce demand for services. A purely fee-for-service system where providers' only incentive is to maximize utilization cannot work for too much longer in modern Japan.

### **Public Expenditures on Health Care & Taxes:**

Much of the burden of Japan's health care spending rests within the public coffer. Government spending on health care accounts for 82.1 percent of all health care expenditures as of 2010, according to the Organization for Economic Cooperation and Development (OECD) [10]. This is well above the OECD average, and almost twice the rate of the United States. The U.S. government's share of its total health care spending is 46.5 percent [16]. The bulk of Japan's public health care dollars are expended to pay for the National Health Insurance Plan. In 2005, NHI costs topped \$333.8 billion, or 6.6% of Japan's GDP, and this figure has risen since then [7]. In terms of total public and private spending, Japan spent \$3,213 per capita on health care in 2010. This is in line with the OECD's average of \$3,339, but again, just a fraction of the \$8,508 spent by the U.S. on average [16] [10].

From purely a spending perspective, Japan outperforms the United States in terms of its health care spending. It spends less per person and less as a total percentage of GDP. However, Japan currently faces a mounting fiscal crisis -- and with more than 82 percent of all health care expenditures coming from government, finding a way out of this crisis will be tricky.

Understanding this crisis requires a brief analysis of Japan's public debt. Japan holds the largest debt as a percentage of GDP of any industrialized nation in the world. In August of 2013, the nation's debt hit a staggering one quadrillion yen [15]. That is ¥1,000,000,000,000,000. Fifteen zeros. A million-billion yen. Paying it off at the rate of one yen per second would take 31 million years. In real terms, just the interest payments made on this debt equal 25 percent of all government revenue [1].

Japan's debt is now more than 250 percent of its GDP [1]. This means that the annualized value of all products and services within Japan is equal to less than half of the money it owes investors. A quadrillion yen in American dollars is a little over \$10 trillion, which is less than our nation's \$17 trillion debt, although the U.S. debt as a percentage of GDP is roughly 1:1 (U.S. GDP is just over \$15 trillion as of Nov. 2013) [1]. In both nations, health care is a driving force behind this debt.

Japan's debt is of vast concern to its citizens and to the entire Western hemisphere. A debt crisis

in Japan would surely have shock waves in the United States. Faced with a looming debt crisis and a potential downgrade of its debt rating, Prime Minister Shinzo Abe made the tough decision in September, 2013 to announce an increase in Japan's consumption (sales) tax, raising it from five to eight percent starting in April, 2014. This move is projected to take an additional ¥8 trillion from Japanese pockets in its first year. This was a bold move for Prime Minister Abe; the last time the sales tax was increased, the nation entered a deep, two-year recession [9].

This increased tax adds to an already stressful tax burden. Japanese corporations face tax rates of 38 percent -- the highest in the industrialized world [9]. Prime Minister Abe believes that raising the sales tax is necessary in order to sustain social welfare services. Households are experiencing increasing health care costs even despite the Japanese government's ability to limit cost growth, due in large part to the nation's aging population. In order to truly sustain programs, the government must cut services even as it raises taxes. This is not a position in which any politician would wish to find himself or herself. The elderly are likely to be hit the hardest. Abe proposes that in addition to tax increases, out of pocket payments by consumers between 70 and 74 years of age will double. Further, certain elderly populations will be excluded from special nursing care programs [17].

This is a lesson that should be observed by American leaders as this nation inches its way into a greater public role in health care: once a public budget bears the burden of paying for health care, it must also bear the burden of rationing it in hard times.

### **ACCESS TO HEALTH CARE IN JAPAN**

There are fewer barriers to access of health services in Japan than in many other industrialized nations including the United States. However, this medical free-for-all can itself be an impediment to access.

Access is assured through heavy central government regulation to reduce competition, lock in prices, and prohibit a profit motive within the insurance industry. In addition to the individual mandate and standardized pricing, insurance plans must accept any person who applies for coverage regardless of their current health status. Preexisting conditions hold no merit in the insurance enrollment process. Access to health insurance is truly universal. Employers must offer it and the unemployed must enroll in the National Health Insurance Plan. Even visitors to the country whose visas permit stays longer than one month must enroll [14].

Plans include medical, dental, pharmaceutical, and long term care services for every Japanese citizen [19]. In T. R. Reid's trip across the globe in search of the best health care system to treat his wounded shoulder, he found that Japan's insurance industry covered the widest array of services of any nation he had visited. Covered services included a mixture of Eastern and Western medicine techniques "from acupuncture to injections to manipulation to the total shoulder arthroplasty that my doctor back home had recommended" [14, p. 83]. If a service

appears in the Quick Reference Guide, insurance companies are obligated to reimburse for it -- and at the same standardized price. Insurance companies cannot deny a claim and must pay every bill they receive [14].

Japan takes the fee-for-service payment structure to the extreme. When patients visit doctors' offices, it is common to see a poster in the waiting room listing prices for various services much like produce prices displayed at the deli [14]. If a patient decides to switch doctors, they will pay that same price regardless of where they go. This level of price transparency is enviable from the American perspective, where rate setting is secretive, negotiated and dependent upon a provider's and insurer's market strength, and where neither the patient nor the physician know how much will end up being paid for any given service until the bill arrives in the mail [2]. Japan could achieve a great deal of cost savings if quality ratings of providers were as transparent as their pricing.

Access to care in Japan is also not obstructed by a burdensome gatekeeping system. Unlike in other industrialized nations like Great Britain or Canada where patients must be referred to specialists by first seeing a primary care practitioner, Japanese general practitioners do not play a role in gatekeeping. This means that any Japanese citizen can walk into any willing provider's office at any time and be seen by a medical professional [7]. Someone seeking treatment for a sore knee can choose to go to a general practitioner or directly to an orthopedic specialist if one is available.

In many locations an appointment is not necessary. A waiting room can be packed and patients waiting hours to see a physician for just three minutes -- but their problems will be addressed that day. This free-for-all system has its weaknesses. The lack of a gatekeeping system coupled with heavy provider-induced demand means that many services and procedures are performed without having to prove they are medically necessary. There is no penalty for over-utilization of health care services [7] and providers bear none of the risk present in capitated payment models.

## **QUALITY OF JAPANESE HEALTH CARE**

In reality, access to care in Japan is a free-for-all -- and this is evidenced in some statistics that illustrate the limitations to universal access and how this system affects the quality of care provided.

It is widely reported that the Japanese are the most prodigious users of health care in the industrialized world. The Japanese see their doctor an average of fourteen times annually -- three times as frequently as American consumers [7]. More doctor visits means less work productivity. It also results in the over-prescription of drugs.

### **Provider-Induced Demand**

Provider-induced demand (or supply-induced demand) is a major problem in Japan [7]. Providers are reimbursed so little for their services that they have no choice but to see as many patients per

day as possible. They work long hours just to break even. In the United States, if a patient were to call a specialist to see how much a consult costs, the doctor would have no idea. It would depend on whether the patient is insured; whether his plan is an HMO or a PPO or a POS or another type of insurance; whether his deductible/premium is high or low; which of the over 9,000 billing codes are associated with the service. The sheer complexity present in the United States prevents price transparency.

Japanese doctors are not paid to make people healthier. They are just paid for the services and treatments they offer. This is important to understand. Without the presence of any kind of managed care system or capitation or risk sharing, physicians in Japan have little incentive to actually make someone a healthier person. Making them healthier means less visits which means less revenue. That is the downside to a purely fee-for-service reimbursement system.

Provider-induced-demand is even worse in hospitals. Emergency rooms in Japan turn away tens of thousands of patients each year due to overutilization and no gatekeeping system. Again due to extremely low, government-set reimbursement rates and a fee-for-service system that does not incentivize reduced utilization, hospital inpatient stays in Japan are on average, four times longer than in the United States [3] -- and twice as long as any other industrialized nation. A hernia operation that requires one night in a New York hospital requires four nights in a hospital in Tokyo [8].

Some of the hospital inpatient overutilization in Japan is caused by the role that hospitals play in long-term-care; however, this does not account for everything. The hospital crowd-out effect that is present in Japan means that beds are often occupied by less urgent cases [3]. Triage of patients is difficult when patients have complete choice of which provider to see. A patient who walks into a hospital seeking nonemergency services generally cannot be turned away unless the hospital is operating beyond capacity, which they frequently are.

### **Quality Varies Significantly**

Japan's health care system is often cited by U.S. health care reformers as a driving force behind the Japanese being among the healthiest people on Earth; but the quality of this system varies significantly throughout the nation. First, many regions within Japan experience gross shortages of emergency room specialists, anesthesiologists, obstetricians, and other specialists. These shortages can be attributed to low reimbursement rates, long hours, and high stress levels. Rural areas are particularly hit hard by shortages due to a lack of patient volume (provider-induced demand does not work when there are fewer patients seeking care).

Second, quality varies due to Japan's very weak accreditation standards. Physicians in Japan are licensed for life. There are few continuing education credits or other requirements that health professionals must pursue in order to maintain their license. Once a license is granted, it has no expiration date [7]. A Japanese medical school student upon graduation and upon being granted a license is not required to keep up to date on the vast medical discoveries and advancements

occurring in this modern age. As new, less evasive procedures are developed, physicians already in practice have no requirements to learn them or adopt the new practices. Further, there is no centralized oversight of training for physicians. Certification programs exist at the prefecture (ie: state) level or at the local level. At the national level, there exist only bare minimum requirements for certification [7]. This means that depending on where one is geographically within the country, there are very different requirements for health professionals to gain certification.

Third, Japan's hospital network suffers from extreme fragmentation and lack of coordination which further limits quality. Many of Japan's hospitals are small and lack the array of services and specialists that are standard within other developed nations. The Japanese central government limits entrants into the medical field and disincentivizes the practice of specialty medicine through extremely low reimbursement rates. Many hospitals completely lack intensive care units [7]. This is not to say that there are no state of the art facilities in Japan. Indeed, many hospitals, especially in cities, feature extensive services and high-tech equipment. However, these facilities are islands of best-practice in a sea of fragmentation. The United States enjoys a rich history of strategic planning when it comes to health care. As far back as the 1940s, President Truman signed the Hill-Burton Act which targeted under-served areas within the United States and set goals for the building of new hospitals and facilities to serve America's growing population [18]. In contrast to this, the Japanese have had fewer targeted strategic health care planning goals. Their reimbursement model pays for individual services and structurally discourage inter-department coordination and collaboration. Unlike episode-based payment structures that bundle payments for entire episodes of care, the Japanese have fallen into the habit of breaking everything down and paying individually for each service or product used. According to the Economist, more than three quarters of hospitals are operating at a loss. Even aggressive supply-induced demand cannot make up for absurdly low reimbursement rates [5].

Fourth, the Japan's health care system lacks incentive to improve the quality of care provided. This idea was explored in the previous section on access. Physicians who are paid on a fee-for-service model are not paid to make people healthier. On top of this, there are few measures in place in Japan to gauge provider performance. It is surprising that in a tech-savvy, data-oriented nation like Japan, there are no structures in place for patients to compare provider quality outcomes. The nation already has fixed pricing. If this utilization data already exists (and in a centralized format no less), it is mind boggling to think there is no transparency relating to outcomes. This is perhaps the strongest reason for the variation in health care quality throughout Japan. If providers could be judged by their service effectiveness, utilization would likely decrease, the overall quality of physicians would increase, less money would be spent from public coffers, and the population would be healthier.

Fifth and equally surprising given how adaptive the Japanese are to new technology, quality varies due to long delays in the introduction of new treatments and technology in the health care system. This delay is due to two factors. The first is the lifelong licensing that slows the learning



process within the medical community. Secondly, new treatments and technology are slow to be adopted by Japanese physicians due to the fact that their hands are tied by government-defined reimbursement. As new treatments are discovered and implemented in facilities throughout the globe, their implementation is delayed in Japan due to the fact that no billing codes exist for them in the Quick Reference Guide to Medical Treatment Points. In the United States, an experimental treatment can be tested by a health insurance plan engaging in a pilot with a provider. In Japan, that experimental treatment must go through the rigorous, political and bureaucratic process of the central government, gain a position in the Quick Reference Guide, and only then can physicians be reimbursed for trying out this experimental procedure.

### **CRITICAL ANALYSIS OF THE JAPANESE MODEL**

Many reformers cite Japan's superior health indicators and controlled spending levels as evidence that their heavily government-regulated health care system outperforms the more market-based system in place within the United States. There is debate as to how much credit their health care system deserves. Indeed the Japanese are healthier than Americans, with an enviable life expectancy of 83 years compared to 78 years in the U.S. [4]. Three and a half percent of Japanese citizens are obese, compared to over 35% in the United States. In Japan, infant mortality is 2.6 per thousand, compared to a rate more than twice that in the U.S.: 6.7 [8]. Chronic diseases like diabetes, asthma, and congestive heart failure exist in Japan at small fractions of that experienced in the United States. However, attributing these statistics solely to the nation's health care system is overly simplistic and discounts other important intervening variables that contribute to a nation's health such as a better diet, more exercise, a culture that embraces a greater work-life balance, and less drinking [3].

The Japanese have fewer physicians per capita than most industrial nations [10]. Overutilization and meager reimbursement rates force providers to work themselves to the bone and see entirely too many patients. A high quality health care system cannot be built on such superficial three-minute encounters. Even if Japan's hospitals have more beds per capita than in America, many of those beds are filled by patients who do not need them while others who do, are being turned away.

Further, Japan's antiquated licensing and certification regulations are stifling innovation. Granting life-long licenses to physicians and health professionals without any requirement for further learning reduces the likelihood that they will stay up to date with developing best practices and emerging technology.

Japan's modest health care spending (as percentage of GDP) is the envy of many American reformers. The Japanese spend half of that spent by the United States (9.6 percent GDP versus 18 percent in the U.S. [16]) while maintaining a healthier population and universal access. This is certainly a strength of the Japanese model. However, Japan cannot sustain its tight pricing controls in the long run. Across-the-board fee cuts are merely short-term, quick fixes and do not

address the long term problem at hand. Eventually, price gouges will affect quality. With physicians already overworked and stretched to the max in order to make a living, it will be critical for the central government to look elsewhere for future cost savings.

Here is a rare instance where Japanese reformers could borrow from an American practice. The Japanese fee-for-service payment structure should be modified to more closely resemble managed care. Physicians should be incentivized to make patients healthier – not maximize their utilization. A shifting focus to preventative services and techniques would reduce utilization, make for a more meaningful patient/doctor interaction, greatly reduce spending per capita, and most importantly, would make for a healthier Japan. This reform alone, would address each side of the iron triangle of reform.

The price transparency achieved in Japan is very enviable from the American perspective. The difference in cost for any given procedure in the United States can fluctuate by more than 1,000 percent depending on who is paying the bill [2]. The rates can sometimes be illogical, irrational, and not explainable by anyone. These rates are the result of a highly confidential, contracted rate-setting method that widely varies depending on the type of insurance plan and the market share of each provider and payer. Worse yet, no one in the actual health transaction knows the cost. A patient in Japan sees a poster on the wall with the costs of each procedure. In the United States, the patient nor the physician nor the payer knows what dollar figure will be associated with the treatment until the bill is processed. There are lessons here for both Japan and America:

- In Japan, reformers should work to make quality outcomes more transparent. If patients could know the effectiveness of providers, they could make great strides in improving health, reducing utilization, and saving money. Given that they pay the same price regardless of where they go, increased quality transparency would put the worst performing doctors out of business.
- In America, achieving greater price transparency would have the same result. American payers and providers are slowly becoming more receptive to reporting quality outcomes. However, the value of this quality data is somewhat limited by the fact that pricing remains secretive. If patients knew that selecting one provider for a procedure would reduce their bill but maintain the same quality, we too could improve health, reduce utilization, and save money.

Dr. John Traphagan writes in the blog “The Diplomat” that the Japanese see health care as more than the balancing of quality, access, and affordability. They see it as nothing less than a national security issue. “Maintenance of a healthy population is just as important as protecting that population from external threat... An unhealthy population is just as much a threat to national security as terrorists and political enemies” [19]. Perhaps this cultural philosophy is the greatest strength of Japan’s health care system. But currently, the nation’s payment structures do not maximize health as a priority – only utilization. By 2050, forty percent of Japan’s population will

be 65 years or older [5]. Demand for health care services will triple over the next 25 years, just as Japan's workforce dwindles. Without reforms, some predict that costs will double within the next ten years [3]. Moreover, the system will not generate the revenue necessary to meet that growing need. The consulting firm McKinsey & Company estimates that by 2020, a funding gap will exist of \$200 billion [7]. This level of demand simply cannot be made up with further provider reimbursement cuts. The sales tax that Prime Minister Abe recently raised from three to five percent (and, which many feel will lead to recession) would need to be hiked up to 13 percent by 2035 in order to meet this growing demand [7]. The increased costs of care and reduced nursing home access announced by Prime Minister Abe is just the tip of the iceberg that is ahead. As stated earlier, once a government bears the burden of paying for health care, it must also bear the responsibility of rationing it when times are bad.

### **CONCLUSION: THERE'S NO SUCH THING AS PERFECT**

In the design of the perfect health care system, it is naive to observe the practices of a nation and assume that they would work elsewhere, where cultural norms, regulatory environments, and institutional infrastructures are vastly different. Even as other industrialized nations spend less than America on health care, they all share in common serious concerns about rising health care costs and their strain on the public treasury. A 2010 report by the OECD: *Health Care Systems: Efficiency and Policy Settings* measured the quality, access, and affordability of OECD nations' health care systems along dozens of variables, only to find that "there is no clear indication that one health care system systematically outperforms another. On the contrary, countries performing well can be found in all institutional groups. Countries doing poorly are also present in most groups" [8].

Japan's price transparency is one of its greatest strengths, yet the means by which it achieves this transparency sets a dangerous precedent. A perfect nation's health care system would have complete price transparency without placing a strain on providers that impedes progress. Even in highly-regulated industries like the airline and banking industries, consumers can find the price of a flight and pay for that flight with a few taps of their smartphone. Health care reformers in the United States should not let regulation stand in the way of making meaningful progress on improving price transparency. Doing this would make the industry more accountable. Accompanying this must also be increased transparency of quality outcomes. The consumer booking a flight on her phone can also see how often that flight leaves on time. There is no reason why a physician's surgical success rate cannot be equally transparent.

A consumer who has the power to judge providers by their success rates as well as their prices would be in position to select a highly qualified provider at a competitive price. This would pressure providers to increase the quality of their services and place a greater emphasis on the patient-provider relationship. The payer's responsibility would be to contract only with the best providers and assure meaningful selection to their clients. Payment models should shift toward greater capitation and risk-sharing for both providers and patients themselves. An obese smoker

should pay more for health care than someone who is fit and does not smoke. Quitting smoking and losing weight should be rewarded with immediate reductions in health insurance. For the provider, keeping someone healthy should be recognized as the end-goal -- and this should be rewarded with a payment.

Reform will be very difficult in the coming decades as many nations' populations grow older. In Japan, the United States, and elsewhere, many thousands of citizens are turning 65 years old each day. With such a huge portion of health care costs being absorbed in the last year of an individual's life, nations must walk a fine line to assure this population is served while at the same time, managing their ballooning health care spending. Life expectancies are on the rise throughout the world. As nations spend more and more to maximize life expectancies, a major opportunity cost is being bourn, which will be paid by the next generation.

Japan's health care system assures access for all – and at a reasonable price. Eyes will be on Japan in the coming years as their central government navigates the challenges of an aging population and growing pressures on pricing. Major reforms will be necessary in order to reduce utilization and maintain high quality services. Tweaking provider rates and increasing the sales tax will not be enough to make up for increasing costs.

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# **AWARENESS OF HYPERTENSION AND ITS COMPLICATIONS IN A DEVELOPING COUNTRY**

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## **ABSTRACT**

Hypertension is a common disease affecting the population in developing countries. We conducted a survey of educated and non-educated individuals in Nigeria, on the awareness of hypertension as a disease and of its possible complications. Our results show that there were no significant differences between the groups for the awareness of hypertension. However the awareness of possible complications from hypertension was more in the educated group. We emphasize holistic healthcare awareness, which includes not only the awareness of the disease but of potential complications from it. We conclude with some measures to enhance overall healthcare awareness in a developing nation.

Hypertension, healthcare, awareness, complications, developing country

## **INTRODUCTION**

Hypertension is referred to as high blood pressure. It is defined as a condition in which the arteries have consistently elevated blood pressure. This causes a strain on the heart, in pumping the blood through the arteries to the whole body. Blood pressure is represented using two parameters – the systolic pressure, which represents the peak pressure in the arteries, and the diastolic pressure, which represents the minimum pressure in the arteries. Normal adult blood pressure is defined as a systolic blood pressure of 120 mmHg and a diastolic blood pressure of 80 mmHg, represented as 120/80. Hypertension is known as a silent killer because most people do not have any symptoms and can continue for a long period of time without a diagnosis [9]. The global burden of this disease keeps increasing [4]. [3] quantified the global burden of hypertension and estimated about 7.6 million deaths. In 2001, 13% of the total population was associated with high blood pressure. Over 80% of the global burden is concentrated in the low and middle-income countries. Compared to developed countries, developing countries have younger people below the age of seventy die due to cardiovascular causes [3]. Complications of

hypertension are diverse and they include stroke, ischemic heart, diabetes, heart failure and kidney failure. The screening to diagnose hypertension is very economical, even for developing countries [4].

Early detection and awareness is the key to conquering the burden of this disease. Prevention of hypertension and its complication is a task that has to involve all stakeholders such as the government, policymakers, health care workers, academic research communities, families and individuals [9]. In this paper, we discussed the outcome of a survey conducted in a developing country about the people's awareness of the disease, awareness of its complications, and measures to prevent the disease and reduce its mortality rate.

## LITERATURE REVIEW

Many cardiac problems are associated with hypertension. In addition, two-thirds of the people with diabetes also have high blood pressure. Therefore, hypertension and type-2 diabetes tend to occur in the same individuals. These two non-communicable diseases are both components of the metabolic syndrome, which is defined by obesity, dyslipidemia, high blood glucose and high blood pressure. As expected, some people have either hypertension or type 2 diabetes while some have both, which ultimately points to an increase in the population with either of their diseases [1] [7]. According to [3] global statistics of hypertension complications reveal that about 54% of stroke, 47% of ischemic heart disease, 75% of hypertensive diseases and 25% of other cardiovascular disease are attributed to hypertension.

[2] projected that by 2025, 29.2% will have hypertension world wide; a 60% increase from 2000. In Africa 40% to 50% of adults are estimated to have high blood pressure. Non-communicable diseases currently cause almost two thirds of all deaths worldwide [9]. Almost three-quarters of people with hypertension (639 million people) live in developing countries where the level of awareness of hypertension is low [2]. Despite facing the greatest burden of diabetes, many government and health planners in developing countries are not aware of the burden of this disease in their country. According to the World health statistics 2013 report, the prevalence of hypertension is highest in the African region.

In a systematic review, [4] did a comparison between developing countries such as Asia, Africa, Latin America, and developed countries such as United States, in terms of the prevalence of hypertension and found an increase in the prevalence in developing countries, and a decrease in the United States. A study by [5] shows that among a cohort of Ethiopians, overall prevalence of hypertension is 19.1% while diabetes is 6.5%. Out of the 2153 participants in the Ethiopian study, 15% were hypertensive but reported as never having had their blood pressure checked prior to the study examination. Approximately 45% of participants who had their blood pressure checked were never diagnosed with hypertension, but were found to be hypertensive in the study.

[8] screened participants in a market population in Enugu, Nigeria and found that 42% of the screened market population was hypertensive; out of these participants 70.6% were not aware that they had hypertension. They found that the prevalence of hypertension in the market workers was 42% while the prevalence of hypertension in Nigeria was 32.8%. Their result is



supported by [6] who performed a systematic review of studies on hypertension over a period of 5 decades. They found out that the overall prevalence of hypertension in Nigeria ranges from 8% to 46.4%. The prevalence is similar in men and women and in the urban and rural setting. The research methodology used in this paper and its results are discussed in the next sections.

## RESEARCH METHODOLOGY

Based on the importance of maintaining normal blood pressure in the population and considering the complications associated with uncontrolled blood pressures, this study was conducted in a Lagos suburb in Nigeria to determine people's awareness of hypertension as a disease and of its complications. The study was conducted between two different groups of people. The first group consisted of educated individuals who were college students with at least a bachelor's degree. The second group consisted of individuals with less than a high school education. 1000 subjects were randomly selected from each group. The respondents were asked questions on their awareness of hypertension as a disease, and of its possible complications. The identified complications include eye problems, heart disease, stroke, and kidney damage. Statistical tests of significance between the two groups were conducted using SPSS software. The results of the survey are discussed in the following section.

## DISCUSSION

The results of the survey of 1000 individuals from the two groups reveal that 93% of educated respondents sampled in the first group are aware of the prevalence of hypertension, as compared to 84% of the non-educated individuals in the second group. A statistical test shows a significant difference in awareness of hypertension, between the educated and the non-educated groups ( $p\text{-value} < 0.05$ ) (See Table 1). This signifies a high rate of awareness of hypertension as a disease in Nigeria, a country in which between 12-34% of the population is hypertensive. In addition, there is a significant difference in the awareness of complications arising from hypertension between the two groups. The statistical results are also shown in Table 1 ( $p\text{-value} < 0.05$ ). The respondents in the educated group have greater awareness of complications from hypertension than those in the non-educated group. This could explain the fact that, in Nigeria, when there is a report of an incident of death from hypertension, it could in reality, be a death arising from the complications of the disease, rather than from the disease itself. If hypertension can be controlled, the risk of developing complications from it can be minimized, which can subsequently decrease the overall incidence of occurrence.

**Table 1: Results of Hypertension Awareness and Related Diseases in a Developing Country**

	<b>% of Educated Individuals n = 1000</b>	<b>% of Non- Educated Individuals n = 1000</b>	<b>Z – Test P-Value &lt; 0.05</b>
<b>Awareness of Prevalence</b>	93	84	0.00
<b>Hypertension complications of Eye Problems</b>	47	18	0.00
<b>Hypertension complications of Heart Diseases</b>	91	20	0.00
<b>Hypertension complications of Stroke</b>	85	42	0.00
<b>Hypertension complications of Kidney Disease</b>	56	16	0.00

The study analyzed the awareness between the genders in the sampled populations. The statistical results show a significant difference between the degree of awareness of all individuals among males and females ( $p\text{-value} < 0.05$ ), as shown in Table 2. When we examined all individuals in the sample, the male population has a greater rate of awareness than their female counterparts. Report (Guardian, April 2013)) has shown that more Nigerian men have higher incidence of high blood pressure than women, due to lifestyle differences. Furthermore, gender analysis was conducted within each of the two groups. In the group with educated individuals, there is no significant difference between males and females awareness of hypertension ( $p\text{-value} > 0.05$ ). The rate of awareness is about the same among the genders, as shown in Table 2. A similar result was obtained with the non-educated respondents. There was no significant difference in awareness between males and females ( $p\text{-value} > 0.05$ ) (Table 2). This study also revealed that the degree of awareness is approximately the same between male and female respondents.

**Table 2: Gender Awareness of all Individuals, Educated and Non-Educated Individuals**

	<b>Male (%)</b>	<b>Female (%)</b>	<b>Z-Test P-Value &lt; 0.05</b>
<b>All Individuals</b>	66	34	0.00
<b>Educated Individuals</b>	66	69	0.15272
<b>Non-Educated Individuals</b>	34	31	0.15272

### **CONCLUSION**

There is a pressing need to decrease the mortality rate of the non-communicable diseases in developing countries. In the case of Nigeria, there is a general awareness of the prevalence of hypertension in the population. The awareness of its complications is more prominent among the educated respondents than the non-educated group. Ideally, the awareness of the disease and its complications must be high in the country as a whole.

Since hypertension is one of the risk factors of heart disease and the number one cause of death in the world, preventing it from occurring or controlling its incidence will reduce a country's mortality rate and improve its general health.

Hypertension can be prevented and treated with lifestyle modifications starting from diet and behavior control. In terms of diet control, efforts should be made by individuals to reduce their salt intake especially in certain foods that contain more than the daily-required amount of salt. . In terms of behavior control, the populace should be encouraged to exercise regularly in an attempt to maintain the weight according to the normal Body Mass Index (BMI). Exercising as tolerated will not only reduce blood pressure, but also prevent complications from uncontrolled hypertension. The most important intervention in detecting hypertension is regular monitoring of blood pressure in recognized health clinics. In Nigeria, conducting health fair programs every six months in all the states will be beneficial to early detection of high blood pressure among the population.

A combination of structural measures such as establishing health clinics and health monitoring programs, behavioral measures such as educating the population to have better control of their health, and personal measures such as encouraging good dietary habits, are all necessary to improving the healthcare in developing countries.

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# **A GOAL PROGRAMMING APPROACH TO DETERMINE COST-EFFECTIVENESS OF REMANUFACTURING**

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## **ABSTRACT**

In this paper, we consider the cost effectiveness of remanufacturing with the help of goal programming approach. While the main goal is to minimize the cost of remanufacturing, this paper also includes the goal to maximize quality of remanufactured products. A partitioning algorithm is used to solve the goal programming problem.

**Keywords-** remanufacturing, cost-effectiveness, quality, goal programming, partitioning algorithm

## **INTRODUCTION**

Environment conscious manufacturing is the current trend in industry. Customers favor environment friendly (green) products to reduce the future hazards to the environment, which is a much talked about topic. This has inspired manufacturers to reuse, disassemble, recycle and remanufacture products to improve the End of Life (EOL) product recovery and to reduce the waste [1]. This integrates waste back into the manufacturing cycle. Reuse is the process of using a component again for the same or different function. Disassembly is a process of removing desirable components from the original assembly with the intention of reusing them. Recycling is the process of capturing the materials from EOL products and using them to produce new products. And remanufacturing is the process of disassembling the EOL product into components and reassembling back into products using good components [2]. In recent years, a number of major equipment manufacturers such as Caterpillar and Xerox have shown interest in remanufacturing their products [3].

Remanufacturing is an effective trend in conserving the environment. An EOL product is disassembled, recovered and reconditioned with processes like repair, rework, refurbish and replacement into a remanufactured product. After remanufacturing, the products are transformed into conditions which are as good as the new product [4]. The quality of the remanufactured product is of utmost importance. But at the same time, cost of the remanufactured product is equally important. The cost of remanufacturing any product should be economically justified and

the remanufactured product's cost should be favorable compared to the cost of a newly manufactured product to seek customer's attention. The price of remanufactured product is generally 30-40% less than that of a new product. Thus remanufacturing provides products at lower cost [5]. Customers often believe that remanufactured products are not as good as the newly manufactured products. Thus, it is still a challenge to overcome this thinking. However, manufacturers are overcoming this by providing warranties for remanufactured products at par with new products.

There are various characteristics involved with remanufacturing such as quality, cost and time required for remanufacturing, on which the performance of a system depends. Thus any decision requires the use of a multiple criteria model. Goal programming is an example of a multi-criteria decision making tool. It takes into account multiple objectives and constraints. The goals can be prioritized as per our requirement and desired target levels can be set for them. Then the problem can be solved using a systematic algorithm to find the best possible solution.

The use of remanufactured products will increase, if their costs are reduced for the desired levels of quality. This paper concentrates on determining the cost-effectiveness of the remanufacturing process. A mathematical model is developed based on a goal programming approach. The characteristics of manufacturer's interest are treated as goals. Minimizing the cost of remanufacturing and maximizing the quality of remanufactured products are the two goals considered. The primary goal is to minimize the cost while the secondary goal is to maintain the desired level for the quality of the remanufactured product. The mathematical model illustrates these two goals, the goal constraints and an algorithm to find the best possible solution. The conclusion economically justifies the use of remanufacturing over the use of newly manufactured products, encouraging industries to use more of these products.

## NOTATION

### Variable    Definition

$y_{im}$	1 if EOL product $i$ is remanufactured to product of product quality bin $m$ , zero otherwise
$y_i$	1 if EOL product $i$ is remanufactured, zero otherwise
$TC$	Total cost
$Q$	Total quality level
$rp_{ij}$	1 if component $j$ in EOL product $i$ is disassembled during remanufacturing, zero otherwise
$rep_{imjb}$	1 if a component $j$ from life bin $b$ is used for remanufacturing in order to make a product for life-bin $m$ , zero otherwise
$rp_{ij}$	1 if component $j$ in EOL product $i$ is disassembled during remanufacturing, zero otherwise

### Parameter

### Definition

$I$	Set of end of life products on hand
$J$	Set of components dealt with

$M$	Set of quality level
$B$	Set of component bins
$C$	Cost of remanufacturing each EOL product $i$
$N$	Quantity of remanufactured product
$d_m$	Demand for product in product quality bin $m$
$cd_j$	Disassembly cost of a component $j$
$ca_j$	Assembly cost of a component $j$
$\beta_{ij}$	Highest component bin product $j$ can be placed in
$a_{ij}$	1 if component $j$ of EOL product $i$ is functional
$d_m$	Demand for product in product bin $m$

### PROBLEM DEFINITION AND FORMULATION

Some components of a small washer system are considered for remanufacturing here. The disassembly costs, assembly costs for each component are given in Table 1. The quality level of a component is defined by the remaining life of that component. Larger remaining life signifies better quality. Depending on the remaining life, quality component bins are defined for the remanufacturing system. Three quality component bins considered here (bin 1 with the lowest quality, bin 2 with the medium quality and bin 3 with the highest quality) and their respective demands are given in Table 2.

Table 1: Assembly and disassembly cost of the components

Component	Disassembly Cost (\$/unit)	Assembly Cost (\$/unit)
A	0.18	0.09
B	0.27	0.24
C	0.58	0.40
D	0.41	0.43
E	0.64	0.67

The remanufacturing system is formulated as follows:

1. The first goal is to minimize the total cost. The total cost is set to be at most  $TC^*$ . Therefore the first goal can be formulated as follows:  
 Goal: minimize  $d_1^+$   
 Subject to:  $TC + d_1^- - d_1^+ = TC^*$

- The second goal is to maximize the quality, to achieve the quality level of at least  $Q^*$  or more. Therefore the second goal can be formulated as follows:

Goal: minimize  $d_2^-$

Subject to:  $Q + d_2^- - d_2^+ = Q^*$

Table 2: Component demands for each quality bin

Component	Bin 1	Bin 2	Bin 3
A	30	24	18
B	18	2	16
C	24	24	9
D	33	22	15
E	15	28	14

### Constraints:

- The total cost represents the total cost of remanufacturing. Remanufacturing activity consists of disassembly of EOL product and assembly of the required ones.

$$TC = \sum_{i \in I, j \in J} rp_{ij}(cd_j + ca_j) \quad (5)$$

- Total quality level ( $Q$ ) is the difference between the highest life bin the remanufactured component could be placed in and the life bins they are actually used in.

$$Q = \sum (rep_{imjb}(b-m)) + ((a_{ij} * y_{im} - \sum_{b \in B} rep_{imjb})(\beta_{ij} - m)) \quad (6)$$

- The equation below ensures that an EOL product  $i$  is remanufactured to produce only 1 product of life bin  $m$

$$\sum y_{im} = y_i \quad (7)$$

- Number of products in product life bin  $m$ , is at least equal to the demand for that product

$$y_{im} \geq d_m \quad (8)$$

## PARTITIONING ALGORITHM

One approach for solving the goal programming problem is the partitioning algorithm. The algorithm is solved as follows:

The goals are divided into single linear programming models. The first goal is optimized first and this goal is adjusted to be as close as possible to the target value. Then this solution is added to the constraint set and the next goal is optimized and this is adjusted to be as close as possible to the target value. This process is continued till all the goals have been considered. The solution at this stage becomes the final solution to the problem.

The flow chart of the partitioning algorithm is shown in Figure 1.



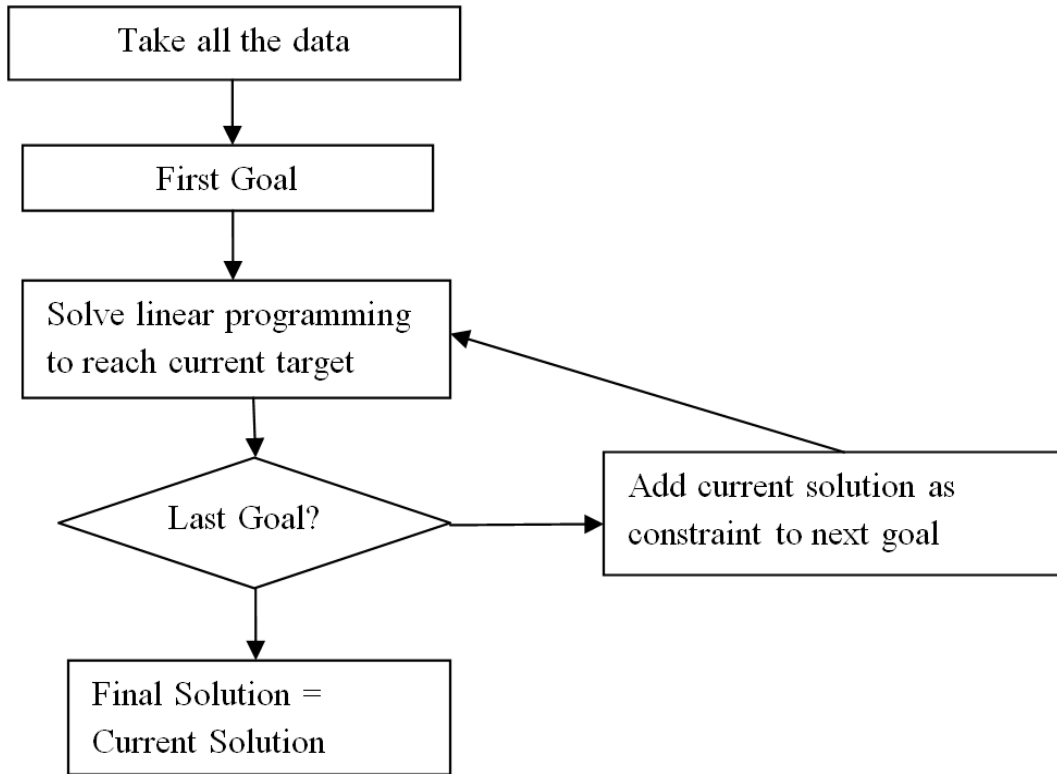


Figure 1: Flowchart of the partitioning algorithm

## NUMERICAL RESULTS

The product demands are assumed to be 16, 20 and 24 for bins 1, 2 and 3 respectively. The target total cost for this case is given as \$75 and the quality level is set at 400. The mathematical model was solved using CPLEX. The result for total cost after solving the goal for a desired quality level comes out to be \$74.67 which is almost equal to the desired target total cost of \$75. And the quality level achieved is 385, which is less than the desired quality level but still comparable to it. The results of CPLEX are given in Table 3.

Table 3: Goals and target values using CPLEX

Goal	Target Value	Step 1	Step 2
Total Cost	75	74.67	74.67
Quality level	400	385	385

## CONCLUSION

In this paper, a mathematical model was formed to determine the cost effectiveness of remanufacturing. The main purpose of the study was to control the cost of remanufacturing products while maintaining their quality level. The actual solution came close to the set target values. The example illustrates that remanufacturing can be a good alternative for product recovery and waste reduction.

As a future research, more goals can be added, to study their effects on the total cost of remanufacturing.

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## **Analyzing Exogenous Factors That Affect Efficiency of Supply Network Complexity**

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### **Abstract**

Global supply chains contain significantly more participants and cost elements than their domestic counterparts. In this paper, we analyze the import processes of a group of U.S. based manufacturers that import raw materials, components and subassemblies from various across the world. Specifically, we consider factors that are, based on relevant literature, known to affect the complexity of supply network and compute the efficiency of the sourcing process using data envelopment analysis (DEA). Using the DEA efficiency as a dependent variable, we then determine the various exogenous variables that affect the efficiency of supply network.

# ANALYTICS OUTSOURCING AND THE LOSS OF COMPETITIVE EDGE

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## 1. Introduction

A company possesses an intellectual property or a trade secret (a process or technique) which gives it an edge over its competitors. The company works with an external vendor and in the process of this interaction the vendor legitimately learns the trade secret.

The vendor takes all reasonable precautions to protect the original client's intellectual property in its dealings with other clients. Despite these precautions, the secret practice or portions of it, are revealed to one or more clients. With the outsourcing of analytics becoming standard practice in many industries and resulting in a dramatic increase in the closeness with which client and vendor work, we believe that this scenario needs to be studied in greater detail.

The remainder of the paper is organized as follows: Section 2 presents a brief review of the previous research related to this area; Section 3 provides a formulation of the mathematical problem under two different assumptions regarding the transfer of the secret from the vendor to a competitor client. The paper closes with some ideas for further research.

## 2. Literature Review

This topic has been researched in three different contexts: (1) the R&D literature on the risks and benefits of outsourcing to an outside vendor, (2) the IT outsourcing literature in connection with protection and loss of intellectual property, and (3) the supply chain literature having to do with the sharing of information within a supply chain.

*R&D Outsourcing:* Baccara (2007) develops a general equilibrium model to analyze the R&D outsourcing decision when information leakage is present. Lai, Riezman, and Wang (2007) use a principal-agent framework to make the R&D subcontracting decision in the presence of information leakage. Wu, Li, Chu, and Sculli (2013) present a supplier selection framework based on two indices – one measuring supplier capability in technological innovation, and the other measuring the ability to protect the client's intellectual property. They validate it with a substantial empirical study of manufacturing companies operating in China.

*IT Outsourcing:* Aubert, Patry, and Rivard (1998) in their assessment of the risks of IT outsourcing include loss of organizational competencies as one of the four major classes of risk. Loss of competitive advantage is one component of this class of risk. In a follow-up work, Aubert, Dussault, Patry, and

Rivard (1999) discuss some general risk mitigation strategies. Hoecht and Trott (2006) discuss the risks inherent in the outsourcing of unique firm-specific skills and core competencies to consultants who then either deliberately or inadvertently spread them to the wider industry – a direct concern of this paper.

*Information-Sharing in a Supply Chain:* Cooperation between members of a supply chain in the form of information-sharing reduces uncertainty and makes the supply chain more efficient overall (see for example, Sahin and Robinson, 2002, Lee, Padmanabhan, and Whang, 1997). On the other hand, concerns about the loss of competitive advantage have inhibited information-sharing. Anand and Goyal (2009) find that the drive to control information flows within the supply chain can trigger severe losses. Zhang, Zeng, and Wang (2011) consider the information leakage situation in which members of a supply chain can make inferences based on partial information. Agrell, Lindroth, and Norrman (2004) use a minimal agency model to contrast known optimal mechanisms for information sharing between different levels in a supply chain with actual practice in the telecommunications industry.

None of these approaches actually models the interaction between vendor and client and the process by which proprietary knowledge is transferred from a trusted vendor to other clients. We believe such an approach is essential to understanding the magnitude of the risk confronting clients who are outsourcing their analytics on an ever-increasing scale.

### **3. Problem Formulation and Modeling**

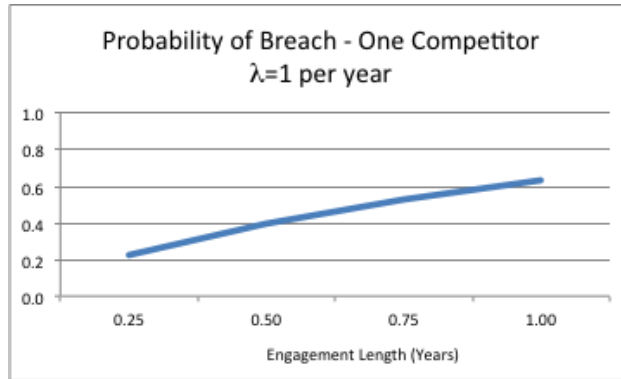
Assume that a vendor is in legitimate possession of a trade secret belonging to client A. Over an engagement of duration  $T$  with competitor B, what is the probability that Vendor V divulges (inadvertently) company A's secret? We look at this situation under two assumptions. First that one breach is enough for competitor B to gain the secret. Next we look at a case where multiple breaches are necessary for B to gain the secret. In this case, the secret cannot be gained from a single breach because there are several components to the secret and a single breach will reveal only a single component. A minimum number of components (more than one but not all) have to be revealed to the competitor before the entire secret can be inferred.

#### **3.1 Single Breach**

In this section we consider the case where vendor V works with a single competitor B and only one breach is necessary for B to learn company A's secret.

These kinds of breaches are random and infrequent and so might appropriately be described by a Poisson distribution with a parameter  $\lambda$ , interpreted as the average number of breaches over unit time. Thus the expected number of breaches over the engagement period  $T$  is  $\lambda T$  and the probability of at least one breach occurring in time period  $T$  is  $1 - e^{-\lambda T}$ . Of course  $\lambda$  has to be estimated for a given situation. Market, vendor, industry practices, etc., will determine the appropriate value. For illustration purposes assume that  $\lambda$  is 1 per year.

The following graph shows the probability of at least one breach for various values of  $T$ . Over an engagement period of one year, the probability of a breach of confidentiality on the part of vendor V is 0.63. Even for smaller engagement periods, the probabilities are not trivial. It must be noted that outsourcing engagements of one year duration are quite standard in industry; they are often included in the operations budgets of the client and renewed annually.



These simple calculations present a bleak picture of how well the outsourcing interaction protects a client’s confidentiality against inadvertent breaches by the vendor. One reason might be that the value of  $\lambda$  chosen is simply too high and that real life interactions deserve a smaller value of  $\lambda$ . Given the absence of data that might allow determination of realistic values of  $\lambda$  it is hard to validate any assumptions.

Another reason might be that there are mitigating factors in real-life vendor-client interactions that reduce the likelihood of the loss of the proprietary practice. In the next section, we consider and model one such factor: trade secrets and proprietary competitive practices that have several aspects and components to them.

### 3.2 Multiple Breaches – A Loss Threshold

Here we consider the case where the secret competitive practice has several components to it and some minimum number of these components, the loss threshold, have to be divulged by the vendor before the competitor can infer the remaining components and thus gain knowledge of the entire secret. We assume for simplicity that each breach that occurs reveals one component of the secret. Successive breaches may reveal the same component which is not helpful to the competitor.

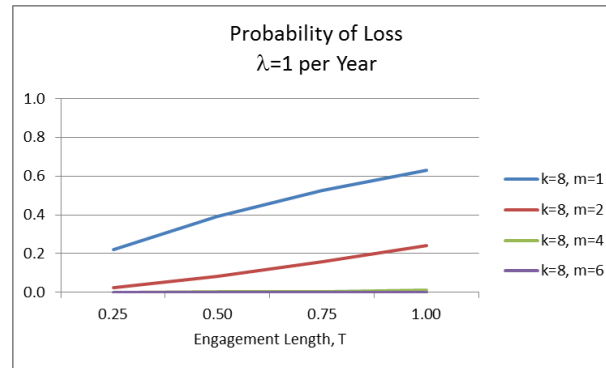
Suppose that there are  $k$  unique components to this proprietary competitive practice. When a breach occurs any one of these  $k$  components might be revealed with probability  $1/k$ . If  $m$  or more of these  $k$  components are revealed, the rest can be inferred by the competitor. We refer to  $m$  as the *loss threshold*. Assume that  $n$  breaches have occurred so far. What is the probability that over these  $n$  breaches  $m$  or more components have been revealed? Let  $X$  be the number of unique components revealed over  $n$  breaches. Then for  $x \leq \min(n,k)$ ,

$$P(X = x) = \frac{S(n,x)k!}{(k-x)!k^n} \tag{3.2.1}$$

where  $S(n,x)$  is the Sterling Number of the Second Kind providing the number of ways of partitioning  $n$  elements into  $x$  non-empty sets.

Suppose for illustration that a proprietary practice has eight ( $k=8$ ) subprograms of computer code. In the course of performing a targeting assignment for another client the vendor might recreate (perhaps with minor variations) subprograms that were developed for the original client. The loss threshold  $m$  ( $m \leq k$ ) is the minimum number of subprograms to which the new client has to be exposed to be able to infer the rest of the program and thus the original client’s proprietary practice in its entirety. As before, we assume that  $n$  is Poisson-distributed with parameter  $\lambda$ . The graph below shows the expected

probability of loss for an average breach rate of  $\lambda=1$  per year. The engagement period goes from 3 months to one year. If we think of  $m$  as protection against loss, then the curves offer a comparison of the protection offered by increasing values of  $m$ . In the graph below, with  $m=1$ , any breach *will* result in loss of the secret. Over a one-year engagement, the probability of loss is 0.63. If two of the 8 components have to be known before the secret is lost, this probability shrinks to 0.24, a 62% reduction. If 4 or more of the 8 components have to be known, the probability of loss is practically zero.



Thus having multiple components to a proprietary practice offers redundancy that protects against complete loss of the practice through a single breach. It provides an explanation for why accidental breaches of confidentiality may not result in complete loss of the proprietary information.

#### 4. Areas of Further Research

In this paper we have mathematically modeled the interaction between a vendor and a client in order to better understand how confidential intellectual property belonging to a previous client can be inadvertently transferred from vendor to a new client. We used the simplest mathematical model that would provide a starting point for the exploration of this issue. Some possible extensions would include enriching the model to allow for:

- The vendor working with multiple clients all of whom compete in the same market
- Multiple breaches occurring simultaneously (in the spirit of batch arrivals), and correlated breaches
- A learning curve: a secret cannot be learned in just one exposure.

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## Dynamic Lot-sizing in a Reverse Logistics Environment

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In reverse logistics products are returned from customers to manufacturers. Environmental concerns (due mostly to political and societal pressures) as well as economic opportunities have nowadays motivated many firms to be involved in value-added recovery and reuse activities of returned products. The problem of how to operate such systems in a way that is both economically and environmentally sustainable has been receiving increasing attention from the academic literature (Teunter, Bayindir, and van den Heuvel 2006). The idea has been to reconsider “traditional” models of production planning and inventory control in settings with various product recovery and reuse options. One of these models that has been reconsidered is the Dynamic Lot Sizing Problem With (product) Returns (DLSPWR). The DLSPWR consists of determining the ordering quantity of “newly” and “remanufactured” items in each period such that the total cost (ordering and holding) over the planning horizon is minimized and the demand is met. It occurs in a setting where returned/used units of an item are acquired from customers and remanufactured in order to meet customer deterministic but time-varying demands of the item over a finite planning horizon (van den Heuvel and Wagelmans 2008). Hence, there are two types of inventory: returns and serviceable, where “serviceable” refers to either a newly manufactured or a remanufactured returned item (van den Heuvel and Wagelmans 2008).

Authors who have addressed the DLSPWR include Richter and Sombrutzki (2000); Richter and Weber (2001); Golany, Yang, and Yu (2001); Beltran and Krass (2002); Teunter, Bayindir, and van den Heuvel (2006); and Schulz (2011). Richter and Sombrutzki (2000) consider the case where there are no variable manufacturing and remanufacturing costs. In each period there is a known amount of returned items that can be remanufactured in the period or in later periods. Richter and Weber (2001) consider an extension of this problem in which there are manufacturing and remanufacturing costs. It was shown in both of these works that the zero-inventory property that serves as basis for the Wagner-Whitin (WW) algorithm still holds, solely for the special case in which (a) the number of returns available in the first period is at least as large as the total demand over the planning horizon, and (b) the inventory holding costs for new and remanufactured products are higher than those of returns. These results were used to develop a WW based heuristic procedure to serve solely in the case of the availability at the beginning of the planning horizon of large quantity of low cost returned items. For the general model with no such return restrictions, needs for new algorithm developments were pointed out. Golany, Yang, and Yu (2001) discuss also this general model to which they did include disposals at costs of unprocessed returned items. They showed that the problem is NP-hard for general concave costs, but solvable to optimality as a transportation problem if all costs are assumed to be linear (and hence zero set-up costs). Beltran and Krass (2002) consider a version of the DLSPWR where returned items are used to meet demand without remanufacturing (i.e., salable returns), disposals

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of returned items are allowed, and demands may be negative in some periods. They derived several useful properties by analyzing the structure of the optimal policies, and developed an efficient dynamic programming algorithm for solving their model. Teunter, Bayindir, and van den Heuvel (2006) consider a problem similar to that of Richter and Sombrutzki (2000), but with two different set-up cost structures (the “joint” and “separate” set-up cost structures) for manufacturing and remanufacturing. However, contrary to Richter and Sombrutzki (2000) as well as to Richter and Weber (2001), they dealt with the general model with no return restrictions as they did not restrict their results to the availability at the beginning of the planning horizon of a large quantity of low cost returned items. A mixed integer linear problem (MILP) model was developed for each set-up cost structure. The model with joint set-up costs was shown to meet the zero-inventory and “remanufacturing-first” properties. These were used in order to develop a dynamic programming algorithm which solves the problem (i.e., with “joint” setup costs) optimally in  $O(T^4)$  time (where  $T$  refers to the number of periods). For the model with separate set-up costs, they concluded that these properties no longer hold and conjectured that the problem may be NP-hard. For each of the set-up cost structures, they proposed modified versions of well-known heuristics developed for the DLSP without returns such as Silver Meal, Least Unit Cost, and Part Period Balancing. In Schulz (2011), an extension is discussed to the modified Silver Meal heuristic proposed in Teunter, Bayindir, and van den Heuvel (2006) to solve the DLSPWR with separate set-up costs. A generalization which includes two additional features (manufacture first/remanufacture later versus remanufacture first/manufacture later) in the decision process and an improvement phase were proposed, resulting in a significant improvement in the quality of solutions. As discussed above, the cost structures in both papers (Teunter, Bayindir, and van den Heuvel 2006; Schulz 2011) do not consider variable manufacturing and remanufacturing costs. A more general formulation of the DLSPWR which assumes that costs may vary over time and includes variable manufacturing (and remanufacturing) costs as well as separate set-up costs for manufacturing and remanufacturing is discussed in Helmirch et al. (2014). In this general model (and all previous models) the number of returned items is known with certainty. It was shown that this general model is NP-hard (Helmirch et al. 2014).

This work deals with the DLSPWR in a setting where returned items that enter the system are acquired at costs and fully remanufactured to meet a deterministic but time-varying demand of a single product over a finite planning horizon. We consider time-varying separate set-up costs for the manufactured and remanufactured items, time-varying separate variable manufacturing and remanufacturing processing costs, and time-varying acquisition costs for the returned/recycled items. Motivated by business practices of some local companies in the ferrous and non-ferrous metal recycling industry (e.g., Bakermat Ottawa), contrary to most existing work, we don't assume that there is for each period a known amount of returned items that can be remanufactured in the period or in later periods. Instead, we assume that the returned items are acquired at time-variant costs. Hence, the problem we consider is a special case of the general model that was shown to be NP-hard (Helmirch et al. 2014). We do not restrict our model to the availability of a large number of low cost returns at the beginning of the planning horizon as in Richter and Sombrutzki (2000), and in Richter and Weber (2001). We show for this special case that there exists a special property of the cost function which allows for the zero-inventory property to hold, so that the problem remains solvable in polynomial time. The procedure we develop solves the DLSPWR to optimality in  $O(T^3)$  time. Our solution method is essentially an extension of the WW algorithm. A new and different formulation of the problem is proposed.

We show how fast the algorithm is, so it can be considered, at this point, as a viable alternative to evaluate the performance of future heuristics (larger problem instances can be solved in few seconds). Because of the generality of the cost structure we consider (no assumption is made on the costs other than their being of a fixed-charge form), our proposed procedure can be readily used as a “stand-alone,” or can serve as the foundation for solution procedures aimed at more realistic models (such as when there are multiple-items and capacity limits), in a similar way that the WW algorithm has been used in the solution of “standard” capacitated lot-sizing models. For practitioners, our model provides a framework that can be used to setting up the overall acquisition budget for returns during a given planning horizon.

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## **MAKING STATISTICS RELEVANT: AN INTRODUCTION TO THE USES AND MISUSES OF STATISTICS IN HEALTH**

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### **ABSTRACT**

Probability and statistics can help people make good decisions, but can also be used to wreak havoc. This paper provides examples to students of how statistics can be used and misused to mislead the public and result in poor decision-making. We discuss the use of statistics in evaluating healthcare decisions, and how they can mislead patients. We describe evaluation criteria like number needed to treat (NNT) and number needed to harm (NNH), which are important to a patient in deciding whether to undergo a medical procedure. We also describe how information about medications' effectiveness often focuses on the relative risk reduction (RRR), which can be misleading to consumers. This is particularly useful to those looking to introduce a discussion of framing and ethical issues into a statistics course.

**Keywords:** Misuse of statistics, framing effects, healthcare statistics, “treating the many to benefit the few,” ARR, RRR, NNT, NNH.

### **INTRODUCTION**

There is no question that we place a great deal of faith in statistics. Everything from products to hospitals and colleges is assessed and rated. The drive to quantify is a strong one, and has been growing stronger in recent years. With the increased omnipresence of statistics comes an increased opportunity to use statistics to mislead and obfuscate. As a result of this, it is important for students in all areas to not only have a familiarity with the uses of statistics, but to also be familiar with the misuses of statistics. In this paper, we present real-life applications that illustrate uses and misuses of statistics. The idea of this paper is to present ideas in a way that can be used in the classroom, and show how valuable an understanding of statistics is in today's world. We discuss the idea of NNT, and how it can be used or misused in health and medicine. This not only serves to introduce students to a particularly useful, but esoteric metric for healthcare, but also leads to a discussion of framing and ethical issues in the use of statistics. This would help make statistics more relevant to students, by illustrating how making the correct health decisions can involve an understanding of statistics, and by showing how a misunderstanding of statistics can and does lead doctors and patients astray. The ethical issues involved in reporting health statistics, can be particularly useful to those looking to introduce a discussion of ethics into a statistics course.

## THE COSTS AND BENEFITS OF MEDICAL TESTING

Developments in medical technology have provided doctors with tests that can probe for various conditions, and the sensitivity of such tests has only increased with time. This allows doctors to discover maladies earlier, and with higher probability than ever before. Technology has also allowed for medical tests that are cheaper, and can be performed more frequently. This does not mean, however, that increased testing is a pure good. The more tests a doctor performs, the greater the likelihood of finding true problems, but, at the same time, performing more tests can create increased costs, which go beyond the monetary costs of performing the test.

One such cost comes from the danger of overdiagnosis [11]. As our ability to see more of what is going on inside the body via the use of high-resolution scans increases, so does the likelihood that there will be an overdiagnosis. Welch, Schwartz, and Woloshin [11, p. 36] report that in people with no gallbladder disease symptoms, approximately 10% will exhibit gallstones in ultrasound scans; 40% of people without any symptoms will show damaged knee cartilage (meniscal tear) with MRI scans; MRI scans will show bulging lumbar discs in more than 50% of people with no back pain. In fact, a recent study consisting of a sample of 1,000 people with no symptoms willing to undergo a total-body CT screen, 3,000 abnormalities were found; 86% of subjects had at least one. The danger of overdiagnosis means that there is a diminishing return to performing additional tests. As more tests are performed, the greater the likelihood of finding true problems, but the greater the likelihood of finding spurious problems.

Another problem is that such tests can cause much suffering. Beyond the fact that many tests, such as mammograms and prostate exams can be frightening and uncomfortable, many tests can also have harmful side effects that last a lifetime. For example, many patients who receive radical prostatectomies suffer from harmful side effects that include incontinence and impotence [2]. It is not clear, then, whether the increased probability of finding a true instance of disease is worth the harm caused to multiple patients. Bach [1], for example, notes that “with routine mammography, you’d have to screen more than 1,000 women in their 40’s to prevent just one breast cancer death.” The guidelines for prostate exams and surgery were changed when it became known that more than 80% of radical prostatectomies performed in the United States are unnecessary. Apparently, only one out of 48 men have their lives extended by this type of surgery [2].

### NNT / NNH

How, then, to measure the value of additional testing against its costs? One potential way of measuring the value of an additional test is to estimate the amount by which it increases the lifespan of the patient. However, if not properly calculated, this statistic can be misleading. Suppose people with a certain disease live to the age of 65 on average. If the disease is discovered when people are 60, then we can say that the average person with the disease lives for five years, or that the survival time is 5 years. Suppose with better technology we are able to discover the disease earlier, say when the typical patient is 50. Even if patients continue to have the same lifespan, living to the age of 65, it would appear that the survival time has increased to 15 years. Thus, because the survival time is calculated from the time the disease is *discovered*, early detection gives the false impression of increasing lifespan. Generally, early diagnosis may not result in a longer life but simply increase the time the disease is discovered until death. Thus,

while it is “true that patients diagnosed early have better survival statistics than those diagnosed late,” this does not mean that early diagnosis actually helps [11, p. 187].

Another statistic that can be used to measure the effectiveness of a procedure, test or drug is the difference of occurrence in a treated group and occurrence in a control group. However, such statistics can be manipulated to mislead as well. Suppose an experiment is done and a large sample of people are randomly assigned to two groups; one group takes a placebo and the other group takes an experimental drug for, say, five years. Suppose, at the end of the study, 3 out of every 100 people in the placebo group had strokes while 2 out of every 100 people in the experimental group had strokes. Would it be correct to say that the drug reduced the number of strokes by one-third (from 3 to 2)? This makes the drug sound quite effective, but is arguably misleading. Only one person out of 100 benefitted from taking the drug; 99 out of 100 got nothing out of taking the drug. This example is not fiction. This is essentially what Pfizer did in promoting its statin, Lipitor [5]. Pfizer ran a campaign targeted to consumers that declared: “Lipitor reduces the risk of heart attack by 36%... in patients with multiple risk factors for heart disease.”

More generally, such studies often suffer from a misunderstanding about the meaning of statistical significance. Statistical significance is about statistics – how sure are we that the difference observed is real, and not just the result of some random deviation? It is possible for the difference between two populations to be statistically significant, yet completely “insignificant” in a practical sense. I may be 100% certain that I have a penny in my pocket, but that does not make its value significant. Similarly, it may be true that a drug has decreased the incidence of stroke from 3 in 100 to 2 in 100, but that does not mean that this decrease is of sufficient importance to warrant the risks involved in taking it.

Another statistic that is used to measure the effectiveness of a procedure, test or drug is Number Needed to Treat (NNT). Heisel [5] defines NNT as “the number of patients that would need to undergo a particular treatment over a specific time period in order to see their health improve beyond what would have happened had they done nothing or had they undergone a different treatment.” Suppose only one in 100 patients who take a drug are cured. Then, for every patient who receives a benefit from taking the drug, there would be 99 who received no benefit, or were adversely affected. In this case, since 100 patients must take the drug for one patient to be positively affected, the NNT is 100. A related statistic, which focuses on the potential harm caused by a treatment or test is the number needed to harm, or NNH. Obviously, when evaluating a course of treatment, it is important to consider both numbers.

NNT can help clarify the difference in populations. Consider the test above, where a drug reduced the incidence of stroke from 3 in 100 to 2 in 100. In this case, only one person out of 100 benefitted from taking the drug; the NNT is 100. When stated this way, the potential ineffectiveness of the drug is more apparent. There is evidence that the NNT for low-risk patients using statins for five years is 250 [3]. If the NNT were made available to the public, it might result in reduced medical costs and better health. Incidentally, medical experts say that one should not take a drug with an NNT of over 50 [3]. This, of course, assumes that the NNH is not a problem. If it is, then even if NNT is low, the concurrent likelihood of being harmed by the course of treatment might mitigate against taking it.

As another example, consider sinusitis. It is a quite common condition, with 20 million cases a year. It is usually the result of a virus, in which case antibiotics are ineffective. Despite this, many physicians will prescribe antibiotics anyway; 20% of all antibiotic prescriptions in the United States are for sinusitis. (<http://www.thennt.com/nnt/antibiotics-for-radiologically-diagnosed-sinusitis/>) Analyzing the statistics for use of antibiotics in treating sinusitis shows that the NNT is 15, while the NNH is 8. (<http://www.thennt.com/nnt/antibiotics-for-radiologically-diagnosed-sinusitis/>) This means that only one out of every 15 people with sinusitis was helped by taking antibiotics, while one out of 8 were harmed (vomiting, rash, and/or diarrhea from the medication). There are likely a number of patients who, presented with this knowledge, would choose not to take the medication.

The following example, further illustrates the different ways of presenting data from the same study, and how they can be used to mislead:

You read that a study found that an osteoporosis drug cuts the risk of having a hip fracture in the next three years by 50%. Specifically, 10% of the untreated people had a hip fracture at three years, compared with 5% of the people who took the osteoporosis drug every day for three years. Thus 5% (10% minus 5%) less people would suffer a hip fracture if they take the drug for 3 years. In other words, 20 patients need to take the osteoporosis drug over 3 years for an additional patient to avoid a hip fracture. ‘Cuts the risk of fracture by 50%’ represents a relative risk reduction. ‘Five per cent less would suffer a fracture’ represents an absolute risk reduction. ‘Twenty patients need to take the osteoporosis drug over 3 years for an additional patient to avoid a hip fracture’ represents a number needed to treat” [8].

The ARR (absolute risk reduction) is 5%; RRR (relative risk reduction) is 50%; and NNT is 20. Advertisements and brochures would stress the 50% RRR, creating the false sense of effectiveness. This sort of practice may help explain why we spend too much on health care and have little to show for it. Patients may fall into the trap of choosing treatments with high relative risk reduction, but with large NNTs, resulting if few patients actually helped. “Treating the many to benefit the few” is an apt description of health care in the United States [9].

## FRAMING

We have seen that the numbers used in advertisements are often misleading; and that the NNT and NNH might often be more useful in evaluating a treatment. This raises the important issue of framing in statistics: the way statistics is presented may underlie patients’ decision to opt for procedures which have low probabilities of success, and may even have significant probability of harm.

Framing is a prominent cognitive bias, identified by Tversky & Kahneman [10]. For example, people respond differently to choices/preferences depending on whether they are presented as a gain or loss. Thus, doctors are more likely to prescribe a procedure when it is described as having a 93% survival rate within five years than if it is presented as having a 7% mortality rate within five years [7]. Similarly, 9 out of 10 students will rate condoms as effective if they are informed that they have a “95 percent success rate” in stopping HIV transmission; if, however, they are told that it has a “5 percent failure rate,” then only 4 out of 10 students rate condoms as



being effective [6]. The implications of framing theory in medicine is discussed in Dewall and Myers [4]. They aver that “people who understand the power of framing can use it to influence others.”

## DISCUSSION

With the abundance of medical information thrown at a patient, it is important to give them some basic numbers that they can use to form their decisions. We have seen that there are a number of ways to present this information, and that some of them can be misleading. In particular, we have seen that advertisements sometimes tout a large relative reduction in likelihood of incidence of a disease, while the absolute reduction may be quite small. We have discussed the NNT and NNH, and have seen that those statistics may be more helpful in evaluating treatment.

This does not mean that NNT and NNH are without flaws. In particular, while these statistics are indicative of the likelihood of being helped or harmed by a drug, they do not indicate the magnitude of various benefits or harms. For example, we indicated that an NNT of 15 and NNH of 8 might mitigate against a treatment for sinusitis. Suppose instead that a treatment for terminal cancer had the same numbers – one out of every 15 patients were totally cured, while one out of every 8 patients treated were not cured, but developed a rash. Would the evaluation of the treatment still be negative?

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## Exploring Models for Teaching the Use of Web Analytics Tools in an Undergraduate Course

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Before the introduction of web analytics tools, web server log files were used to generate web traffic reports which provided only a limited and of and not very accurate view of what was happening on a web site. ROI questions could not be addressed, individual users often could not be identified and real web site usability could not be measured. Problems resulted from several factors such as caching and log file size. With the introduction of web analytics tools, it became possible to show both statistical and graphical representation of the data in standard and custom reports, leading to increased number of organizations using these tools for analysis of their web site traffic in order to make more-informed business decisions. Consequently, demand was created for workers and managers who had knowledge of analytics, analytics tools, and their use in business environment. Several publications have identified analytics expertise as scarce skill.

The need for trained workers has also created an opportunity for educational institutions to offer graduate, undergraduate, and certificate programs in analytics. Several universities already offer such programs. They go by various names such as Big Data Analytics, Analytics, and Business Intelligence, to mention a few. In addition, many marketing-related programs also include analytics as a major topic. In all of these programs, web analytics is an important component.

Although the lecture component of web analytics courses can be developed by adapting traditional methods, providing students practical exposure to a web analytics tool is quite a challenge for course designers because of several factors. First, the course designers must select a cost effective analytics tool that meets the course objectives. Second, they must find a way to provide the students access to this tool. Third, they need to have access to an active website from which data could be collected. Fourth, they are often faced with the challenge of designing exercises that can accommodate students with various levels of technical backgrounds, ranging from students majoring in information systems to students majoring in non-technical business areas. Lastly, with the growth of Internet use in education, it is important that the exercises be designed so that students in online and hybrid courses could carry them out independently.

This study explores various models that could be used for teaching web analytics tools in an academic setting. The ideas presented are based on a survey of models used in existing programs and other models explored by the researchers as they developed an undergraduate course in Internet analytics. This course will to be taught in onsite, online, and hybrid environments.

## **WEIGHT, WEIGHT, DO TELL ME!**

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### **ABSTRACT**

The Statistics Education community has, for several years now, advocated the use of real data and compelling examples within the introductory statistics course. Many such courses, particularly those in business and social sciences, cover the construction of surveys as well as the analysis of survey data. Yet, most introductory texts using examples based on surveys perpetuate the illusion that professional survey organizations rely on simple random samples, and then proceed to analyze such data using methods inappropriate to the dataset. With widely-used software, it is a simple matter to (a) apply sampling weights (usually provided with the data) and (b) instruct introductory students in their use.

**Survey data, introductory course, GAISE, real data, complex sampling**

### **INTRODUCTION AND BACKGROUND**

Statistics educators continuously need to re-evaluate the scope, sequence, and content of the introductory statistics course as computing technology and real-world statistical applications continuously change [1]. Each new generation of hardware and each new iteration of statistical software offer alternatives to traditional methods of statistical practice and education [8], [9], [17]. Decisions about which application areas are essential vary by client discipline and over time as well. Recently, across a wide variety of public and private sector organizations and disciplines, “Big Data” and “analytics” are being applied to numerous purposes [4], [12].

Within the statistics education community, calls for reform and adjustment to changing realities are a long-standing tradition [6], [16]. In recent years there has been growing attention given to the importance of using real data and taking full advantage of technology, culminating in the 2005 GAISE report [1], [2]. More recently still we find arguments that, in response to the big data explosion, further changes are needed [5], [7]. As on-line sources of real-world data continue to become more extensive and easier to access freely, textbooks and courses continue to replace artificial small data sets with larger real data files. Among the many “new” sources of reliable real raw data are large-sample surveys from governmental and non-for-profit organizations (see, for instance, [15]). The combination of user-friendly software and widely-available datasets create numerous opportunities to rethink which topics “make the cut” for the introductory statistics course. Some topics which were formerly in the canon are no longer pertinent, and others that once were considered too advanced for college sophomores may now have a place. This paper argues introductory students can and should learn proper ways to analyze from complex probabilistic sampling—that is, the standard sampling methods used by most large-scale survey research organizations.

## STATISTICS EDUCATION: KEEPING IT REAL

The arguments for including real, or at least realistic, data sets in the introductory course have been recited numerous times in the past 25 years or more [1], [6], [16] and probably need no repetition here. One might reasonably ask, though, precisely what we intend by the term “real” and just how much reality can introductory students tolerate before they are either overwhelmed or disillusioned? Much of the available real data is observational, and many large datasets are sparsely populated and/or peppered with errors which can easily become stumbling blocks for novices.

Introductory students are typically taught that one develops a research question and a research hypothesis, gathers a simple random sample of suitable data, performs the appropriate inferential technique and evaluates the hypothesis that prompted the effort. Instructors model this behavior by raising interesting questions, providing real (or realistic) and moderately clean data sets, and walking the students through an analysis through its statistical and contextual conclusions. Perhaps the instructor then sends students off to locate their own real data and conduct a start-to-finish study of their own.

This is all consistent with several of the major tenets of statistics education reform. Extensive investigations such as these emphasize concepts over computation, engage students in critical statistical reasoning, use real data, and application as well as theory. Projects and good examples exploit available technology and engage the students in active learning.

### **“You Can’t Handle the Truth! – Or Can You?”**

Among the tradeoffs we confront is that real data are sometimes, frankly, quite ugly. In the name of constructing examples that “work out” or a desire to maintain focus on analytic techniques rather than the drudgeries of data preparation, it is quite reasonable for instructors to prepare real datasets in advance, purging them of some of their natural imperfections.

At the same time, if we thoroughly sanitize raw data we compromise some of the reasons for including it in the course. If the sanitization process becomes the equivalent of generating random pseudo-realistic data, what have we gained?

Excessive data cleansing is just one issue. Another thorny issue is one raised by Prof. Nick Horton and colleagues about the contradictory facts that, on the one hand, we hold up the simple random sample as the only authentic and reliable foundation for drawing generalizable inferences but on the other hand know that many students are entering fields (e.g., health professions) where the SRS is a rare phenomenon [7].

We often teach that if one wants to model causation, there’s no substitute for the randomized controlled experiment with random sampling, yet we also know that governments and businesses daily make consequential policy decisions using observational convenience samples or survey data because, simply, those are the data they have and controlled experiments are out of reach due to concerns of ethics, cost, time or physical reality.

Moreover, we also know that when governments, NGOs, and survey research firms conduct survey research, they routinely use multistage complex samplings techniques, and have done so for years [11]. Though many first-level courses and introductory texts may devote space to

probabilistic sampling methods in addition to the SRS, it is rare to find fulsome treatments of sampling weights and their use in *analysis* of such data.

Historically, it makes a great deal of sense to defer the topic of post-sampling adjustments to a subsequent course past the first course. Articles treating the topic (for example, [10], [11], [18]) tend to be well beyond the reach of undergraduates in a service course, much as Gosset's original paper on the  $t$ -distribution probably has no place in such a course. Yet, just as we have found ways to introduce the  $t$ -test accessibly with software, current software offerings can make it quite reasonable to teach proper methods of analysis using sampling weights.

### **Just Because We Can, Should We?**

In a recent empirical study of learning outcomes associate with the use of real-life data, Neumann *et al.* [14] note that “research experiences should be authentic and grounded in context,” reporting that students in their study found the prospect of real-world application to both motivate their efforts and make concepts memorable. Many instructors have likely observed similar impacts.

Yet, when we use real data, how often do we introduce it by saying “this is not really a random sample, but for instructional purposes let's treat it as if it were”? How many textbooks contain similar caveats?

Further, what about data from large national or international surveys? Even if the text (or instructor) carefully explains that this is not a SRS, but rather the investigators used some combination of clustering and stratification, what happens when we get to the descriptive or inferential analysis?

Perhaps students just overlook the gap, but the practice of taking a real dataset and then analyzing it in an “unreal” way—that is, a way that practicing statisticians would *not* analyze it—potentially deflates some of the motivational charge that students get from knowing that they are actually and actively doing data analysis. For any students that notice the lapse, we set up an opportunity for cognitive dissonance.

### **Seriously, Can We Teach Introductory Students about Sampling Weights and their Use?**

There are surely reasons to delay the topic of sampling weights until a later course, perhaps a course for students in fields that rely heavily on survey research. The introductory course is often overloaded with topics. Complex sampling only makes sense subsequent to understanding simple random (and non-random) sampling, so in some respects it is a follow-on concept. Post-sampling adjustments to standard errors *are* complicated both in concept and in terms of the underlying mathematics, and hence probably do go beyond the scope of most introductory courses that de-emphasize formulae and theory. And, of course, we've never done it.

On the other hand, we do want to use real data to tackle real problems. As much as we all enjoy classroom activities with m&m's or chocolate chip cookies, they do lack a certain gravitas. In contrast, as we'll see in a major example of the next section, students literally sit up and take notice of data from the Pew Research Center that shows that in some respects, individuals in the US have food-security concerns comparable to citizens of developing nations [15]. And Pew researchers not only use sampling weights in preparing their reports, they also provide the

sampling weights in the data set. Better still, available software makes it nearly effortless to use the weights, assuming the analyst (*i.e.*, the student) knows that she wants to use the weights.

## **AN APPROACH TO TEACHING COMPLEX SAMPLING & WEIGHTED ANALYSIS**

For this paper I have not conducted an extensive review of textbooks on the market, but one has the impression that it is quite common for authors to include a brief mention that surveys often employ a combination of stratified and cluster sampling. In one recent noteworthy newer text [14], after introducing sampling variation and sampling distributions, the authors go on to note that a stratified sample can provide more efficient estimates than the SRS:

“The mean and standard deviation from each stratum would be calculated separately and combined to form an estimate of the population parameters. The standard deviation of each subgroup should be smaller than the standard deviation of the population. When those standard deviations are combined to form an estimate of the population standard deviation, the resulting standard deviation will be smaller than if a simple random sample had been used.” [14]

The authors prudently stop at that point, without explaining precisely how the means and standard deviations of the strata are combined to achieve this result, but the point in this discussion is that the idea is delivered in three sentences. The idea may be a subtle one, and candidly may be lost on some students, but with care the idea can be expressed simply and briefly.

Somewhat unfortunately, this is typically where the treatment of complex sampling and the subsequent combination of subsample statistics ends. As noted earlier, this would make sense given the somewhat difficult computational investment that it required—except for the fact that software gracefully and efficiently manages the task readily, much as it computes regression parameter estimates without first requiring students to compute sums of squares.

Rather than belabor the point further, consider the following two examples as an introduction to estimation based on complex sampling. Both examples use real data from the Web, and both analyses are performed using JMP 11 [9] It should be noted that current releases of SPSS can also do the same thing. An important element in the argument here is that widely-available software accommodates sampling weights in a seamless way.

The first illustration uses a sampling frame from a known population at a given point in time, inspired by Diez’ excellent on-line text [3]. The goal here is to introduce students to two ideas through example: 1) that in a stratified sample, observations from different strata represent a different number of population elements and 2) that weighting each observation proportion to the size of its stratum generates a more accurate estimate of a population parameter than simply treating all observations equally.

Once those concepts are established, the second example uses the weights supplied with the Pew Global Attitudes survey[15]. This is an international survey administered to more than 29,000 respondents in 23 different nations. Sample sizes in each nation range from 700 to just over 4,000.

Both examples are introduced and accompanied by prose intended for students. In other words, the corresponding explanations should guide a student through the intended thought process. One might distribute the passages as assigned reading or use them as the foundation for in-class presentation. Hence the tone of the prose changes in the following parts of the paper.

### **Why Real Studies Often Use Alternatives to Simple Random Sampling**

If we plan to draw general conclusions about a population or process from one sample, it's important that we can reasonably expect the sample to *represent* the population. Whenever we rely on sample information, we run the risk that the sample could misrepresent the population (in general, we call this *sampling error*). There are several standard methods for choosing a sample. No one method can guarantee that one particular sample accurately represents the population, but some methods carry smaller risks of sampling error than others. What's more, some methods have *predictable* risks of sampling error while others do not. If we can predict the extent and nature of the risk, then we can generalize from a sample; if we cannot, we sacrifice our ability to generalize.

Although simple random sampling (SRS) forms the foundation for our understanding of sampling distributions thus far, in practice researchers frequently adopt other randomized sampling methods for several reasons. First, simple random sampling requires that we can identify and access all  $N$  elements within a population. Sometimes this is not practical. Moreover, in some situations we can actually reduce the variability of predictable sampling error using *stratification*.

Two common alternatives to the SRS break a population up into groups, and then use random sampling methods to gather a probability sample based on the groups. Fundamentally, we group in one of two ways:

*Stratification:* *Strata* (the singular form is *stratum*) are logical or natural subgroups within a population such that individuals within a stratum tend to share similar characteristics, but those characteristics are likely to vary across strata. In other words, within a stratum we anticipate *less* variability in the variable of interest than we find in the entire population. In a *stratified sample*, we identify strata within the population and then randomly sample from each stratum. For example, imagine a public health study focusing on diet and blood pressure among adults in the U.S. We might reasonably stratify the population by gender and age group. Our first example below will construct and investigate stratified samples from a known population.

*Clustering:* *Clusters* are often geographical or arbitrary groupings within a population such that there is no particular reason to expect individuals within a cluster to be more or less homogenous than individuals across clusters. In a *cluster sample*, we identify clusters within a population, randomly sample a small number of clusters, and then proceed to sample individuals from those clusters.

For example, many telephone surveys in the United States cluster the population by area code and randomly select a group of area codes, and subsequently use computers to randomly dial seven-digit telephone numbers. In such a process, where the sample is built up in stages, the area codes are referred to as the *Primary Sampling Units* (PSUs).



*Complex sampling* refers to methods that combine stratification and clustering. Whether a sample is complex, stratified, or clustered, analysis of the sample data generally will require *weighting* if we want to generalize from the sample to the entire population. In a simple random sample of  $n$  individuals from a population with  $N$  members, each of the individuals represents the same fraction of the total population ( $n/N$ ). However, consider what happens when a pollster randomly calls households within two different area codes. The entire state of Wyoming (population of approximately 0.5 million) is covered by area code 307. In New York City, area code 212 covers part of the borough of Manhattan that is home to about 1.6 million people. If the pollster were to phone 10 people in each of these two area codes, the Wyoming subsample would be representing about 50,000 people apiece while the Manhattan subsample would be representing nearly three times that number. As a result of this fact, when we later begin to analyze the data we'll want a way to account for that key difference.

When we use a data table assembled from a published complex sample, we'll typically find one or more weighting variables—sometimes identified as *post-stratification weights*—and a PSU column. Most of the analysis platforms in JMP provide the option of specifying a **weight** column, to be used if our data came from a complex sample.

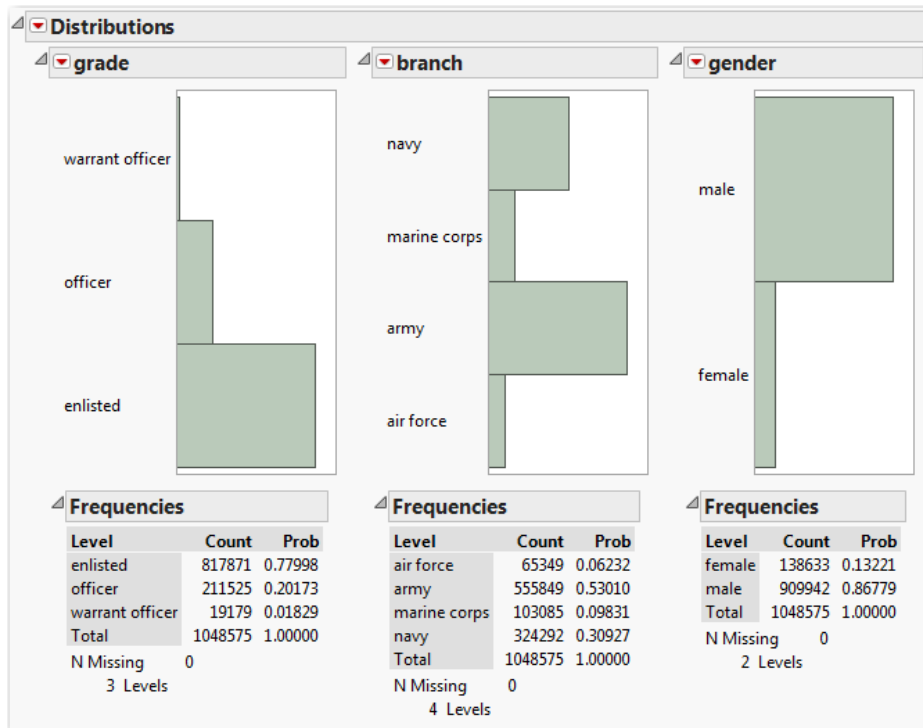
### **The Baseline: Drawing and Analyzing Simple Random Samples**

To see how simple random samples and stratified sampling differ, consider an example in which we start with a known population and investigate the outcomes of two different sampling methods. We begin with a sampling frame from the United States armed forces [3]. The data table contains selected attributes of 1,048,575 active-duty personnel from four branches of the U.S. military, excluding the Coast Guard, in April 2010. We'll treat this group as a population for the sake of this example. Naturally, in a real situation in which we have the luxury of having access to raw population we can just go ahead and calculate the population parameters. In this example, though, we are trying to get a feel for the accuracy and precision of different sampling methods, so we will start by computing a parameter and then subsequently drawing some samples to see how different methods compare.

The variables in the dataset are these:

- Grade (enlisted, officer or warrant officer)
- Branch (Air Force, Army, Marine Corps or Navy)
- Gender (female, male)
- Race (7 categories)
- Hisp (Hispanic ethnicity: false, true)
- Rank (ordinal value from 1 to 12)

Below are JMP-generated distributions of the first three variables:



We see that approximately 78% of the individuals are enlisted personnel, that 6% are in the Air Force, and that 13% are female. We'll keep these population proportions in mind as we examine some samples. Recall that our goal here is to gain insight in the extent to which different methods of sampling produce samples that mirror the population.

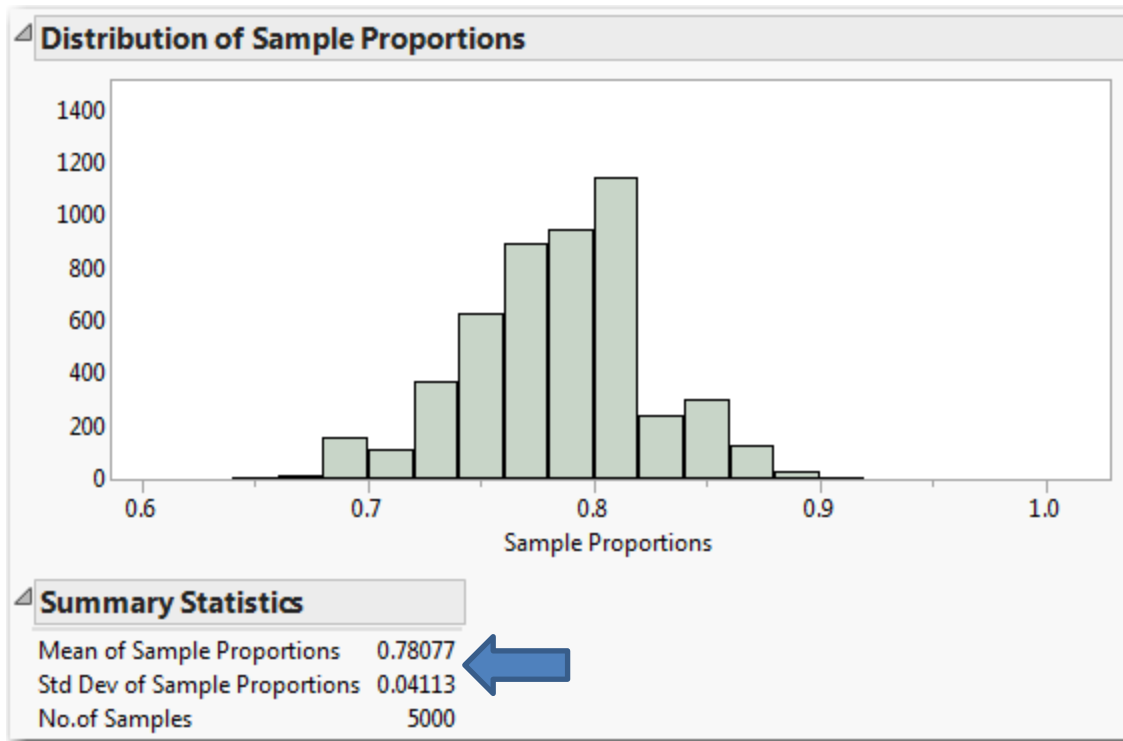
At this point the instructor can assign (either in class or for homework) each student to use the software and randomly draw a 100-person sample and report the sample proportions obtained. Although this would be sampling without replacement, the sample is so small relative to the entire population that the difference in probabilities on each draw is negligible.

We know, for example, that in repeated simple random samples of 100 individuals, the sampling distribution of the sample proportion for, say, the proportion of enlisted personnel in the sample is approximately normal with a mean of approximately 0.78 and a standard error of  $\sqrt{(.78)(.22)/100} = 0.041$ .

Below is a table of five such samples; with further repetitions as a class exercise the pooled sample proportions quickly converge on the population proportions, with dispersion as predicted by the Central Limit Theorem.

Source	% Enlisted	% Air Force	% Female
<b>Military (n=1,048,575)</b>	<b>78</b>	<b>6</b>	<b>13</b>
Sample 1 (n=100)	73	7	15
Sample 2 (n=100)	75	9	15
Sample 3 (n=100)	77	5	9
Sample 4 (n=100)	83	5	9
Sample 5 (n=100)	75	4	12

A simulation script (available on the JMP website) allows us to simulate the process as many times as we like. Here are the results after just 5,000 iterations and we see that the SRS produces an empirical distribution as predicted by the CLT:



So a simple random sampling process has two desirable outcomes: sample proportions tend to be “close” to the population proportion of 0.78, and they stray or vary from that value in predictable ways with a standard error of just 0.04. But could another method do as well or better?

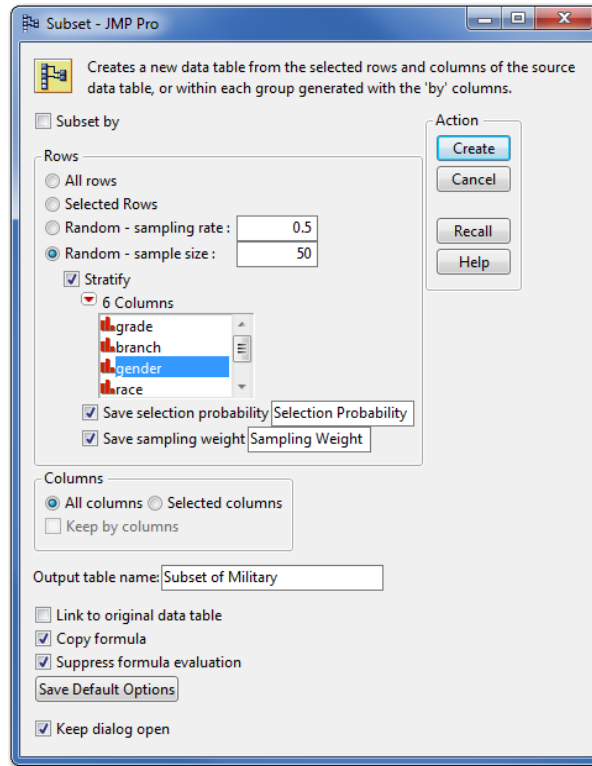
### Constructing and Analyzing a Stratified Sample

Clustering and stratification both rely on random selection. To illustrate the general approach, we’ll use JMP’s Subset platform (command) to first select a stratified sample, compute sampling weights, and then develop sample proportions using and not using the weights.

The Subset platform enables us to stratify using columns already within the data table. Let’s stratify by gender. To illustrate the concept of sampling weights, we’ll choose a total sample of 100 personnel, 50 women and 50 men, recognizing that a sample with an equal number of men and women will initially misrepresent the entire military.

We know that there are 1,048,575 individuals in the population, of whom 138,633 (13%) are women. Hence, in a random process of choosing 50 women, each woman has a probability of approximately 1 or  $1/138,633 \approx 50 \times 1/138633 = 0.00036$ . Another way of thinking about this is that each of the sampled women represents  $1/0.00036 = 2,772.66$  other women. Because there are nearly seven times as many men as women in the military, each sampled man represents a far greater number of men by almost a factor of seven.

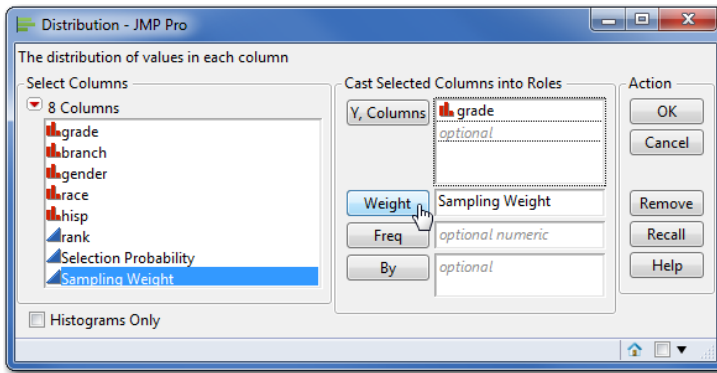
The JMP dialog that will automatically select the stratified sample is shown below. Once the student understands that the goal is to randomly choose 50 women and 50 men, executing the command is straightforward.



This command creates a 100-observation sample with two new additional columns. The **Sampling Probability and Sampling Weight** values for males and females are as shown here:

Gender	Sampling Probability	Sampling Weight
Male	0.0000549486	18198.84
Female	0.0003606645	2772.66

In the entire population we know that approximately 78% (77.998%) of the personnel are enlisted; for men, the proportion is 78.6% and for women it is 74.1%. Hence, if we look at the proportion of enlisted personnel in our stratified sample of 100 individuals, we would anticipate that the disproportionately large number of women in the sample will bias the estimate of enlisted individuals. Indeed, the next class activity would be to have all students generate a stratified sample as just shown, and compute the naïve, unweighted sample proportions. Then, to more properly use the stratified sample, JMP's descriptive analysis command provides an input box for post-stratification weights. An introductory student can easily and confidently choose the pre-calculated sampling weight when instructed to do so.



For this discussion, the author generated 5 stratified samples with sample proportions shown in the table below. Obviously five samples is insufficient, but can serve to establish the pattern that will be more clearly evident in class.

With summary measures recomputed across the five stratified samples, we obtain generally better estimates of the actual proportion of enlisted personnel. Weighting the observations mitigates the bias.

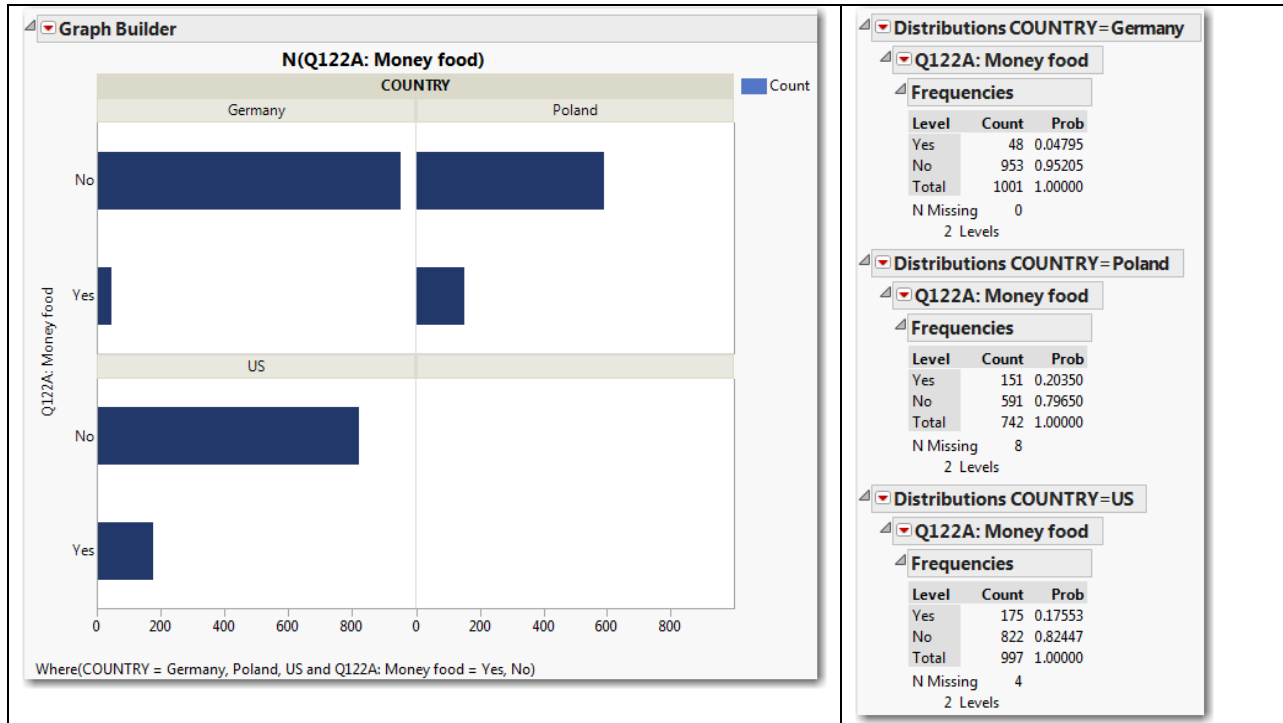
Sample	Unweighted estimate	Estimate adjusted with Sampling Weights
Strat. Sample 1 (n=100)	75	75.7
Strat Sample 2 (n=100)	79	82.7
Strat Sample 3 (n=100)	76	74.5
Strat Sample 4 (n=100)	71	73.2
Strat Sample 5 (n=100)	77	74.8
Strat Sample 6 (n=100)	67	66.3
Strat Sample 7 (n=100)	72	74.9
Strat Sample 8 (n=100)	68	68
Strat Sample 9 (n=100)	73	81.1
Strat Sample 10 (n=100)	81	83.2
Grand Mean	73.9	75.44

### Now for the Real World

The prior example is artificial but potentially instructive. Far more useful and powerful lessons can come from analysis of authentic survey data about issues of economic and social justice, relying on data published by a respected research organization. As noted earlier, the Pew Research Center conducts survey research on, among other things, social attitudes of ordinary citizens around the world [15]. Most of its country samples have sizes of approximately 1,000 respondents. Among the many data columns is a column of sampling weights.

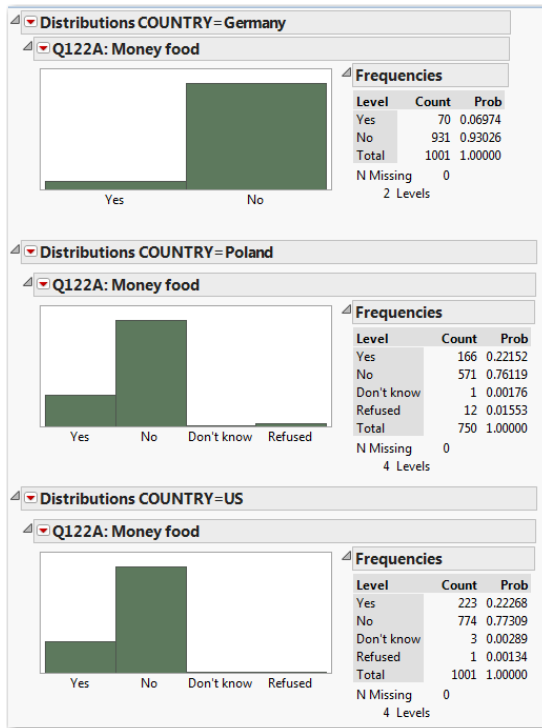
To illustrate the lesson for students, we'll focus on the following question posed by Pew investigators: "Q122A. Have there been times during the last year when you did not have enough money to buy food your family needed?" Responses are coded as Yes, No, Don't Know, Refused. The data can be filtered by country and summarized in many ways. For the sake of this illustration, we'll focus on just three national samples: Germany, Poland, and the US. In these countries, very few respondents refused or did not know, so for this analysis we will omit those

cases and treat the question as dichotomous. Prior to examining the data, one might ask a classroom of US students to predict the prevalence of food security difficulties among citizens of these nations, to encourage the inferential thought process. Here are graphs and summaries without weighting the data:



Fewer than 5% of the German respondents reported having insufficient money in the household in the past year, whereas 20.4% of Polish respondents and 17.6% of US respondents reported difficulties.

However when we perform the weighted analysis, we find a different story: now we estimate that 7% of Germans reported food security issues and that 22.5% of respondents in Poland and 22.4% of those in the US reported difficulty affording food (see table below). In other words, the point estimate for Germany increases slightly when weighted, for Poland it is unchanged, and for the US it increases substantially.



Beyond the simple descriptive point estimates, now let's narrow the discussion to the US and Poland. If we were to use the Polish and US respondents as a basis for drawing an inference about the two nations' well-being, the implications of failing to weight the data are also thought-provoking. Below are the results of two Chi-Square tests comparing the two countries. The unweighted analysis (that is, the one many of us would use in class) is on the left, and the weighted analysis is on the right.

Contingency Table			
Q122A: Money food			
Count	Yes	No	
Row %			
Cell Chi^2			
COUNTRY			
Poland	151	591	742
	20.35	79.65	
	1.0183	0.2349	
US	175	822	997
	17.55	82.45	
	0.7579	0.1749	
	326	1413	1739

Tests			
N	DF	-LogLike	RSquare (U)
1739	1	1.0877481	0.0013
Test	ChiSquare	Prob> ChiSq	
Likelihood Ratio	2.175	0.1402	
Pearson	2.186	0.1393	

Contingency Table			
Q122A: Money food			
Count	Yes	No	
Row %			
Cell Chi^2			
COUNTRY			
Poland	166	571	737
	22.54	77.46	
	0.0035	0.0010	
US	223	774	997
	22.36	77.64	
	0.0026	0.0007	
	389	1345	1734

Tests			
N	DF	-LogLike	RSquare (U)
1734	1	0.00392868	0.0000
Test	ChiSquare	Prob> ChiSq	
Likelihood Ratio	0.008	0.9294	
Pearson	0.008	0.9294	

Both Chi-Square tests fail to find a significant difference between the two countries with respect to this variable, but there are quite large differences in the P-values. Fisher's exact test, one-

tailed for the alternative hypothesis that a smaller proportion of US respondents report food security problems actually is significant at the 0.0786 level in the unweighted analysis, but finds no difference in the weighted analysis.

Thus, the choice of weighting or not weighting real data is consequential: one's conclusion about the state of the world depends on the choice. And in this illustration, the topic at hand is one that stirs interest and passion among students—one in five US families report not having enough money to eat during the year in question, and that ratio is roughly the same as in one of the poorest countries in Europe.

## CONCLUSION

The current era of interactive, visual, intuitive software and plentiful real-world data offers exciting opportunities for statistics educators. The interest in big data analytics provides additional stimulus for student interest in our subject. It is laudable that textbooks and instructors are increasingly applying powerful software to real problems and authentic data even at the introductory collegiate level. This paper argues that we have been overlooking sampling weights in the introductory course, and that traditional obstacles to their inclusion should no longer impede us, and that there are positive reasons to incorporate them in our first courses.

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## **CLOSING THE GAP: INTEGRATING DISASTER RECOVERY METHODOLOGY INTO THE PROJECT MANAGEMENT LIFE CYCLE**

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### **ABSTRACT**

For most organizations, disaster recovery is too often an afterthought of the project planning process. If it is addressed at all, disaster recovery is typically dealt with during the middle of a project or toward its end. We used participant observation and a case study approach within a Fortune 500 company in the airline industry to examine the integration of a disaster recovery methodology and its core principles. We detail the integration process throughout the Project Management Life Cycle and Systems Development Life Cycle, describing the challenges along the way. Based on our experience in observing systems development for an airline, we enumerate the benefits of disaster recovery integration into the Project Management Life Cycle.

**Disaster recovery, systems development life cycle, project management, airline industry, backup requirements**

### **INTRODUCTION**

In this article we use a case study research methodology [1], [6] to conduct a study of Global Air (a pseudonym to protect confidentiality) a US-based airline of over 80,000 employees, operating on 6 continents. An overview of the airline reveals that the company operates in over 350 airports, completes over 5,000 flights per day, and transports between 300,000 and 400,000 passengers every day.

We used participant observation to understand and work with the airline. One of our research team is a member of the Disaster Recovery (DR) Team for the case study airline, two others are IS researchers working primarily in systems development and project management research. Through participant observation we were able to collect current and archival documents, participate in organizational meetings, conduct interviews and observations, including those of physical artifacts, and to use our analysis to propose, design, and implement innovative forms and processes to integrate a disaster recovery methodology into the IT project management framework.

The Disaster Recovery (DR) Team at Global Air is responsible for the development of disaster recovery plans for the airline information systems and resources. In addition, the team facilitates and coordinates disaster recovery exercises for mainframe systems that have a secondary system at a geographically diverse site. As with many companies that have a disaster recovery team, the

team is often viewed as an external entity revolving around the core day-to-day operations and processes waiting to be called upon when something catastrophic occurs.

This is an old reactionary paradigm that many companies have yet to evolve from, and is the DR Team's greatest challenge. Most of the departments the DR Team collaborate with view disaster recovery as more of a chore than a necessity, often placing tasks requested by the DR Team on the back burner. This can be attributed to the "nothing has ever happened before" and "no, we've been just fine all along, we'll deal with it when it happens" mentality. While the DR Team exists in its own silo, it is actively working towards better integration throughout the organization.

## **CHALLENGES OF DISASTER RECOVERY INTEGRATION**

When new systems are developed, they go through the project and systems development life cycles. However, in our experience with Global Air, as is the case with many other service companies, systems are developed without input or participation from the disaster recovery team. This lack of disaster recovery integration within the Project Management Life Cycle has led to our observation that the following four problems are occurring.

1. The Global Air DR Team was first notified of a new system disaster recovery test via the grapevine or during change management system review meetings.
2. The technical design teams did not know whether they were over architecting or under architecting the recovery components for a system because an application business impact analysis (Application BIA) of the system was not conducted.
3. The DR Team was not part of the testing phase to provide oversight; hence there is no formal sign off by stakeholders to confirm that the Recovery Time Objectives (RTO) and Recovery Point Objectives (RPO) were met.
4. Systems with disaster recovery capabilities in place did not have a disaster recovery plan developed, leading to a "test once and done" mentality.

Through our fieldwork with Global Air, we came to recognize many distinct challenges to integrating disaster recovery into the Project Management Life Cycle. For example, project delivery timelines may be impacted by the addition of a step. Second, the integration may impact the current workload of the DR Team. It is also possible that some who prefer the current system may renege and not follow the new process. Furthermore, there is a catch up period where people have to learn the new process.

## **THE PROJECT MANAGEMENT LIFE CYCLE**

At Global Air, the development of any new system is managed by the airline's IT Project Management Office (PMO). The PMO manages the framework for the Project Management Life Cycle. The life cycle is composed of two interdependent parts, the Project Management Life

Cycle (PMLC) and the Systems Development Life Cycle (SDLC). Mainly, the traditional waterfall methodology [3] is used in systems development, though some smaller systems are developed using agile methodologies [5].

Problems occurred because the Project Management Life Cycle and the Systems Development Life Cycle were not in synch with one another. Figure 1 shows that the Project Management Life Cycle and the Systems Development Life Cycle differ in the number of phases as well as the type of phases each practices.

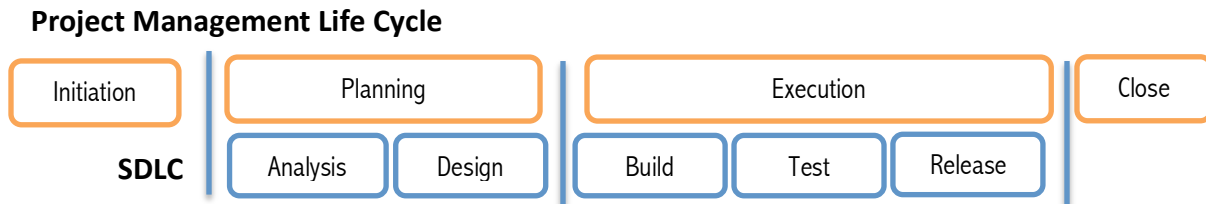


Figure 1. A typical Project Management Life Cycle and a Systems Development Life Cycle may not be perfectly synched.

The project manager is accountable for all deliverables of a systems development project. However, project managers at Global Air do not have a standard process to follow when a project moves from one phase to another. This lack of an established process means some tasks and activities do not get completed when one phase is being transitioned to the next. This was an issue that the Project Management Office was aware of, and during the initial meetings with the PMO analyst, she mentioned that the group was working on a process to keep the project managers better engaged when it came to completing certain tasks before moving on to the next project and the next systems development life cycle phase.

While there is a formalized process to project management and systems development, a standard disaster recovery methodology was absent within the Project Management Life Cycle. That meant that it was necessary to integrate a disaster recovery methodology into the Project Management Life Cycle to ensure every new critical system that is developed meets business recovery requirements prior to production release.

The success of integration was heavily dependent on an Application BIA, a “statement of requirements for recoverability, a hierarchy of priorities, and the value proposition to support senior management’s investments in data backups, alternate facilities, duplicate equipment and other resources.” [4]. The Application BIA can be used as a checklist and if set up properly it will contain the critical touch points necessary for good communication.

Application Business Impact Analysis, shown in Figure 2, was introduced at Global Air. In the updated Project Management Life Cycle, recovery requirements will now be driven by the addition of the Application BIA. The DR Team will now be responsible for all of the disaster recovery testing and disaster recovery plan development responsibilities. The Application BIA will play a critical role throughout the development of the system as it will provide guidance, structure, and touch points in the development of disaster recovery environments for critical systems.

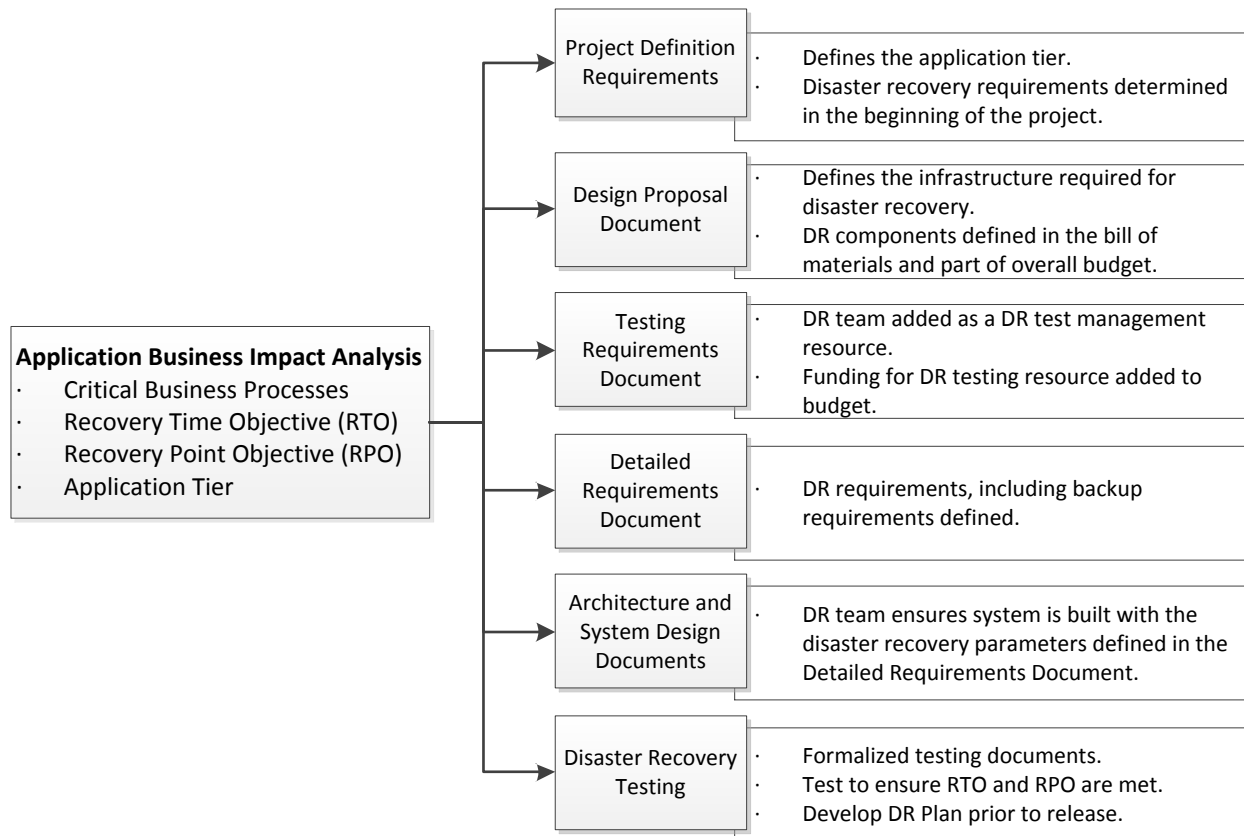


Figure 2. Application Business Impact Analysis touch points at Global Air.

## BENEFITS OF DISASTER RECOVERY INTEGRATION

Through our work with IT disaster recovery (Kendall, Kendall, and Lee, 2005), as well as our experience in the field, we have identified several benefits of integrating disaster recovery into the Project Management Life Cycle:

1. If the organization uses a disaster recovery methodology that follows industry best practices and standardizes it throughout the Project Management Life Cycle, it means everyone follows the same disaster recovery processes for the development of all new systems.
2. The addition of the Application Business Impact Analysis ensures all new systems are tiered (which means appropriately classifying new systems into a priority level or “tier” based on how quickly the system will be restored) under the same methodology, establishing Recovery Time Objectives and Recovery Point Objectives that will help drive application recovery design, disaster recovery testing objectives, and set recovery expectations.
3. Disaster recovery requirements decided upon during the early stages of system development facilitate more accurate forecasting and budgeting. There will be less

- retrofitting of disaster recovery into a system post-release, leading to reduction costs in application redevelopment, additional hardware, software, resources, and time.
4. Disaster recovery plans are developed during the systems development process and tested regularly, to ensure support team members are adequately trained and the recovery systems are performing as designed.
  5. Integration of disaster recovery into the Project Management Life Cycle will place disaster recovery into the forefront and give the DR team more visibility throughout the organization. If the role of disaster recovery isn't well understood throughout the IT enterprise, integration will promote a culture where disaster recovery becomes part of the process and not an offshoot of the process.

## **CONCLUSION**

At the completion of this case study, the Global Air DR Team handed off the integration process to the Project Management Office for implementation. The PMO went a step further and added even more touch points for the DR Team so they could be involved at each project tollgate, giving the DR Team new authority to prevent release of a system into production if it deems the system's disaster recovery environment is not production ready.

With the newly defined process, the Global Air Project Management Office has begun to send out the disaster recovery additions for peer review. Initial feedback has been positive and welcoming. It will take a few months to determine how successfully the disaster recovery process has been integrated into the PMLC and SDLC. We anticipate some challenges at first, such as familiarizing the project managers, business analysts and other IT teams with the process. However, as with starting anything new, the learning curve must be overcome.

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### **ACKNOWLEDGEMENT**

The authors wish to thank everyone at the company we call Global Air for their help and generous cooperation without which this research would not be possible.

# **A STUDY OF THE EFFECT OF SOFTWARE EFFORT ON SOFTWARE TESTING AND SOFTWARE PROJECT MANAGEMENT**

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## **ABSTRACT**

Much of the software estimation research has been focused on software effort involved in direct software development. As more and more organizations buy instead of building software, more effort is spent on testing the acquired software and in project management. In this empirical study, we test the effect of program duration, computer platform, and the software development tool used on program testing effort and project management effort. The study results point to program duration and software tool as significant determinants of testing and management effort. Computer platform, however, does not have an effect on testing and management effort.

**Keywords: Software estimation, effort, testing, project management, platform**

## **INTRODUCTION**

Software development effort and the variables that influence it have been studied extensively. Several software cost estimation models have been developed and tested.



Much of the software estimation research has been focused on software effort involved in direct software development. There is a research gap in studying software effort expended in testing and project management.

As more and more organizations buy instead of building software, more effort is spent on testing the acquired software and in project management. Testing and management also become more important when an organization is outsourcing software development or using web services and other means of contracting out software development. In these software environments, the study of determinants of testing and project management effort becomes important.

In an empirical research study, the effect of computer platform and software development tool on software effort was studied [49]. The research supports the effect of both computer platform and software tool on software development effort. As these two variables cover hardware and software, we examine the effect of these two independent variables on testing effort and project management effort. In addition, we believe that time duration of the program (i.e., time constraints faced) would also significantly impact testing and management effort. So, we posit that the following independent variables – program duration, computer platform, and the software development tool used – determine the program testing effort and the project management effort.

## **LITERATURE REVIEW**

### **Software Effort Estimation Approaches and Models**

Software effort estimation is a key consideration to software cost estimation. Software effort is defined by the equation  $effort = people * time$  [13]. Effort estimation techniques fall into four categories – empirical, regression, theory-based and machine learning techniques. Empirical techniques include analogy, function points (FP) and rules of thumb [21]. Regression techniques use parametric and non-parametric forecasting models [16]. Among the popular regression techniques are the Multiple Linear Regression (MLR), the Stepwise Regression (SR), the Poisson Regression, the Standard Regression, the Ordinary Least Squares (OLS) and the Stepwise Analysis of Variance (ANOVA) [6], [7], [28]. The theory-based techniques are based on the underlying theoretical considerations characterizing some aspects of software development processes [13]. Two theory-based models based on the manpower distribution curve proposed by Rayleigh [31], are Putnam's resource allocation model [37], [38] and Jensen's (1984) model. Other examples of theory-based techniques are the COCOMO and the SLIM model. COCOMO (the constructive cost model; [5], [4]) is a procedurally complete and thoroughly documented model for effort estimation. Albrecht and Gaffney, 1983 present the function points method for the prediction of program size and, eventually, the software development effort. Machine Learning (ML) techniques for predicting software effort involve Artificial Neural Networks (ANNs) [18], Classification and Regression Tree (CART) [17], [12], Case-based Reasoning (CBR) [29], [15], Genetic Algorithm (GA) [19], Genetic programming (GP) [8], and Rule Induction (RI). See [12] for a detailed and an excellent review of data mining approaches for software effort estimation. A study by [22] provides detailed review of different studies on the software development effort. Chulani et al. (1999) used the Bayes theorem to combine prior

expert judgment information with sample data to empirically illustrate that the Bayesian approach outperforms the multiple regression approach. Stamelos et al. (2003) illustrated how Bayesian belief networks can be used to support expert judgment for software cost estimation.

### **Empirical Testing of Estimation Models**

Empirical studies examined the portability of effort estimation models to different project sites. Kitchenham and Taylor (1985) examined the effectiveness of [36] Rayleigh curve model and Boehm's (1981) COCOMO model. The study assessed the relationships between software project size, effort expended, and time required for development based on data for 33 software projects. Neither the Putnam nor the Boehm models adequately modeled these relationships.

Kemerer (1987) did an empirical study on 15 large "complex" data processing projects and compared the performance of the function points method, COCOMO, and two proprietary models, SLIM and ESTIMACS. The performance of these models was generally poor. Empirical testing of the function points method points to the superiority of this approach over the size in lines of code-based approach (Kemerer, 1987). The function points method has been evaluated and its problems highlighted in research [50].

Sheta et al. (2008) use Soft Computing Techniques to build a model structure to improve estimations of software effort for NASA software projects. The authors compare various software cost estimation models such as COCOMO-PSO, Fuzzy Logic (FL), Halstead, Walston-Felix, Bailey-Basili and Doty models and claim good performance results.

More recently, [13] benchmarked different techniques that included tree/rule-based models like M5 and CART, linear models such as various types of linear regression, nonlinear models (MARS, multilayered perceptron neural networks, radial basis function networks, and least squares support vector machines), and estimation techniques that do not explicitly induce a model (e.g., a case-based reasoning approach). Their results indicate that ordinary least squares regression in combination with a logarithmic transformation performs best. The author also report that by selecting a subset of highly predictive attributes such as project size, development, and environment related attributes, typically a significant increase in estimation accuracy can be obtained.

### **Descriptive Effort Estimation Practices**

Descriptive estimation practices are characterized in case or analogy based reasoning for determination of software effort and cost, as in [11] and [29], and also in the use of documented facts, standards, and simple arithmetic formulas, as in [26]. Mukhopadhyay et al. (1992) document the human expert's problem-solving process and the accuracy of the resulting effort estimate in 15 projects. Software effort estimate alterations based on adjustment variables are also highlighted in [46]. Sentas et al. (2005) propose an ordinal regression based cost estimation method which is applied to three data sets and is validated with respect to its fitting and predictive accuracy. Jiang et al. (2007) develop a statistically-based model based on software size, which can be applied during software plan and design. The authors also summarize the average amount of effort spent on each development stage, and present the formulae to estimate the effort for software

building, testing, and implementation. This study also found a strong positive correlation between software fault and size.

### **Use of few Independent variables and their Influence on Effort**

Research has focused on model building using **a few critical variables** that influence software development effort. Fenton and Pfleeger, 1997 argued that subjectivity should be replaced by objective measurement. One way of providing objective measurement is to test the empirical validity before the inclusion of adjustment variables. Wrigley and Dexter, 1991 and Chrysler, 1978 proposed a general model that causally predicts the software development effort throughout the systems development life cycle. The model (Wrigley and Dexter, 1991) consists of **three independent variables**: system requirements size, personnel experience, and method and tools. Subramanian and Zarnich, 1996, Nesi and Querci, 1998 and Banker and Slaughter, 1997 report that software development effort depends on software development tools, software development methodology, software developers experience with the development tools, and the project size and complexity. In reality, software development effort depends on several complex variables (Banker and Slaughter, 1997, Pendharkar and Subramanian, 2002) whose interrelationships are often not very clear. However, researchers started focusing on a few critical variables and studying their effect on software development effort.

In the same vein, Subramanian and Zarnich, 1996 and Pendharkar and Subramanian, 2002 used three variables as a predictor of software effort. These three variables were software development methodology, software development CASE tools

and programmer CASE tool experience. The three independent variables used by Pendharkar and Subramanian, 2002 are a sub-set of the variables specified in the COCOMO II 1998 model [10]. Pendharkar, Subramanian, and Rodger (2005) use a Bayesian model and a belief updating procedure to forecast software development effort. In another study, [34] examine the software development experience and effort relationship and show the existence of a learning curve.

### **Prediction vs. Descriptive Analysis**

Lederer et al., (1990) points to the use of a rough/refine method of arriving at effort estimates that are changed as more information is available during the systems development process. In their words, “The estimator first identifies modules of programs with their functions, then determines files, and next assesses the complexity level of each module. Then the estimator looks up the number of days of analysis and programming of each module in an existing matrix of **complexity** levels and duration.” The focus of the Lederer et al., (1990) study is to conduct descriptive analysis to illustrate how effort estimation is a dynamic process involving changes to the estimates as the project progresses.

## **RESEARCH MODEL AND HYPOTHESES**

Most of the software effort estimation literature looks at overall effort and does not break it down into direct software effort (analysis, design, and programming) and indirect effort (program testing and project management). The key question is how much indirect effort needs to be expended and specifically on testing and management. As

mentioned earlier, most effort estimation research is on the effort estimation predictive mode. Also, important is the descriptive mode which looks at analysis of the variables that influence effort so that the variables can be managed better [26]. In this research study, we will focus on indirect software effort, primarily program testing and project management, as the dependent variable in our descriptive empirical model.

In this study, we focus on studying at the programming level for two reasons. First, investigation at the program level allows for the examination of a relatively large number of data points that is impractical to obtain at the project level as stated in [43]. Second, "If you can't estimate in the small, then don't estimate in the large" [39]. So, we first need to show proof at the programming effort level before we can apply it at the project level. In NASA projects, coding effort comprises 49% of the total effort and testing of the coding is another 29% [52]. This statistic clearly emphasizes the importance of studying programming effort, as it constitutes at least half the total effort. Moreover, researchers in [27] observe from actual estimation practices that the estimation process starts at the program/module level.

### **Program duration**

Program duration or the time taken to complete the program is an important variable studied in empirical evaluation research by [25]. Two theory-based models based on the manpower distribution curve proposed by Rayleigh [31], are Putnam's resource allocation model [37], [38] and Jensen's (1984) model. Theory based models that examine distribution and resource allocation through the project consider the duration or time schedule as a critical software effort driver.

In their study of software effort determination using descriptive practices [26] note that managers often use a percentage allocation effort across the duration and/or the development lifecycle. As we examine indirect software development effort such as testing and project management effort, we argue that program duration often dictates the extent of such indirect effort that can be expended.

### **Computer Platform**

Computer Platform refers to the target-machine combination of computer and infrastructure software [6]. Platform factors include execution time constraint, main storage constraint, and platform volatility [6]. In most application software development, the target machine (mainframe, minicomputer or personal computer) often determines the platform characteristics in which programming needs to be accomplished. Platform factors or platform difficulty is rated from very low to very high and then used as a cost driver in effort estimation in COCOMO II [6]. Configuration or equipment committed by the organization to run the application is one of the adjustment variables in the function points approach [1].

Client-server architecture extensively uses the personal computer as clients and more powerful small or mid-range computer as a server [41]. Mainframe computers continue to be a central part of business data processing and specifically for centralized data management functions [41]. Older systems (also called legacy systems) mostly run on mainframes while newer systems run on the PC or midrange platforms and need to interact with these legacy systems [41]. Midrange computers are also quite popular in distributed data processing.



We argue that indirect software effort on program testing and project management is very much dependent on the computer platform with all these platforms involving significant use of program testing and project management effort.

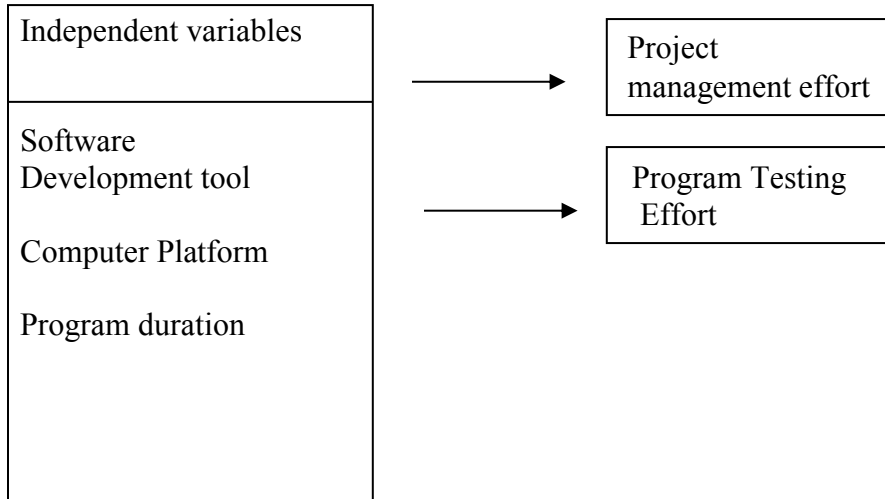
### **Software Development Tool (SDT):**

Wrigley and Dexter (1991) and Chrysler (1978) proposed a general model that causally predicts the software development effort throughout the systems development life cycle. The model (Wrigley and Dexter 1991) consists of three independent variables: system requirements size, personnel experience, and method and tools. Subramanian and Zarnich (1996); Nesi and Querci (1998); Banker and Slaughter (1997) report that software development effort depends on software development tools, software development methodology, software developers experience with the development tools, and the project size and complexity. It is amply clear from all these research that software development tools are an important determinant of software development effort. As software development tools significantly determine software development effort, we expect development tools to determine effort expended on program testing and project management.

In this research, we look at projects that would fall into one of the four categories based on the use of software development tools: a third generation procedural language (example – C, COBOL), Fourth generation tools (example –Foxpro, Powerbuilder), Fourth generation tool with integrated development environment (example – Visual Basic, Rational Rose) and report writing tools (ORACLE Developer, Crystal Reports) as the different software development tools.

*Research Model*

*Figure 1*



**Hypothesis 1a:** Software Development Tool (SDT) is a significant determinant of Project management effort

**Hypothesis 1b:** Software Development Tool (SDT) is a significant determinant of program testing effort

**Hypothesis 2a:** Computer Platform (COMP) is a significant determinant of Project management effort

**Hypothesis 2b:** Computer Platform (COMP) is a significant determinant of program testing effort

**Hypothesis 3a:** Program duration (DUR) is a significant determinant of Project management effort

**Hypothesis 3b:** Program duration (DUR) is a significant determinant of program testing effort

**RESEARCH STUDY AND DATA COLLECTION**

Two hundred and ninety four programs spanning over twenty software projects were included in the study. The testing and management effort were collected at the program level and measured in days. All these projects were business applications. The actual program testing effort (in hours), the management effort (in hours), computer platform for development of the program (mainframe, midrange, and PC), the software

development tool used, and the program duration (in days) were provided in the data set. As the organization was a software development firm, meticulous data collection was used.

In this study, we focus on studying at the programming level for two reasons. First, investigation at the program level allows for the examination of a relatively large number of data points that is impractical to obtain at the project level as stated in [43]. Second, "If you can't estimate in the small, then don't estimate in the large" [39]. So, we first need to show proof at the programming effort level before we can apply it at the project level. In NASA projects, coding effort comprises 49% of the total effort and testing of the coding is another 29% [52]. This statistic clearly emphasizes the importance of studying programming effort, as it constitutes at least half the total effort. Moreover, researchers in [27] observe from actual estimation practices that the estimation process starts at the program/module level. The description of the variables is in the table below.

**Table 1: Description of Variables**

<b>VARIABLE NAME</b>	<b>DESCRIPTION</b>
<b>TST</b>	<b>number of hours spent on program testing: (dependant variable)</b>
<b>MGT</b>	<b>number of hours spent on management: (dependent variable)</b>
<b>COMP</b>	<b>platform – midrange, client/server, mainframe, or PC (independent variable)</b>
<b>SDT</b>	<b>software development tool (independent variable)</b>
<b>DUR</b>	<b>duration of program development in days (independent)</b>

## RESULTS

Descriptive data on the variables used in data analysis is shown in table 2 below.

Computer platform and software tool were not nominal and classified into categories.

Testing effort, Management effort and program duration were all nominal data.

**Table 2. Descriptive data**

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Testing Effort	294	0	179	10.69	16.362
Management Effort	294	1	20	2.76	2.837
Computer platform	294	1	3	2.15	.814
Software tool	294	1	4	2.36	1.306
Program duration	294	1	89	25.21	20.424
Valid N (listwise)	294				

Next, we provide results on pearson correlations between the variables.

**Table 3: Pearson Correlations among the variables**

		TST (hours)	MGT (hours)	DUR (days)	COMP	SDT
TST (hours)	Pearson Correlation	1	.108	.272(**)	.022	-.129(*)
	Sig. (2-tailed)		.063	.000	.713	.026
MGT (hours)	Pearson Correlation	.108	1	.234(**)	.069	.089
	Sig. (2-tailed)	.063		.000	.236	.127
DUR (days)	Pearson Correlation	.272(**)	.234(**)	1	.026	-.014
	Sig. (2-tailed)	.000	.000		.655	.811
COMP	Pearson Correlation	.022	.069	.026	1	.403(**)

	Sig. (2-tailed)	.713	.236	.655		.000
SDT	Pearson Correlation	-.129(*)	.089	-.014	.403(**)	1
	Sig. (2-tailed)	.026	.127	.811	.000	

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed).

Duration and software tool have a significant correlation with testing effort.

Duration has a significant correlation with management effort. Computer platform and software tool have significant correlations. Results are in table 3.

To test our research model and the hypotheses, we conduct a multivariate analysis of covariance (MANCOVA) with the testing effort (TST) and management effort (MGT) as dependent variables and the computer platform (COMP), software tool (SDT), and duration(DUR) as independent variables as in the equation below.

$$TST, MGT = F (COMP, SDT, DUR).$$

Results of the MANCOVA are shown below in table 4. As seen in table 4a, Program duration and software development tool had a significant effect on both dependent variables in the model. Computer platform had no significant effects. Interaction effects were not significant. The research model is partially supported with support only for hypotheses 1a, 1b, 3a and 3b. There is no support for hypotheses 2a and 2b as computer platform has no significant effect in the model.

**Table 4a: Multivariate tests (Multivariate Analysis of Covariance)**

Effect		F	Sig.
Intercept	Pillai's Trace	22.652(a)	.000
	Wilks' Lambda	22.652(a)	.000
	Hotelling's Trace	22.652(a)	.000
	Roy's Largest Root	22.652(a)	.000
Program duration	Pillai's Trace	17.431(a)	.000
	Wilks' Lambda	17.431(a)	.000
	Hotelling's Trace	17.431(a)	.000
	Roy's Largest Root	17.431(a)	.000
Computer Platform	Pillai's Trace	.239(a)	.788
	Wilks' Lambda	.239(a)	.788
	Hotelling's Trace	.239(a)	.788
	Roy's Largest Root	.239(a)	.788
Software Tool	Pillai's Trace	8.378(a)	.000
	Wilks' Lambda	8.378(a)	.000
	Hotelling's Trace	8.378(a)	.000
	Roy's Largest Root	8.378(a)	.000

Table 4b expands on 4a and provides the F values and significance with breakdown on the effect on the testing and management effort with cut-off at the 0.05 level.

**Table 4b. F values and Significance**

Source	Variable	F	Sig.
Corrected Model	Testing Effort	7.526	.000
(Dependent)	Management Effort	5.525	.000
Program duration	Effect on testing	20.275	.000
Program duration	Effect on management	17.582	.000
Computer platform	Effect on testing	.121	.728
Computer platform	Effect on management	.322	.571
Software tool	Effect on testing	9.229	.003
Software tool	Effect on management	6.221	.013

## **DISCUSSION AND CONCLUSION**

The results point to duration and software tool as significant determinants of testing and management effort. It can be argued that effort spent on testing does depend on the time duration involved in completion of the program. Duration can be an effective proxy for complexity or thoroughness/completeness with which a program is written. Hence, it is possible that a program that was completed hastily may need to go through more testing. Similarly, management effort is also influenced by duration. Time constraints and deadlines often influence the extent to which management effort can be expended on supervising the completion of programs.

Software tool used will also affect testing effort. It can be argued that third generation environments are supported by less automated software engineering and testing tools and so may require more testing effort compared to newer fourth generation

and integrated development environments. In all software tool environments, management of projects is important. It is argued in research (Subramanian et al, 2009) that project management can effectively navigate traditional and newer agile development environment and software tools if they can exercise a good balance of critical factors that influence these tools and environments. This research study adds support to the work in [47].

Computer platform had no significant effect on testing and management effort. Our argument is that testing and management effort depends less on the hardware and more on methods, software tools, business and project related variables.

In conclusion, our research points to the importance of studying indirect and important software effort expended on testing and management. We take a descriptive and empirical approach in looking at a few variables that may influence testing and management effort. The variables studied are computer platform, software tool and duration. Computer platform and software tool were selected as they were extensively used in prior research. We could make a strong case for the influence of duration and we included it as an independent variable also. In the resulting research model and hypotheses, duration and software tool were the only two variables that had a significant effect on testing and management effort.



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## Technology as a Motivating Factor in Team Interactions and Teamwork

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The importance of teamwork and the ability to interact and work in a team has always been emphasized, and technology is being used to facilitate teamwork activities. The role of technology in teamwork has significantly increased in recent years and has changed functioning in a team and teamwork activities. Technology has made working in a virtual environment a reality, and has made it possible to form and work in virtual teams. Furthermore, technology has changed the way team members interact and work together whether they are in co-located or virtual teams, and has changed the way team members collaborate and communicate.

A survey is conducted to explore perceptions, awareness, knowledge and usage of different technologies in teamwork. The awareness, knowledge and usage of different technologies in teamwork should increase interactions among the team members resulting in better collaborations and consequently better team outcomes.

## **FACTORS INFLUENCING CONSUMERS' WILLINGNESS TO RECONCILE AND TRUST REPAIR IN E-BUSINESS ENVIRONMENT**

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### **ABSTRACT**

E-commerce companies leverage the advanced capabilities of information technology and the Internet to incorporate trust-building mechanisms into their website. Trust is the first line of defense against a failing business, as shoppers conduct transactions with websites that meet their confident expectations. But if these expectations are shattered, e-commerce companies must be prepared to gain back trust in order to get consumers to repurchase. For business-to-consumer websites to capitalize on e-commerce technologies to rebuild trust in their consumers, they must first understand the overarching phenomenon that triggers consumers' willingness to reconcile. The research investigates the factors that influence consumers' acceptance of willingness to reconcile and rebuild trust.

**Keywords: E-Business, Trust, Trust repair, Willingness to reconcile**

### **INTRODUCTION**

Trust plays an important role in people's lives. In the world of business, people choose to work with others who portray trust. Trust is also routed into the technology world, when business is a sub-set of an e-commerce environment. Consumers perceive trust of online shopping websites, and this perception determines whether they will make purchases. People use the Internet and other advanced technologies that have been developed and adapted for ease and convenience. Shoppers expect e-commerce vendors to apply these technologies in order to provide for wonderful experiences in making online purchases. E-companies must work to reflect an image of trust to their prospective customers. Without trust, e-businesses would not be able to operate. Therefore, vendors must make it possible for them to sustain consumer trust.

E-businesses must realize that consumers may experience a loss of trust, i.e. a trust violation, and it is important for these businesses to incorporate trust rebuilding mechanisms if trust is breached. Where a vendor may potentially lose one customer, that customer can bring along many other existing customers to lose trust in the company, as well as prevent prospective customers from building trust in the company. Firms must realize the loss of consumers due to trust violations, and hence anticipate such consequences. Subsequently, companies can prepare mechanisms that trigger trust repair. The objective of this research is to propose a model for analyzing factors that influence trust repair.

The rest of this paper is organized as follows. The upcoming section presents the research background. It is followed by our proposed research model. In the end we present our conclusions.

## RESEARCH BACKGROUND

Trust is an important phenomenon studied across a variety of disciplines including information systems and e-commerce with prior research focusing on factors that complement e-commerce vendors' trust building mechanisms in order to attain and sustain customers. According to Nilashi and colleagues [1], there is a need for a trust management system that guides e-commerce businesses in the development of a website that would ensure consumers' trust in making purchases. It would help reduce the risks of trust-related issues. Companies could utilize the trust management system to build their websites in such a way that the important factors are targeted to instill trust in their customers. Beatty et al. [2] found that consumers avoid making e-commerce transactions when they distrust websites and other web services. They suggested for e-commerce companies to consider the particular aspects that reflect trust within the website to build consumer trust. According to Shahibi et al. [3], security is a main factor influencing trust and e-commerce companies must take security factors influencing trust into consideration when building their websites. Kao [4] claims that security affects whether consumers will make purchases online. According to Sau-ling [5] "...social commerce is a trusted environment of which prospective consumers make buying decisions based on the advice of a network of friends and family, not strangers they don't know or trust."

According to Goles et al. [6], previous experience with internet sellers is an important factor that influences their responses to service failures. Weisberg et al. [7] noted that consumers' past experiences with e-commerce websites affected intentions to conduct future transactions with those companies as successful transactions over time build a positive customer experience and thus build customer trust in websites. However, when there is violation of trust, there exists a need to repair the trust or otherwise it can have detrimental effects. The process involved in repairing damaged trust and the process of developing trust are different, but organizations do not respond too positively to trust violations [8].

Kim et al. [9] and Schweitzer et al. [10] argued that it is harder to rebuild trust than it was to initially gain trust. As positive experiences are established, a trust violation will create a more damaging effect on consumers' feelings, as the vendors they once had strong ties to have crushed their positive expectations. Liao et al. [11] proposed a model of rebuilding the post-violation trust in the e-commerce environment. They found that consumers' perceived congruence between the expectation of a vendor's trustworthiness and its trust restoring activities influences perceived trustworthiness of online vendors. Vendors can fix the very trust that they might have broken [8] because doing whatever it takes to allow violated consumers to see the importance of repurchasing from their websites will enable e-commerce companies to rebuild that trust.

## RESEARCH MODEL

E-commerce companies should be able to earn back the trust of their old consumers after incidents have invoked their loss of trust. We define trust repair as the rebuilding of trust within consumers after trust violations by e-commerce companies.



### **Willingness to Reconcile**

Willingness to reconcile is defined as the readiness of consumers, after having once lost trust in e-commerce companies, to engage in trust repair with the violating e-business. Two parties reconcile when they have come to satisfying terms with a particular disagreement and in turn restore the trust that was lost at that time [12]. After a company loses the trust of a customer, it is ultimately the customer that must make the decision to either forgive the company that broke the trust or move on to other vendors. E-commerce companies should work to get consumers to accept this process; by doing so, those consumers are said to be willing to reconcile and are ready to repurchase from the vendor. Thus, the rebuilding of trust can be completed. Trust repair can take place only if the consumers are willing to reconcile. Therefore,

*H1: Willingness to reconcile is positively related to trust repair.*

### **Distrust Regulation**

Distrust regulation reflects customers' perception of the actions designed to avoid and prevent future trust transgressions, by dealing with the cause of the failure that led to the trust violation [8]. If the cause of failure is left unhandled, there is a higher likelihood of a repeated failure of a similar nature, and this would merely lead to pushing consumers further away from repurchase intentions. Distrust regulation involves implementing controls to prevent actions or circumstances that could lead to future violations [8]. It is reassuring to customers to know that a vendor is sincerely concerned about the problem, and is willing to spend resources in an effort to solve it. To a user, distrust regulation implies a desire to change and to stop such a failure from occurring again. If the customer witnesses a thorough and complete investigation, they would be more willing to reconcile with that company than if no investigation had taken place. Therefore,

*H2: Distrust regulation is positively related to willingness to reconcile.*

### **Trustworthiness Demonstration**

Trustworthiness demonstration is defined as customers' perception of the attempts taken by the vendors to show signs of regret and apology to consumers after having violated their trust from a failed transaction [8]. Not only can apologies help repair trust between people, so can they make customers more willing to reconcile with an e-commerce company. A sincere apology is an acceptance of responsibility for a failure, as well as a show of regret. Trustworthiness demonstration reflects repeated, clear, and consistent signals that reflect conduct and desirable actions from the organization [8]. E-commerce companies must not only work to improve on previous failures to deliver satisfactory transactions, but also to make reparations with consumers, acknowledging that the failure took place. Consumers that receive trustworthiness demonstration are likely to regain the hope, faith, and assurance that were previously threatened by vendors' distrustful acts [8]. The more consumers perceive trustworthiness demonstration, the more consumers are willing to reconcile. Therefore,

*H3: Trustworthiness demonstration is positively related to willingness to reconcile.*

### **Response Action Effectiveness**

Response action effectiveness is defined as the perceived effectiveness of the actions that the e-commerce vendor conducts in response to a trust violation. These responses reveal the vendors' understanding of its damage to the trust relationship [12]. Because the follow-up response

reflects the vendor's attempt to heal the wounds inflicted to its consumers, its effectiveness must be well thought-out, timely, and credible [8]. A more prompt, sincere, and fair response will make the actions of the company more influential on the customers. The more effective the response, the greater will be customers' favorable perception of the actions designed to avoid and prevent future trust transgressions. Therefore,

***H4: Response action effectiveness is positively related to distrust regulation.***

Similarly, the more effective the response, greater will be customers' favorable perception of the repeated, clear, and consistent signals that reflect conduct and desirable actions from the organization. Therefore,

***H5: Response action effectiveness is positively related to trustworthiness demonstration.***

### **Response Timeliness**

Response timeliness is defined as the amount of time taken by the vendor to respond to a consumer after a conflict is logged. E-commerce companies must get back to the consumer in the most time-effective manner in order to have a greater effectiveness [12]. Consumers, who are already disappointed from trust violations will only continue to grow angrier and in turn decrease the likelihood of repurchase if the website does not ensure a speedy response [8]. The more time that passes after a trust violation without a response from the violating business, the less effective the response will be. The reason for this is that when the company responsible does not respond, it projects that the company is either ignorant to the fact that the trust violation occurred, or is ambivalent to the plight of the consumer. The timelier the response to an incident, the more reassured the customers, and the more effective the response. Therefore,

***H6: Response timeliness is positively related to response action effectiveness.***

### **Response Communication Richness**

Response communication richness is defined as the quality of the communication between the violating e-commerce website and the violated consumer during the response action. It is important that vendors strive for worthwhile communication when responding to trust violations [8]. Vendors must communicate as best as they can in order to gain back the consumers' trust. Otherwise, consumers would merely think that vendors have no concern or consideration for their feelings [8]. The richness of the communication will greatly vary the outcome of the conflict settlement. Communication alone may be important, but poorer communication, even if the conflict was resolved, could still lead to a lack of trust by the consumer [10]. The quality of the communications during the response to a trust violation event determines how effective the response action actually is. The greater amount of quality information contained within the communications, the more effective the response. Therefore,

***H7: Response communication richness is positively related to response action effectiveness.***

### **Response Sincerity**

Sincerity is defined as the sensitivity and genuineness that the e-commerce company shows to the violated consumer after a conflict. Vendors who are sincere in their responses let consumers know that they regret the inconvenience [12]. Consumers may be willing to accept their response

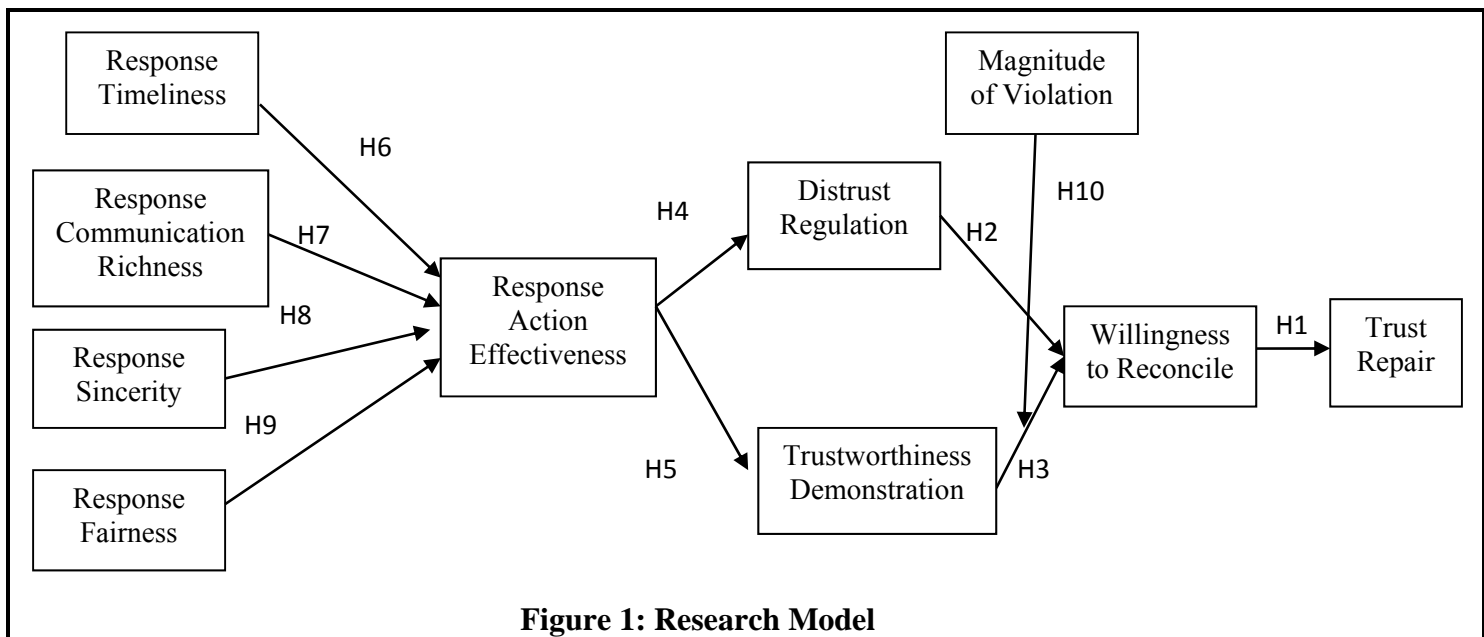
more easily when they feel that the company reacts with utmost sincerity. Moreover, consumers may just end up angrier and all-out avoid repurchase if the company shows no sign of sincerity to the trust violation. Sincerity yields better outcomes to the response action. The greater perceived response sincerity, the more effective the response. Therefore,

**H8: Response sincerity is positively related to response action effectiveness.**

### Response Fairness

Response fairness describes the individual's belief that the actions being taken in response to a trust violation and the responses being given are fair, equitable, and done in an ethical manner. E-commerce companies must be fair in the conflict resolution process. Consumers will refuse to repurchase from a vendor that treats their complaints unfairly. Fair and equitable responses by the seller could soften negative responses of the customer and is an important factor in determining customer decisions to repurchase from a vendor [6]. The more consumers perceive responses to be handled fairly, the better the outcome of the response action. Therefore,

**H9: Response fairness is positively related to response action effectiveness.**



**Figure 1: Research Model**

### Moderating Role of Magnitude of Violation

Magnitude of violation is defined as the degree of impact the trust violation had on the consumer. The magnitude of the violation will affect consumers accordingly, where a much larger scale will have an equally stronger impact [8]. If the trust violation was so strong that it seriously affected the consumer, vendors need to try harder in their repair efforts [12]. While trustworthiness demonstrations such as apologies are beneficial in making consumers more willing to reconcile, it is most beneficial when the trust violation was of a minor magnitude. For a larger violation of trust, such as a failure to keep financial information secure, an apology would likely seem as lip service if not backed up with actions. For a lesser offense, with less of

an impact on the customer's life, trustworthiness demonstrations would have a greater effect. For example, an unannounced layout change on a web site that causes some confusion to customers. This would not have a significant effect on anyone's life; thus, even a small trustworthiness demonstration would increase customers' willingness to reconcile. Therefore,

***H10: The influence of trustworthiness demonstration on willingness to reconcile will be less if magnitude of violation is high and high if the magnitude of violation is low.***

Figure 1 shows the research model for the study.

## METHODOLOGY

We will develop a questionnaire by adopting standard survey development procedures and using validated measures available in the literature. The individuals to be included in the study will be consumers of e-commerce websites.

## CONCLUSION

Rebuilding trust is not easy, and many organizations may realize the difficulty involved in appropriately and effectively engaging in the trust repair process with the violated individuals. Much research has been done to identify contributing factors to the trust rebuilding process at the business and organizational level, mostly involving employees as the victims. However, e-commerce companies also experience consumers that lose trust due to conflicts in conducting transactions. E-commerce organizations leverage the advanced capabilities of information technology and the Internet to enable consumer intentions to purchase, but after trust violations, it is very difficult to win back those customers. The factors described in this study are postulated to affect users' willingness to reconcile and acceptance of trust repair. Our proposed model investigates a research area that needs careful attention in today's environment. By investigating the mechanisms that underlie the various e-commerce technologies (e.g. social networking, security, information richness, interactivity), which are used by websites to strengthen their brands and earn trusting consumers, it is possible to understand the best possible business operations that trigger consumers' willingness to engage in the trust repair process. It will contribute to IS theory by evaluating a theory based model of the factors behind the willingness to reconcile and the repair of trust. The results can also be used to advance our understanding of developing appropriate technological mechanisms to repair trust.

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# **Value Creation from Mobile Social Networks: A Framework and Taxonomy**

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## **ABSTRACT**

An unprecedented amount of information is generated, transmitted, captured, and analyzed at an unprecedented scale and speed. A large portion of such information is abundantly available to businesses as well as to the general public by virtue of the “openness” of online social networks, allowing it to be exploited for creating business value. The mobile consumerism is an added dimension to this newly found value creation opportunity. Presented in this paper is a framework and taxonomy of value creation for businesses drawn from openness and mobility in the context of online social networks.

## **The Webnovela as an Emerging Online Marketing Vehicle**

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### **Abstract**

The traditional approach for developing a marketing strategy tends to follow a well-established pattern based on the 4Ps of marketing in which marketers conduct market research and industry analysis in order to determine consumer needs, identify segments, assess profit potential, and reveal trends. Marketers then define product features, develop pricing and promotion strategies, and determine the necessary distribution channels, support structures, and packaging requirements. The process tends to be top down with passive consumer involvement. In recent years, however, the strategic marketing process has been upended in numerous ways as a result of the continuing evolution of the Internet. Social technologies, new forms of media, and Web 2.0 tools can be used to create a marketing platform that can attract and actively involve the consumer in the marketing process and its implementation. This emerging marketing platform is characterized by several factors originally defined by New Media Theory, and an extension to the theory, and includes content, creativity, communication, collaboration, community, convergence, customization, connectivity, and cognizance. This paper delineates how the characteristics of this emerging marketing platform affects the traditional marketing process. This paper also presents a case study that illustrates how this emerging marketing platform can be implemented using the “webnovela,” which is a new type of commercial media fiction that is increasingly popular in the US Hispanic market.

### **Key Terms**

Social Media, Web 2.0, Marketing Platform, New Media, Marketing Mix, Webnovela

## **Introduction**

Weinber and Pehlivan suggest that the traditional marketing process is characterized (1) developing a marketing plan (2) determining a marketing budget (3) selecting the marketing channels and (4) determining the success metrics [30]. The marketing plan is typically guided by addressing the 4Ps of the marketing mix — product, price, place, and promotion. The marketing budget is guided by what is deemed necessary in order to achieve a specified level of awareness and access. Marketing channels are numerous and can include, but are not limited to TV, radio, print, billboards, and of course, the Internet. Valid metrics may include awareness, recall, attitude and beliefs, purchase, re-purchase, loyalty, market share, and of course, return on investment. The marketing plan must be consistent with the overall goals of the organization. A situational analysis should assess the company, customers, potential market segments and targets, competitors, and potential collaborators. The organization should have a solid understanding of the general business and industry climate.

Due to the technological changes wrought by continuing evolution of the Internet, the marketing process has changed radically. Traditional promotion channels are important, but now they can be integrated and/or enhanced with various social media technologies made possible by Web 2.0. The nature of e-commerce today is a far cry from the static mail order model that characterized early e-commerce websites. Today the marketing mix can be implemented in a variety of new and exciting ways. The costs of reaching niche audiences have fallen drastically. The costs of doing market research have fallen in many respects. And the range of metrics that can be used to judge the effectiveness of a marketing campaign has expanded significantly.

Laudon and Traver describe in detail the many features of e-commerce that distinguishes it from other forms of commerce and that facilitate a wide range of new business and marketing models and include ubiquity, global reach, universal standards, information richness, information density, interactivity, personalization,



social technology, and the ability to reach geographically dispersed audiences [20]. The significance of interactivity, personalization, and social technology and the major impact it has had on e-commerce can be attributed largely to Web 2.0 technologies.

Web 1.0 was largely characterized by websites that presented users static information with little opportunity for engagement. As the Internet evolved into Web 2.0, it became possible to more seriously engage the user in a two-way conversation. The Internet experience became much more interactive and users could engage in the co-creation and sharing of content. Word of mouth could be more impactful and far reaching. It became possible to generate business insights that not only enabled the organization to better target the consumer, but to also glean much more actionable market intelligence that better reflected real time user sentiments. The organization now has the opportunity to quickly spot trends and emerging product issues. It has become possible to more effectively monitor the brand. Relationship building between and among users and organizations is not only possible, but also essential in ensuring the success of a brand.

Web 2.0 is largely defined by social media technologies that have led to the emergence of marketing platforms that can reach a wide audience, under various conditions, in different contexts, and on a variety of devices. The marketing platforms are defined by the same special characteristics that define social media, and also by what we refer to as the marketing vehicle.

The marketing vehicle is the commercially produced content that pulls consumers to the website and that can be used to also drive consumers to other appropriate channels depending on the stage of the consumer buying process. In this article, the marketing vehicle discussed is the webnovela, an emerging format that is gaining popularity in the Hispanic world. The webnovela is an emerging genre with special qualities that enables the marketer to reach a very large and growing Hispanic population with unique characteristics.

The goals for this paper are to describe the nature of Web 2.0 technologies, specifically social media, and how they give rise to modern marketing platforms that can be used to support the marketing mix. Marketing platforms vary a great deal, but they are characterized by the marketing vehicle, and the dimensions defined by New Media Theory.

## **Literature Review**

Web 2.0 technologies include a wide range of social media tools such as blogs, wikis, discussion forums, and social networks. Tumblr and Twitter are among the most popular micro-blogging websites. Technorati is a popular search engine for blogs. Wikipedia is the world's largest wiki in English, but there are many others such as Wikia, and WikiAnswers. One of the most popular social networks in the world is of course Facebook; however, there are numerous social networks that are more focused, such as LinkedIn for business, or Match.com for dating.

Content sharing sites for all types of media are numerous and cater to different audiences with different needs. YouTube is the largest video sharing website. Vimeo is a specialized video sharing website that is strictly non-commercial and presents itself as a platform for creative individuals looking to host their original works. Photo sharing sites such as Flickr, Photobucket, and Snapchat allow users to host and share images. In the case of SnapChat, its unique feature is that photos disappear after a short interval of time, which gives individuals a greater sense of freedom to share images without having to worry as much about having to self-censor.

Social book marking sites allows users to add, edit, annotate, tag, rate, and share websites. Digg and Reddit are two such sites. Users can vote news stories up or down, thereby deciding collectively on those stories that are deemed to be most important. Users can also comment on the articles.

Social media tools can vary a great deal with respect to their design and purpose. As is the case with software, most social media tools allow you accomplish a variety of

tasks. How they differ is in what they allow you to do more easily. For example, the New York Times has adopted an architecture that in many respects resembles a typical blog. The newspaper includes various tools for sharing, an RSS feed, and it also includes a comments feature that allows readers to provide feedback, and also feedback on the feedback. Some of the reader comments can be elaborate and well crafted and serves to often augment the quality of an article by providing alternative viewpoints, references, and context. Readers can sort feedback according to reader perceived quality or the opinion of the editorial board.

The design architecture of a blog facilitates one-to-many communication primarily. It is not the easiest platform for multiple users to collaborate on articles or other types of content. The tool that better facilitates that kind of collaboration is a wiki, which allows multiple users to edit content. It keeps a record of all the changes made to a page. It allows users to revert to previous versions and each wiki has a section for comments where users can dialogue about a page without making edits to the actual live page.

In large part, organizations are using social media tools to become part of communities, especially those built around their brands. Brand communities have been shown to have positive effects on community markers, such as shared consciousness and obligations to society, which in turn have positive effects on value creation such as community engagement, impression management, brand trust, and brand loyalty [19].

Online communities facilitate consumer engagement through fan pages with contests, quizzes, games, prizes, and rewards [4, 31]. Fan page engagement has a positive effect on consumers' brand awareness, word of mouth activities, and purchase intention [15]. It can also extend the business cycle of media products and service through user generated content and the repurposing of media that consumers may learn about through community groups [29]. The intensity of the customer relationship with the product, brand, company, and other customers can influence outcomes such as trust and brand loyalty [18].

Online communities also allow organizations to glean market intelligence [5, 24, 31]. Based on the nature of community discussions, organizations can spot trends, issues, and more easily manage their brand [31]. Communities in which people are actively engaged and generating content, such as ratings or commentary, allows an organization to perform in depth analysis to assess levels of engagement, which can be measured by factors such as the number and frequency of posting and commenting, or the number of repeat visitors [24].

Communities formed around social media can help an organization better manage their reputation [24], but it is worth pointing out that managing reputation in online communities can be very challenging. Negative contributions on social media has been shown to greatly outweigh positive contributions [8]. Users may also be influenced by the nature of the prior comments left by others [22]. This suggests that organizations have to learn how to properly assess social media contributions.

Online communities made possible by various social media tools also facilitate communication, interaction, and collaboration not only among individuals [4] but also with employees of the organization itself [3, 24]. Collaboration can encourage individuals to work with organizations in addressing issues and in coming up with new ideas for innovative products [5, 24]. Online communities can facilitate and improve customer service and support [3, 24].

One of the challenges for organizations is learning how to interact with communities. The traditional marketing model was unidirectional; however, the communities formed and facilitated by social media require that organizations engage in relationship building and conversation. In fact, that is how organizations increasingly view using social media; it is to engage in and manage relationships [25]. Organizations have to become part of conversations and not dominate them. "It's about shaping the conversation by using various networking platforms, and using blogs, social media tools, and promotional tools to engage customers" [21].

Some say that customer relationship management has to evolve to become community relationship management and this requires a high level of connectivity that focuses on conversations, content creation, and collaboration [5]. In fact, one's marketing goals in social networking environments should be conversation, sharing, collaboration, engagement, and evangelism [30]. To the extent the advertising takes place, peer influence, ads seen as having informational or entertainment value and that are non-invasive, the extent to which the organization addresses privacy concerns, and ads that are congruent with the brand all contribute towards improving attitudes towards ads on social media in general [28].

Given the importance of community facilitation and engagement for organizations, the question arises as to how that can be established in the first place. It turns out that users have an inherent need for connection and community involvement, which can be characterized in a variety of ways [7, 13, 24, 26, 27]. For some, it is as basic as looking to stay in touch with friends and family. Fans of a product, hobbyists, or those interested in a particular art form, they may aspire to having group experiences. Others may be interested in discussions on topics of common interest, communication, finding friends, relationship building, image management, or finding support on an issue. Others may be driven by altruism and the desire to help and support others. Some may view online communities as a key to social identity and self-expression and a way to develop status and influence.

Some join online communities for entertainment; online communities can be a method of escape, relaxation, self-expression, diversion, mood management, inspiration, or a source of enjoyment and self-improvement [13, 26, 27]. Joining online communities, as an active, integral member, or as a casual observer is also driven by the user's need for information [7, 13, 26]. Communities can satisfy consumer need for research and awareness. Consumers can discover information that goes beyond what an organization will officially disseminate. Consumers want to follow news about products, services, organizations, and organizations that they care about. If there are issues with the quality of a product, problems regarding

warranties, poor customer service, this information is often revealed in online communities.

Some users are interested in learning how to better use a product and to also apply their knowledge and support each other. Online forums is often a way to find answers to specific technical problems and this is very common with respect to computer technology, for example, which benefits organizations; it allows the organization a way of providing additional customer support more cost-effectively to each other [24, 26]. Users look to product reviews, opinions, commentary, and the experiences of others and it influences buying decisions [4].

Of course, one of the prime reasons that organizations use social media is to facilitate the promotion of their products [5, 24, 29]. Social media enables organizations to more easily reach their target audience to support their public relations efforts [5]. It allows organizations to find and nurture opinion leaders [5]. An organization can amplify word of mouth, generate, buzz, and raise awareness [4, 5, 24]. It allows the company to engage in social selling. The opinions of others are generally more influential. If your friend, or someone like you, uses a product, you'll be inclined to use it to. [4]. By using various techniques, such as the sharing of "likes," it is easy to give the people in your social circles quick, easily digestible opinion nuggets that can influence their purchasing habits. To draw users a social media platform must also be secure and provide attractive content [23]. Peer influence, ads seen as having informational or entertainment value and that are non-invasive, the extent to which the organization addresses privacy concerns, and ads that are congruent with the brand all contribute towards improving attitudes towards ads on social media in general [28].

### **Web 2.0 Characteristics, Social Media, and New Media Theory**

Web 2.0 technologies allow for new forms of interactivity, collaboration, building, sharing, communication, and creative expression. There are numerous Web 2.0 technologies, but they generally can all be characterized as having a small distinct

set of properties and effects. According to Berthon et al. there are three main effects [6]:

- (1) There has been a shift in locus of activity from the desktop to the Web;*
- (2) there has been a shift in locus of value production from the firm to the consumer; and*
- (3) there has been a shift in the locus of power away from the firm to the consumer.*

Kietzman et al. observe that “social media comprise both the conduits and the content disseminated through interactions between individuals and organizations [17].” Matar and Qigang suggest that “social media is best understood as a group of new kinds of online media, which share most or all of the following characteristics: participation, openness, conversation, community, connectedness [4]. The barriers to participation and sharing are significantly reduced and sharing is encouraged.

Friedman and Friedman suggested that social media could be characterized by the 5Cs associated with New Media Theory — creativity, communication, collaboration, community, and convergence [11]. We believe that this theory can be extended to include by three additional factors — customization, connectivity, and cognizance.

*Creativity.* A core feature of every social media application is that it encourages the uploading of user generated content. Users are no longer passive consumers of information or entertainment. Increasingly, users are providing content that ranges from the very basic, such as a short commentary on a story, to highly produced material that is professional in quality, including music and video. Many budding artists are recording their performances and uploading it to websites such as MySpace and ReverbNation. Consumers are using inexpensive tools such as iMovie, Comic Life, and GarageBand to create original works and mashups.

*Communication.* Inherent in every social media application is the ability to connect with others and to share. The tools and the process may vary, but communication is

built into most social media applications. Several modalities are possible depending on the application. Blogs tend to facilitate a one-to-many form of communication. Email is largely a one-to-one or a one-to-few sharing modality. Tools such as Facebook's "likes" or rating systems can quickly and succinctly communicate an individual's overall attitude about a subject. Many social media tools maintain profiles and directories, and provide search tools that make it easy to find and make connections.

*Collaboration.* Most social media tools facilitate some degree of collaboration, but some tools manage and facilitate the process more efficiently and effectively. When a small number of people are involved, email can be adequate. But as the scope of a project increases, and the number of individuals involved rises, other tools become more suitable and can better facilitate the collaborative process. The wiki is the principle tool for collaboration, but even a blog can enable collaboration depending on the goals and on how the process is organized.

*Community.* Social media, as previously mentioned, facilitates the creation and development of online communities, which can often spill over into the physical world as evidenced by a site such as Meetup or many of the dating websites. Social media is inherently about making connections with others. The tools that make it easy find and connect to those with similar interests are deeply integrated into virtually all social media enhanced sites. It can be as simple as having an email link. Many sites allow you to connect directly and seamlessly with your Facebook community.

*Convergence.* As technologies mature, functionality is tending towards convergence. Mobile phones are less about making voice calls and more about replacing many of the functions previously done exclusively by computers, cameras, recording devices, televisions, and camcorders. Even a typical camera will also shoot video. Televisions can access the Internet and stream content. Companies such as Apple and Google emphasize a technical ecosystem that supports synchronization across all platforms



so that one can update their calendar on one device and have that information propagated across all their other devices.

*Customization.* Many social media technologies allow the user to customize their experience online. WordPress allows the user to customize the look and feel of site through the installation of various third party “skins.” An organization can offer a user a wide range of options on a website to an extent that is not possible on traditional entertainment platforms. Some social media technologies such as StumbleUpon allow the user to customize their website experience. GoogleMaps allows the user to create customized maps with points of interest that can be shared or incorporated into other websites.

*Connectivity.* Social media technologies are built for communication and increasingly are able to take advantage of continuous connectivity. Most blogs incorporate Really Simple Syndication (RSS) web feed that continually updates. Social media technologies are implemented on platforms that are constantly connected to broadband Internet, which also allows for continuous updating. Most of our devices are built to search for WIFI and 4G connections. Devices are often aware of their locations and are thus better able to provide relevant content. It is the reason that Google searches for French restaurants will not provide a listing for restaurants in Chicago, unless you happen to be in Chicago.

*Cognizance.* One of the outcomes of constant connectivity, the explosion of app development for mobile phones, the amount of personal data generated by users online, and the increasingly availability of online databases is the increasing knowledge that organizations have about users, and the augmented reality that users can experience. Searching for a restaurant in a large city is made easier with a website such as Yelp, which gathers feedback from users. The information provided not only allows the user to find a particular cuisine, but the community of users influence whether one should dine at a particular location. Foursquare is a location-based social networking website for mobile devices that allows users to check in and be found by other members of their social circle. Yobongo, which is now

defunct, was a website that allowed users to search for new friends in the immediate vicinity.

## **Marketing Platforms**

Any website can become marketing platform by incorporating social media functionality that realizes the full range of attributes defined by New Media Theory and by selecting the appropriate marketing vehicle. What is necessary is to identify the target audience and incorporate the appropriate mix of social media technologies. The idea of a marketing platform encourages marketers to address the overall strategy of the organization. The necessary tactics are a function of the marketing mix. This encourages holistic thinking regarding the strategic goals of the organization with respect to products, consumers, and outcomes, which should then drive the types of social media that should be used and how they should be managed. This is consistent with the idea of a social media ecosystem that enables marketers to think first in terms of overall strategy instead of tactics [12]. This concept requires that the targets of a media campaign, and how they use social media, are clearly identified; it also requires that marketers properly tailor the content and decide on the appropriate social media tools [12].

Of course, social media tools are not the only drivers of success for a marketing platform. The design, layout, vividness, interactivity, and various other features can impact outcomes such as the popularity of a site and the number of comments that are generated [9]. The professionally produced core content will also factor in driving users to a website. Designing the right marketing platform will depend on things such as target audience, product, how the target audience behaves online, and the type of message you want to deliver and how, and the level of control over how the message is disseminated [16].

Examples of potential marketing platforms include the following:

- *Social Networks:* Facebook, MySpace, Google+, Foursquare
- *Social Bookmarking Sites:* Digg, Delicious, Reddit, Pinterest

- *Content Communities:* YouTube, Flickr, Vimeo, Coursera, Huffington Post
- *Virtual Reality:* Second Life, Massively multiplayer online role-playing game (MMORPGs)
- *Market Makers:* Ebay, Ubid
- *Peer-to-Peer Commerce:* Craig's List, Loosecubs, Airbnb
- *E-tailer:* Amazon, Land's End, LL Bean
- *Portals:* Yahoo, Crackle, Google, Hulu, Netflix, Rhapsody
- *Wikis:* Wikipedia, AboutUs
- *Blogs:* Tumblr, LiveJournal, Twitter
- *Rating Sites:* Yelp, Angie's List

### ***No Me Hallo (2011): A Full-Fledged New Media Genre and Marketing Vehicle***

*No me hallo* was a romantic comedy webnovela about Luchita (Angélica Vale), a working class Hispanic woman (her father was Spanish and her mother Mexican) and former music star who found herself impoverished after her husband, who was also her manager, deserted her. Back with family in Ojai, California, she unsuccessfully tried to find her calling in minimum salary jobs: as a waiter in an Italian restaurant, as a car mechanic and, finally, as a maid, before she was hired to open a show as a singer and, simultaneously, offered a job as the spokesperson-model for a new soft drink: *Sierra Mist Natural*. “No me hallo” means literally “I can’t find myself,” but in this context it meant “I can’t find my calling,” as only singing and modeling, and not with the other jobs that she tried, the protagonist found it. Luchita ended up finding herself not only because she ended up singing a new genre (she used to perform traditional Mexican fare) but also because of her budding love affair with Abelardo (Harry Geithner), her music teacher.

Like *Vidas Cruzadas*, (2009) *No me hallo* was produced by Carlos Sotomayor and featured top stars. Megastar Angélica Vale had been a famous actress, singer and comedienne since childhood, being the daughter of another Mexican megastar actress and singer: Angélica María. Vale had recently been the protagonist of “*La fea más bella*” (“*The Most Beautiful Ugly Woman*”), which was Televisa’s *Ugly Betty* version. The fifteen episodes were made available at the [www.NovelasSeries.com](http://www.NovelasSeries.com) site every Monday, Wednesday and Friday for five weeks starting in May 16, 2011, and also accessible on the Univision Smartphone video applications. Following its full run online and on mobile, *No me hallo* premiered as a prime time television special on July 28, 2011 and became available at Univision on Demand.

Music was set to play a crucial role in this particular webnovela. Telenovelas and webnovelas always launch new releases as musical themes, but given that *No me hallo*’s protagonist is a music artist, she debuted three new songs, after five years of not recording. She authored one of these: *Miento (I lie)* along with Wendy Vera and

well-known composer Alejandro Jaén. Prince Royce, a bachata<sup>1</sup> singer hit single *Corazón sin cara* (*Faceless Heart*) was *No me hallo's* theme song. Royce had a cameo appearance in the webnovela since it ended as the protagonist opened his show singing her own songs [14].

*Sierra Mist* Natural, Kmart and State Farm were the main brands woven into *No me hallo's* story. *Sierra Mist* Natural kicked off its U.S. Hispanic advertising efforts with *No me hallo*, and prominently featured in [www.NovelasSeries.com](http://www.NovelasSeries.com), across Univision.com's online and mobile sites and within the Univision video application. It also created a Facebook fan page to promote its product integrations and drive viewers to watch the webnovela at [www.NovelasSeries.com](http://www.NovelasSeries.com). Kmart featured in *No me hallo* the Casa Cristina™ bed and bath home fashion collection of Univision's talk show host Cristina Saralegui and hosted a custom mobile and online mini-site for users to participate and for a chance to win cash prizes and Kmart gift cards to help them achieve their aspirations in the areas of family, education, home or career. State Farm was the exclusive sponsor of "¿Dónde está Luchita?" (Where is Luchita?) a spoof of the webnovela characters as they rose and fell from the spotlight. Users had the opportunity to create their own State Farm® jingle, which they could download to their mobile telephone and participate for a chance to win a sweepstakes. The special featured trivia, sneak peeks and behind-the-scene content. Additionally, a guest appearance of a State Farm® agent was woven into *No me hallo*.

Univision's president Cesar Conde told *Fast Company*, referring to *No me hallo*, that one element that they were testing was if they could bring well-known artists from the TV arena into the world of web and mobile [34]. This was part of Univision's broader strategy to experiment with interactive platforms, which evidently ushered the three Univision Interactive webnovelas: *Malena*, *Vidas* and *No me hallo*.

Advances in wireless technology have induced greater fiction consumption through cellular telephones, tablets, and other portable devices. It is estimated, in fact, that

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<sup>1</sup> Bachata is a musical genre from the Dominican Republic.

by 2017 more people will watch fiction on the small screen of portable, wireless devices than on television sets [2]. This should not be seen, however, as a threat to television but rather as an opportunity for the industry to diversify across platforms. Online news did not kill the newspaper industry; rather it transformed it, by pushing it on line, and, arguably, improved it. New media, in fact, never replace the old; rather they reorganize the media ecosystem. Radio did not replace the print media, television did not replace the film or the radio industry, and the latest “new media” developments are not dislodging their predecessors; rather they are forcing all these forms to converge on the Internet [10].

### *Webnovelas and Cultural Separatism.*

Like their predecessors in radio and television, *Webnovelas* constitute a complex marketing system. These stories, in fact, are ideal product placement and survey vehicles. The *Telenovelas*'s star system, which they share with *Webnovelas*, brings together actors, music performers, athletes and all sorts of celebrities. They thus strengthen the inter-promotional web through which Televisa/Univision in particular, and the Spanish-language media in general, build up brand equity and recognition.

Today, political strategists conceptualize constituencies as “markets.” It is no wonder, therefore, that the politicians woo Hispanic voters so intently and intensely through Spanish-language traditional and new media. Their vote is decisive not only in heavily Hispanic states but also in Presidential elections. For instance, President Obama sang “Mexico lindo y querido” during his 2008 debutante campaign, and adamantly opposes Arizona’s policies against illegal immigration.

Ironically, Hispanics are so ethnically, culturally economically and racially diverse that they have little in common among themselves other than the language, the Iberian—Catholic—roots of their countries of origin, the politicians and organizations that claim to represent them, and the Spanish language media they share. They are an artificial constituency to the extent that they label themselves

“Hispanic” under bureaucratic coercion. But this construct is so powerful that it moves billions of dollars in public and private funds. It has indeed, a life of its own and its validity is rarely questioned due to the industrial and political benefits of cultural separatism in the U.S.

Celebrities from the mainstream media like Jorge Ramos (Univision news), Maria Celeste Arraras (NBC Telemundo news) and Eddie [Piolín] Sotelo (Univision Radio) openly censor the use of the term “illegal” and promote “undocumented” instead, and demonize conservative figures that oppose illegal immigration. What seems to be human rights advocacy is in effect cultural separatism advocacy, that is, a defense of the markets that sustain the growing U.S. Spanish media.

There are three ways to conceptualize the Spanish-speaking audience of these media. As a market (U.S. Hispanic) refers to people of Latin American origin, illegal, legal or citizens, who live in the United States and identify with the Spanish language and Latin American culture. These are the constituencies forging the target markets of the 50-million people Hispanic “niche market”—66% of Mexican descent—and the ones that the U.S. media and politicians care to address. The Census Bureau estimates that about 23 million of these are citizens. Illegal immigrants are estimated to be from 11 to 20 million, which means that about 15 million Hispanic immigrants are actually legal (Immigration Policy Issues, 2010). The other two Spanish audiences are those who consume U.S. Spanish-language media products in Latin American countries and Spain, and the so-called Diaspora, which refers to those who live geographically apart, yet culturally connected to their countries of origin. Satellite and cable television and the Internet provide access to these countries’ media in the U.S. Although the audience that “counts” is national, the U.S. Spanish media’s audience is actually transnational, and that explains the nature of the Spanish-language media organizations of this Anglophone nation.

Hispanic demographic growth and the consequent affluence of its consumer market have been accompanied by a drastic increase in the online presence of this population [33]. As previously indicated, this growth has been fueled by the

availability of small screen wireless devices, such as smart phones and tables, and has increased the consumption of (video) fiction. In response to this change and to remedy the scarcity of Hispanic fiction on the U.S. small screen, Univision launched three webnovelas, *Mi adorada Malena* (*My Beloved Malena*, 2007), *Vidas cruzadas* (*Crossed Paths*, 2009) and *No me hallo* (*I Don't Find Myself*, 2011).

### *The Social Impact of the "New Media" on Producers and Immigrants*

The new media are transforming business and culture. The concept refers to the Web 2.0, that is, the new generation of online applications that made Internet content contingent and collaborative. A website best exemplifies the previous generation of Internet technologies, or Web 1.0. Users visit websites to retrieve, not to contribute or challenge information (Friedman, L.W. and Friedman H., 2008). *Wikipedia*, on the other hand, best exemplifies the Web 2.0. Over 30,000 contributors produce and edit content as in a perennial work in progress [1].

The so-called *mashup* phenomenon refers to the fusion of authored music with the music or sounds of amateurs to the point that these become difficult or impossible to discern (Hayes, 2008). The originality of the resulting piece is based in its non-originality. The music industry is vested in protecting intellectual property to secure its livelihood; but doing so may not apply to the new media content. *Webnovelas* are, in contrast, a genre that is open enough to welcome user collaboration and use this collaboration as marketing intelligence. This is particularly true with the fan fiction or *foronovela* that *Wikipedia* mistakenly refers to as *webnovela*.

Friedman and Friedman argued that the diverse lot of media technologies (blogs, wikis, mashups, computer-mediated social networking) although seemingly disparate, share a small set of principles that the authors refer to as the 5 C's: Communication, Collaboration, Community, Creativity and Convergence [10]. According to the *Wikipedia* definition of fan fiction as *webnovela*, the *telenovela* fans collaborate in creating a story as they communicate and forge a community, through converging radio, television, movies and print material. With the extension of New



Media Theory we can state that fans also customize their consumption experience, are increasingly cognizant of product information and other related features and issues, and are increasingly connected. No marketing research seems as effective as *webnovelas* and the new media to gather intelligence, for users contribute what they like the most: actors, songs, places, types of fiction and situations.

Research shows that business organizations have not been quick to welcome the spontaneous and participatory role of customers in product and service evaluation that the new media has made possible. Indeed, less than 5% of the Fortune 1000 companies currently use blogs strategically (Singh, T, Veron-Jackson, L. and Cullinane J, 2008). They see blogs and wikis as venting opportunities for people who do not know what they are talking about. Visionary companies have, however, made the best out of this, by monitoring blogs, wikis and podcasts and creating them for their own benefit.

In *webnovelas*, as well as in similar user-created stories, celebrities and popular genre work in favor of the media industries. The *Wikipedia* definition of *webnovela*, which, again, actually refers to fan fiction or *foronovelas*, depicts how fans incorporate existing actors and music into original stories that follow well-known narrative conventions. For example, *Los dias del Colegio de Santa Ana (The Days at Santa Ana School)* a Peruvian *webnovela* written by Alfil features famous actor Diego Bertie and it is about high school girls in a ritzy Lima school, thus articulating a well-known *telenovela* formula aimed at teenage girls (Alfil, 2010). This *foronovela* celebrates the genre and the stars, and by doing so, generates not only free marketing and content for the industry but also a site from which to monitor product impact and consumer likes.

*YouTube* (which, by the way, features a Univision channel) and the social network sites occasionally produce celebrities that are off the beaten track and base their celebrity on the amount of hits in their portal or site, that is, on becoming “viral.” These are maverick celebrities who may fabricate their own biography, and by doing so they produce fiction. As long as maverick celebrities do not compete with

those of the establishment or “star system” as *webnovela* material, a media organization like Univision can assert its hegemony through distribution across platforms and mashing: sentimental serial drama, new music hits, adventure narrative, game show, etc. That is, it is in the best interest of the television industry to increase their products and formula availability for Internet users to collaborate in creation.

Univision is in a position to leverage what seems to be its primary competitive advantage: in the world’s capital of television more Hispanics watch prime time TV than general market Anglophone viewers. For years the industry has worried that what happened to TV in the general market will also happen with the Hispanics, that is, that they will watch less network television and will instead go for cable and the Internet. It is known that young people of all ethnicities are heavy Internet users. As previously suggested, *La fea más bella*, Televisa’s *Ugly Betty* saw an unprecedented downloading of episodes, when it was broadcast in 2007. This “double dipping” suggests that the Internet does not necessarily compete with broadcasting but, to the contrary, supports it. Telenovelas create a bridge between the new generation and the old, between immigrants who live in the U.S. and their friends and relatives at their home countries. *Betty*, for example, appealed to both demographics. *Telenovelas*, or—to be more precise, “commercial sentimental serial drama”—is a genre that adapts to generational and media technology evolution [32]. It is a business genre to the extent that it embodies a recognizable format that stems from the 19<sup>th</sup> century women magazines, i.e. blending fiction and marketing, and it is one of the world’s most popular genres as well.

### *Managerial Implications*

The barriers of entry to produce webnovelas are low, but in the U.S. this is not how it plays out, as industry giant Univision is the one that benefits the most from this new media genre. A contributing factor seems to be that the traditional distributors of telenovelas such as Televisa may be losing some bargaining power because the Web format is more amenable to U.S. Hispanics than for Latin Americans, who do

not have nearly the same purchasing power. We do not think however, that the size, the purchasing power and the access to new media of its market is ultimately what determined Univision's hegemony. Telenovelas are popular and profitable in economically developed countries such as Spain, Italy and Israel, where consumers are as amenable to Web formats as the U.S. Hispanics, if not more. If U.S. Hispanic's computer literacy and purchasing power were what attracts them to webnovelas, why is it then that NBC-Telemundo and Azteca America, the two other Spanish-language/ telenovela-saturated networks of the U.S., do not produce these?

Rather than the size, the affluence and the computer friendliness of its consumer market, what determined Univision's hegemony regarding webnovelas is, in our view, primarily a combination of two factors: its assets and its privileged access to an international star system. Univision is at least three times the size of Telemundo in terms of broadcasting affiliates, production facilities and traditional and new media venues. More importantly, its history with Mexico's Televisa has been, albeit highly problematic, very long, and so has its history with Mexican-Americans. This population constitutes the largest segment among the U.S. Hispanics and is hence the most influential, overall, in the Spanish language media. It could be said that Univision and Televisa constitute together the global Latin American star system celebrity funnel. Argentineans, Colombians, Peruvians, Uruguayans, Cubans and U.S. Hispanics enter the telenovela hall of fame through Televisa stories that Univision broadcasts and promotes across-platforms in its non-fictional fare. Who else in the world but the Univision group would be in the position to, for example, offer Kmart, State Farm and Sierra Mist the cross-platform star-studded promotion embedded in *No me hallo?*

However, webnovelas carry portability limitations that telenovelas do not have. The freedom of seamlessly integrating brands into a webnovela story implies a compromise not widely seen in television drama. Television industry purchasers buy serials or series knowing that any commercials can be placed between segments and, providing that the story's product placement is not overly evident,

their broadcasting would not invite intellectual property or brand licensing controversy. In webnovelas the brands and products are too integral to the core story to be edited out. That inseparability between brands and story curtails webnovelas' licensed distribution, for which their launching is confined to the "channels" of a media organization.

While in Montreal, when one of the authors attempted to watch *No me hallo*, being outside of the U.S., he was denied access to [www.NovelasySeries.com](http://www.NovelasySeries.com). However, all 15 episodes were available in YouTube thanks to this new media outlet's grey areas regarding intellectual property and branding restrictions. Developing stories around brands and products allowed webnovelas to recover some of the radio drama marketing might of the narrator/announcer who associated brands and products to positive characters. But by doing so they lost the portability of television shows. These shows modular fragmentation for commercial breaks separate the fiction from the announcements, for which these stories adapt to a variety of broadcasting contexts. Simply put, a webnovela is too much of a creature of its own habitat to be, unlike telenovelas, readily sold to other media organizations.

Nevertheless, webnovelas share with telenovelas the marketing might of a Latin American global star system. Italian Gaetano Stucci, a Geneva-based European Union audiovisual industries delegate, declared at the *2010 Telenovela Festival and Market* in Argentina that the lack of a powerful, globalized star system works against Western Europe's ability to compete with the United States and Latin America in the international media market.<sup>2</sup> The examples cited in this article regarding foronovelas or fan fiction demonstrates how these user-generated stories incorporate real celebrities and in-fashion popular music but their dissemination is potentially curbed by intellectual property law and harnessed in the impossibility of a cross-platform and polyphonic presence. In brief, webnovelas and foronovelas emerge from a same star system, but only the former has what it takes to truly capitalize on it.

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<sup>2</sup> Author's notes.

Like telenovelas, is not in the nature of webnovelas to exclusively serve giant private media organizations. The Center for Disease Control, as well as a myriad of media institutions around the planet, use sentimental fiction as a vehicle of public health and development education. Nothing prevents anybody from producing webnovelas without stars for purposes like these, or just for the sake of community building entertainment. The fields of Health and Development Communication are full of cases in which serial fiction in all kinds of media have assisted in the prevention of domestic violence and sexually transmitted diseases, as well as in the promotion of literacy and tolerance toward disadvantaged groups. Any kind of webnovela could perform marketing or de-marketing for the public or the private sectors, for which they are likely to eventually mushroom discreetly. But defined as this article defined them: as industrially produced commercial fiction promoted across-platforms by a media behemoth serving a powerful consumer market, they can only be, at least for the moment, the offspring of Univision.

## **Marketing Platforms and Support for the Marketing Mix**

The discussion of the webnovela as an emerging marketing vehicle and new media genre highlighted the many ways in which the 4Ps of the marketing mix — product, place, price, and promotion — can be supported. With respect to the product, the marketer needs to develop, define, and describe the product, keeping in mind the product life cycle stage. Specifically, this means defining product features, accessories, availability, positioning, purpose, quality, service and support, usage occasions, warranties, and product variations. With regards to pricing, decisions regarding list price, payment and credit terms, bundling, potential discounts and special offers, have to be addressed. *Issues regarding promotion* involve raising awareness through advertising, word of *mouth* promotion, public relations, direct marketing, free gifts and samples, endorsements, advertising in various modes, sponsorships, personal selling, email marketing, and product placement. And finally, the issue of place involves decide on acquisition options and can include online sales, direct sales, retail, wholesale, or peer-to-peer acquisition.

### *The Marketing Vehicle*

The marketing vehicle can be based on a variety of formats, genres, subject matter, and topics. The organization must decide on the appropriate content for the target audience. This can be a function of demographic and psychographic profiles. It can be a function of needs, attitudes, and beliefs. It can be a function of geography and culture. Content can be used to discuss issues of importance to the target audience and interests, or it can be used strictly to provide entertainment, or both.

For the purposes of marketing products, messages can be explicit, external to the content in the form of advertising, for example, or it can be embedded in the form of product placement. The marketing messages can also be implicit, external to the content, or also embedded. In the webnovela *No Me Hallo* there were several instances of explicit product placement.

- As part of the storyline, the protagonist is offered a job as a spokesperson for the drink *Sierra Mist Natural*.
- The protagonist is often seen drinking *Sierra Mist Natural* and indicates her need to be refreshed.
- The protagonist becomes involved in producing a jingle for State Farm.
- The protagonist often mentions her desire for a full-bedroom set by Casa Cristina, a collection sold at Kmart, which also happens to clothe many of the characters in the webnovela *No Me Hallo*.

Support for the marketing mix here is clear. The webnovela describes product features, quality, and purpose. It does not directly indicate pricing for the products, but it does suggest the type of individual who would be able to afford the product. The products are promoted by being prominently featured and written into the script. The protagonist explicitly indicates where some of the products could be acquired.

### *Creativity*

By using various social media tools, organizations can facilitate and encourage creative expression, which can raise the level of engagement, source new ideas for products and accessories, and obtain feedback on the program or source ideas for new story lines. Options to elicit user-generated content are user ratings, reviews, commentary, suggestions, and other user generated content. The website hosting *No Me Hallo*, [novelaseries.univision.com](http://novelaseries.univision.com), has numerous features designed into the site to elicit user generated content. The most prominent are the many forums for commentary and discussion regarding the main storyline, side topics, and images.

The forums support the marketing mix by raising the level of engagement. It increases the likelihood that users will return to the site and spend time at the site. This creates opportunities for increased exposure to advertising and various forms of promotion. User generated commentary can provide the organization with

insights into the show, reveal trends, and indicate consumer sentiment towards the show and the several products highlighted.

### *Communication*

Building community requires the ability to find and connect with others. Options are numerous. The website hosting *No Me Hallo* include the ability to connect via email, chat rooms, social networks, and micro-blogs such as twitter. The tools enable users to connect with each other in different ways, asynchronously and synchronously. It can raise the level of engagement and provides opportunities for peer influence and the sharing of content and ideas. Users can share opinions regarding the program, the script, and on the many products showcased on the site. Users can discuss promotions, where to get the best deals, or anything else related to the program.

### *Collaboration*

The tools for collaboration on the website that hosts *No Me Hallo* are not extensive, but the opportunity is nonetheless there to support some limited forms of collaboration. The most notable tool is perhaps Pinterest, which allows users to “pin” articles of interest online. The pages can then be collected onto virtual boards that can be shared with others. Users could also collaborate using the communication tools on the site such as email and twitter. Collaboration supports the marketing mix by increasing the level of engagement. Higher levels of engagement tend to draw users to the site and allow for more exposure to various promotions and product information. Spending more time at the website also provides opportunities to notice and explore the various other properties associated with the product or brand. [Novelaseries.univision.com](http://Novelaseries.univision.com) has many other websites that offer a variety of products and services.

### *Community*

By providing various social networking options such as Facebook and Twitter, [Novelaseries.univision.com](http://Novelaseries.univision.com) facilitates the emergence and development of



communities surrounding its various webnovelas. This contributes to a certain level of engagement. It allows individuals with common interests to enjoy group experiences and share observations regarding the webnovela and share information regarding products, services, and the various features associated with the programming. Again the primary benefit as it relates to the marketing mix is to raise the level of engagement, improve attitudes towards the brand, possibly identify and motivate influencers.

### *Customization, Convergence, and Connectivity*

The ability to customize the website experience is likely to raise its appeal for users. It can mean that users will have flexibility regarding where, when, and how they are able to enjoy a webnovelas. The trend towards convergence and increasing connectivity also means increased flexibility regarding how, when, and where users can consume content. This can lead to more opportunities for viewing and, as a consequence, more opportunities for exposure to promotions.

### *Cognizance*

Cognizance benefits both the organization and the individual. The increased knowledge that organizations have of an individual can improve the targeting of ads and various other promotions depending on the stage of the buying decision process of the consumer. Devices are now location aware and so it is even possible to target promotions that are location sensitive. On the other hand, consumers also benefit through an increasing sense of augmented reality. It is much easier to discover information about a product, promotions, and product ratings. It allows users to become smarter consumers.

## **Conclusion**

The webnovela is an emerging genre that appeals to a large and growing Hispanic population. It is also a marketing vehicle that can anchor a social media infused

marketing platform that can take advantage of the many possibilities to support the marketing mix. The special characteristics of social media as defined by New Media Theory have had a large impact on the nature of marketing that now revolves around communities, relationships, and conversations.

The metrics for success outcomes are now very different. Increasingly, success is defined by engagement, increased trust, and increased brand equity. Social media technologies can be used to gain market intelligence. It can be used to identify the highly influential super-users. It can be used a source of ideas for product development, and as an early warning system should consumers begin to experience issues with their products.

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## **Efficiency Test of Kuwait Stock Market Using Fractal Analysis**

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### **Abstract**

The purpose of this study is to investigate whether the Kuwait stock market is efficient or not using fractal analysis. In this context, we use rescaled range analysis to estimate the fractal dimension of price returns and test the Efficient Market Hypothesis. This approach has a fewer assumptions about underlying system. The method has an advantage over the other tests of EMH, like the autocorrelation test, runs test, and simple volatility test, in which it doesn't assume normal distribution. It also allows for different distributions, fat tails, and power laws present in the time series, which is more close to reality. The findings of this study show evidence of long-memory in stock returns of Kuwait market.

# STATE-OWNED, FAMILY-OWNED AND PUBLICLY-OWNED FIRMS IN INDIA: FINANCIAL AND OPERATING PERFORMANCE AND CHARACTERISTICS

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## ABSTRACT

Using a unique data set, this study analyzes the financial and operating performance of State-Owned, Family-Owned, and Private Shareholder-Owned firms in India, in the period following the economic liberalization of the 1990s. Finance theories suggesting that firms should experience differences in performance based on (i) the organizational structure and corporate culture (ii) the agency costs in firms (iii) the presence of soft budget constraints, and (iv) contracting issues between owners and managers, are tested using samples of the three groups of firms. After adjusting for firm characteristics, we find that Family-Owned firms outperformed the other two groups, providing support for the existing theories.

**Keywords:** family-owned business; state-owned business; operating performance; financial performance; family control

## INTRODUCTION

The financial and operating performance of a firm has always been a topic of interest to the various stakeholders of the firm – management, employees, current and potential owners, creditors and suppliers, and customers. Academic research has established that ownership structure and ownership control of the firm plays a role in the decision making process, and consequently, on the performance of the firm. Astrachan and Shanker [5], Daily and Dolinger [6], Fama and Jensen [10], Heck and Stafford [13] and Sharma [19], among others, claim that family-controlled firms have better performance compared to non-family controlled firms. The difference in performance can be attributed to the use of different strategies, formal versus informal control systems and the associated monitoring costs, the scope for expanding the size of the firm, and the management expertise of the controlling ownership, among others. Similarly, Ding, Zhang and Zhang [9] and Anderson, Li, Harrison and Robson [2] show that state-owned and state-sponsored firms in China were lagging behind the family and shareholder owned firms in terms of operating performance. They attribute this to the redundant layers of bureaucracy, the soft budget constraints, and the pursuit of social goals in state-sponsored firms, as opposed to strong leadership, tight controls over budgets, and profit motives in family and shareholder owned firms.

This study analyzes the financial and operating performance of three groups of firms in India – state-owned or state-sponsored firms, family-owned and controlled firms, and private shareholder-owned firms. State-owned and state-sponsored firms (including public sector undertakings) have the government or government agencies as the majority owner of the firm and/or have an implicit guarantee from the government. Among shareholder-owned public firms, some firms have a majority ownership by an individual, a family, or a promoter group,

while other firms have ownership by diverse groups with no group having a majority. The ownership and management structure, and the decision making authority in these three groups should result in differences in performances, and would be reflected in the reported performance measures. In turn, the market would evaluate the firms accordingly.

The primary objective of this study is to compare the financial and operating performance of the three groups of firms during the period 1992-2008. Prior to this period, state-owned and state-sponsored firms played a major role in the Indian economy, along with a few firms in the private sector. Since the opening up of the Indian market following the economic liberalization policies of 1991, the private sector has been the driving force behind the phenomenal growth in the Indian economy. The private sector is made up of both firms with (majority) concentrated ownership in the hands of an individual, a family or a promoter group, and firms with diverse ownership with no group having majority ownership and control. The difference in the performance of the three groups of firms are explained in the context of ownership structure and its implication for the organizational structure and corporate culture, the agency costs, the presence of soft budget constraints, and contracting issues between owners and managers in the firms.

## **THEORETICAL BACKGROUND**

### **Family-Owned versus Non-Family-Owned Businesses**

Allouche, Amman, Jaussaud and Kurashina [1], Martinez, Stohr and Quiroga [16], Lee [14], Saravanan [18], Oswald, Muse and Rutherford [17] and McConaughy, Matthews and Fialko [15] summarize the various reasons for the difference in performance between family-owned businesses and non-family-owned businesses:

- (i) The concentrated ownership in family-owned businesses results in incentives to monitor managers and reduce agency costs. The objectives of the ownership and management in firms with concentrated ownership are less divergent, resulting in reduced agency and monitoring costs. The concentrated ownership has a lot of control and power to achieve the goals of the owners, resulting in higher values. An alternative view is that such concentrated ownership seeks to expropriate private benefits, such as related-party transaction and excessive compensation, resulting in lower values.
- (ii) Family-owned firms tend to have longer-term oriented goals and investment policies. Such firms have the ability to invest more efficiently and take less risk by postponing uncertain short-term investments. Further, they have a longer learning-curve in managing the firm efficiently. This sustains value over the long run. An opposing view here is that this perspective sacrifices the goal of maximizing profits for firm growth and firm survival.
- (iii) The longer-tenure of ownership, and consequently, the management of the firm, would result in enhancement of the reputation of the firm, which can help in reducing the cost of debt. However, the potential financial risk and distress associated with large amounts of debt may prompt such firms to select sub-optimal debt financing, resulting in loss of value.



(iv) Family-owned businesses maintain a consistent system of values in dealing with the various stakeholders and implement an organizational structure that maintains an intricate connection between the family and the business. This results in competitive advantages for the firm, especially in identifying and using resources. An opposing view is that since family-owned businesses tend to favor family members while filling management positions and in deciding on CEO succession, such decisions may turn out to be problematic for the future of the business.

Empirical research in the area of financial performance of firms tends to favor family owned and controlled firms over non-family owned and controlled firms. Anderson and Reeb [3], Dibrell and Craig [8], Martinez, Stohr and Quiroga [16], McConaughy, Matthews and Fialko [15], Allouche, Amann, Jaussaud and Kurashina [1] and Lee [14], among others, show that family owned firms have better performance compared to non-family owned firms, using both financial and non-financial measures. However, Oswald, Muse and Rutherford [17] using a sample of US firms, find support for the entrenchment theory, which states that as ownership concentration increases, the firm's performance declines, due to sub-optimal decisions made by the firm in managing human resources, using debt financing, and adopting goals and strategies inconsistent with value maximization. Silva and Majluf [20] also find similar results for family-controlled firms in Chile.

### **State-Owned versus Private Sector (Shareholder-Owned) Businesses**

Building on the theories for differences in performances between family-owned and non-family-owned businesses, Ding, Zhang and Zhang [9] suggests several reasons that may contribute to similar differences between state-owned firms and private sector companies.

(i) Principal-agent conflicts and agency costs can be significant in state-owned firms as the goals of the management of the firm and that of the owners of the firm (shareholders) are inconsistent. The management of the firm may pursue social and political goals at the expense of firm profits and firm value, resulting in poorer performance.

(ii) While private sector firms face market discipline and are subject to budget constraints, state-owned firms face soft budget constraints. Governments and government agencies often bail out state-owned and state-sponsored firms when their revenues are unable to cover costs, which make managers in such firms choose to invest in sub-optimal projects. When this imprudent behavior persists, it results in lower values for the state-owned firms. The absence of market discipline and the moral-hazard problem in state-owned firms should result in inferior performance, relative to private sector firms.

(iii) Owners of private sector firms are able to better monitor the activities of the managers and employees compared to the owners of state-owned firms. Owners of state-owned firms are less able to write complete contracts with managers due to the diverse nature of ownership. In the case of private sector firms, contracting ability is higher as a majority of the ownership seeks to accomplish similar goals and is more effective in reducing the need to provide incentives for management to improve performance.

(iv) The corporate culture and organizational structure of private sector firms allow them to quickly adapt to changes in external factors and to reallocate their resources accordingly. Private sector firms are usually smaller than state-owned firms, and this allows them to restructure their internal organization as and when needed. State-owned firms tend to be large and complex in their organization, and the decision making process is usually complex, redundant and time consuming. Consequently, state-owned firms tend to be less efficient compared to private sector firms.

## RESEARCH DESIGN

Given the above analysis, this study compares the performance of state-owned firms to that of private sector firms. Further, it also compares the performance of family-owned and controlled firms (with concentrated ownership) to that of non-family-owned and controlled firms (with diverse ownership). This comparison is made for firms India, which have a rich history of both state-owned and private sector firms. Further, it uses the time period 1992-2008, during when economic liberalization policies were implemented in India, allowing a free-market economy to thrive along with state-owned and state-sponsored enterprises. It was also a period when non-family-owned businesses were able to grow and expand due to the availability of financial resources.

## SAMPLE AND METHODOLOGY

The financial and operating performance of the three groups of firms is analyzed by constructing different samples from the universe of firms for which firm-level market prices and financial data are available. State-owned and state-sponsored firms are identified from two Government of India web sites (<http://www.goidirectory.nic.in> and <http://www.sarkaritel.com>). Among these firms, only those with traded market prices are included in this study. Two samples of private sector firms are constructed – (i) Family-Controlled firms which have majority ownership by an individual, a family or a promoter group, and (ii) Non-Family-Controlled firms which do not have majority ownership by an individual, a family, a promoter group, or a combination of the three. Ownership data for individual firms were collected from the annual reports through *Mergent Online*. Only firms with ownership data and market prices are included in the two samples of private sector firms. Firm-specific financial data and market prices for all three groups of firms are obtained from *Datastream*. Table 1 shows the characteristics of the firms used in this study. The sample is made up of 399 firms for which data is available; 64 of the firms are classified as State-Owned Firms, 174 of the firms are classified as Family-Controlled firms, and 161 firms are classified as Non-Family-Controlled firms. The mean of the share holdings by an individual, a family or promoter group is 49.40%, and the median value is 50.64%. Based on this, for the purpose of classification, a firm with share holdings by an individual, a family or promoter group above 50% is classified as a Family-Controlled firm. If the share holding by the groups is less than 50%, then the firm is classified as a Non-Family-Controlled firm.

Table 1 shows that State-Owned firms in our sample are significantly larger than Family-Controlled and Non-Family-Controlled firms. Specifically, the average total assets of State-Owned firms is INR 399.39 million, while it is only INR 35.54 million for the private sector

**Table 1**  
**Characteristics of Study Sample**

<b>Variable</b>	<b>All Firms</b>	<b>State-Owned Firms</b>	<b>Family-Controlled Firms</b>	<b>Non-Family-Controlled Firms</b>	<b>Family-Controlled and Non-Family-Controlled Firms</b>
Number of Firms	399	64	174	161	335
Total Assets (in INR)					
Mean	93,200,824	399,390,486	24,592,352	41,789,692	33,541,567
Median	9,051,755	137,003,150	5,134,646	8,586,761	6,636,443
Sales (in INR)					
Mean	34,415,283	116,705,767	17,718,320	18,974,183	18,373,536
Median	6,875,109	38,268,800	4,574,170	6,327,398	5,469,876
Age (in years)					
Mean	39.22	48.44	34.90	40.18	37.44
Median	33.00	42.00	28.00	34.00	31.00
Holdings by Family/ Controlling Individual/ Promoters (%)					
Mean	NA	NA	64.65	32.92	49.40
Median	NA	NA	63.71	35.32	50.64

Note: This table shows the number of firms and, the mean and median values of total assets, sales, age of the firm since incorporation and share holdings by controlling groups for sub-samples of the 399 firms used in the study.

firms. Similarly, the average sales revenue for the former is INR 116.71 million, while it is only INR 18.37 for the latter. The average age of State-Owned firms is slightly larger than that for the private sector group (48.44 years versus 37.44 years). Within the private sector firms, the sales revenues for both sub-groups of firms are similar (INR 17.72 million for Family-Controlled and INR 18.97 million for Non-Family-Controlled firms). However, Non-Family-Controlled firms are larger in size than Family-Controlled firms (INR 41.79 million versus INR 24.59 million). The average share holding for the Family-Controlled firms is 64.65%, while it is 32.92% for the Non-Family-Controlled Firms.

To analyze the financial performance of the three groups of firms, monthly returns for each of the firms in the sample are computed for the period 1992-2008. The monthly returns for each firm are adjusted for the market movements by computing the market-adjusted monthly returns.

The market-adjusted monthly returns, which measures the monthly excess returns over the monthly returns of the market index, are averaged across each group of firms, and then cumulated over time. In terms of market performance, Family-Controlled and Non-Family-Controlled firms are identical for the entire period. However, the performance of the state-owned firms as opposed to the private-sector (or publicly-owned) firms has been different. The cumulative market-adjusted returns for the private sector firms has been higher for almost all intervals starting at 1992, but the difference has narrowed in the most recent time frame. It should be noted that the use of more sophisticated methods to compute market-adjusted returns may yield different results.

This study uses nine different performance measures to analyze and compare the operating performance of State-Owned, Family-Controlled and Non-Family-Controlled firms:

- (1) revenue per employee – the sales revenue divided by the number of employees
- (2) revenue per cost – the sales revenue divided by the operating expenses
- (3) profit per employee – the net income divided by the number of employees
- (4) return on equity – the net income divided by the shareholders' equity
- (5) return on assets – the net income divided by the total assets
- (6) market to book ratio – the market value of equity divided by the book value of equity
- (7) Tobin's Q – the market value of the firm plus total liabilities divided by the total assets
- (8) net profit margin – the net income divided by sales revenue
- (9) total asset turnover – the total assets divided by sales revenue

Revenue per employee and revenue per cost measure the firm's operating efficiency in using its labor and controlling its costs. Profit per employee and net profit margin measure the firm's overall profitability and efficiency in using its labor and managing its costs. The return on assets, total asset turnover and return on equity are indicators of economic profitability and efficient asset utilization. Finally, the Tobin's Q and market-to-book ratio can be viewed as the market's evaluation of the firm's performance.

A methodology similar to the one used in Ashenfelter and Card [4], Ding, Zhang and Zhang [9] and Frydman, Grey, Hessel and Rapaczynski [11] to evaluate standard panel data is employed here. The regression model used is:

$$Y_{it} = b_0 + b_1SD_{it} + b_2CV_{it} + \varepsilon_{it} \quad (1)$$

where, *i* indexes individual firms;

*t* indexes time (year);

$Y_{it}$  the dependent variable, is the performance measure for firm *i* in year *t*;

$SD_{it}$  stands for Sample Dummy, the treatment variable equal to 1 if the firm belongs to the sample group being studied and 0 if the firm belongs to the reference group;

$CV_{it}$  stands for Control Variables.

The control variables used are Firm Size (measured by the natural log of the total assets), AGE (measured by the natural log of the number of years since incorporation), STDDEV, (a proxy for risk, measured by the standard deviation of the monthly returns over 1992-2008), LEVERAGE (measured by the total liabilities over total assets) and Asset Tangibility (measured by the fixed

assets over the total assets). The control variables are used to control for the differences in characteristics of the three groups of firms which may tend to have an impact on firm performance. Several studies have documented that State-Owned firms, Family-Controlled firms and Non-Family-Controlled firms differ in firm sizes, in mortality rates, in strategies used, in control systems implemented, in the age of the firm, and in the leverage used by them. (For example, see Daily and Dolinger [6], McConaughy, Matthews and Fialco [15], Davis [7] and Gallo, Tapies and Cappuyns [12]).

In the regression tests, the coefficient of the treatment variable  $SD$ , measures the difference in the performance between the two groups being tested in the regression. An insignificant coefficient  $b_1$  indicates that there is no difference in the performance measure of the two groups of firms. A positive and significant coefficient  $b_1$  indicates that the performance of the first group of firms ( $SD = 0$ ) is inferior to that of the second group of firms ( $SD = 1$ ).

## **SUMMARY OF EMPIRICAL RESULTS**

### **Univariate Analysis**

The results generally show that State-Owned firms are larger in size, use more leverage and have been around for a longer time compared to private sector firms. However, they have less asset tangibility and have lower risk. Further, their market-to-book ratio and Tobin's Q are significantly lower than that of private sector firms. Also, their total asset turnover, return on assets and revenue per cost are significantly lower. However, the return on assets and revenue per employee are significantly higher for State-Owned firms relative to that of private sector firms. Further, Family-Controlled firms are smaller in size, and Non-Family-Controlled firms, use less leverage, and have less asset tangibility compared to Non-Family Controlled firms. In terms of all the performance measures, Family-Controlled firms have higher median values compared to Non-Family-Controlled firms. One implication of these results is that for the regression tests, all control variables have to be included.

### **Comparison of Family- and Non-Family-Controlled Firms with State-Owned Firms**

Family-Controlled and Non-Family-Controlled firms have superior performance compared to State-Owned firms when performance is measured by revenue per unit cost, return on equity, return on assets, market-to-book ratio, Tobin's Q and total asset turnover. In terms of profit per employee and net profit margin, there is no difference between the two groups. The only performance measure that indicates that State-Owned firms have a better performance is revenue per employee. There is clear evidence that the group of Family-Controlled and Non-Family-Controlled firms outperform the State-Owned firms in our sample.

### **Comparison of Family-Controlled Firms with Non-Family-Controlled Firms**

The regression analysis provides some evidence that Family-Controlled firms have better performance compared to Non-Family-Controlled firms. This result is consistent with the

findings of several other studies that document the better performance of family businesses relative to non-family businesses.

## **DISCUSSION AND CONCLUSION**

In this study, the performance of state-owned firms, family-owned firms and non-family-owned firms are compared to one another. To conduct the analysis, a sample of firms in India during the period 1992-2008 is selected, and classified into the three groups. Private sector firms with share holdings by an individual, a family-group or a promoter group that exceeds 50% are classified as family-owned firms; otherwise, they are classified as non-family-owned firms. The three groups are compared in terms of their monthly average market-adjusted returns and nine different performance measures related to operating performance, asset utilization, profitability and market based ratios. Univariate tests of means and means and medians are conducted to identify any differences in the three groups. Finally, regression analysis is used to differentiate the performance measures of the three groups, after controlling for size, leverage and risk.

The cumulative monthly market-adjusted returns of the three groups indicate that the performances of the family-owned firms and non-family-owned firms are similar to one another. The returns for both these groups are superior to that of state-owned firms. This evidence that the market values private sector firms higher than state-owned firms on a market-adjusted basis is preliminary evidence that the latter group has inferior performance relative to the former.

The univariate tests of the means and medians show that the three groups have significant differences in sizes, leverage, age, asset tangibility and leverage. Consequently, when comparing the three groups, the comparison measures have to be controlled for these variables. The tests also show that the several of the nine performance measures are significantly different for the three groups.

The regression tests show that the performances of state-owned firms are inferior to that of private sector firms. This is consistent with the results found by Ding, Zhang and Zhang [9]. State-owned firms suffer from agency problems that increase costs, lack of market discipline that reduce efficiency, a complex organizational structure that leads to inflexible decision making processes, and higher monitoring costs. These are reflected in the lower performance measures for the state-owned firms relative to private sector firms. The tests also show that family-owned firms have slightly better performance compared to non-family owned firms. This result can again be explained by the lower agency costs and superior monitoring activities in the case of family-owned firms. Further, family-owned firms have longer-term goals which reduce risk-taking behavior by management, and have access to low cost debt. Consequently, their operating performance measures are superior to that of non-family-owned firms. This result is consistent with that of Anderson and Reeb [3], Dibrell and Craig [8], Martinez, Stohr and Quiroga [16], McConaughy, Matthews and Fialko [15], Allouche, Amann, Jausaud and Kurashina [1] and Lee [14], which find that family-owned businesses perform better than non-family-owned businesses.

**[Tables and Figures are not included here and are available upon request from the author]**

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## **CAMPUS SUSTAINABILITY: TO LEED OR NOT TO LEED**

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### **ABSTRACT**

As sustainability research and applications increase, so does the belief among people that they are owed safe and comfortable spaces that respect the environment. A recent survey conducted by Princeton Review states that the majority of students and their parents are making acceptance decisions based on a university's environmental commitment [1]. Assessing the sustainability of a built environment can be a difficult task. One of the leading building certification and assessment systems called Leadership in Energy and Environmental Design (LEED) has been measuring the sustainability of buildings in five major categories: Sustainable Sites (SS), Water Efficiency (WE), Energy and Atmosphere (EA), Materials and Resource (MR), and Indoor Environmental Quality (EQ). The performance of buildings in all of these categories can vary and be directly related to the level of their sustainability. Although students in the Princeton Review survey state that they would rather live and study on campuses that are more sustainable, it is unclear what sustainability aspect of their built environment they consider to be more crucial. Authors addressed a part of this question in the past by measuring the importance students give to each LEED category and how their choices relate to their environmental responsibility. Results of the authors' previous studies showed that when the cost of LEED categories remained constant at 1% of an addition to school tuition, students ranked the importance of LEED categories at different levels. The study presented in this paper takes this approach a step further by eliminating the 1% constant cost and allowing students to choose a percentage on a sliding scale to express how much they are willing to pay for improvements categorized under five LEED categories. Results presented in this paper show that students are willing to pay an average of 3.71% of their tuition to increase the sustainability of their campus based on five LEED categories. Among different LEED categories students are willing to pay the most for improvements in the EA category. Improvement in the EA category can be summarized as establishing high levels of energy efficiency for the campus buildings, increasing the use of on-campus and/or grid source renewable energy and reducing ozone depletion while minimizing direct contribution to global warming. Results of this study may allow universities to decide if it is feasible to invest in LEED certified buildings on their campuses. It may also help administrators decide how much to invest in various aspects of LEED certified buildings as well as how to market those efforts to prospective students.

**Sustainability, LEED, Green Buildings, Sustainability Marketing**



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<http://www.princetonreview.com/college-hopes-worries.aspx>

# **RE-CONSTRUCTING A DISCOURSE ON THE PHILOSOPHY OF HIGHER EDUCATION IN THE PROFESSIONAL SCHOOLS: FOSTERING SUSTAINABILITY IN AN EVOLVING TECHNOLOGICAL AND FINANCIAL ENVIRONMENT**

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## **ABSTRACT**

Higher education must adapt to the current evolving technological and financial environment in order to survive. The purpose of this paper is to suggest ethnographic change theory as a framework for the discourse regarding the philosophy of higher education in the professional schools. This theory gives us an approach to thinking about the potential impact of environmental changes on the philosophy of higher education. Understanding the philosophy of higher education in the context of change theory can facilitate development of administrative and faculty strategies that support institutional sustainability while maintaining the integrity of its mission.

**Keywords:** citizen science, ethnographic change theory, higher education, philosophy of education, sustainability

## **I. INTRODUCTION**

Higher education must adapt to the current evolving technological and financial environment in order to survive. This environment challenges the traditional philosophy of education, which must be re-considered by the academy in light of these changes. The sustainability of the academy may depend on how it re-defines its philosophy and forwards its mission.

Among the many sources of tension surrounding discourse about higher education today is reconciliation of multiple, and sometimes conflicting, views of the world. Expectations of stakeholders, including students, parents, employers, and trustees may be under re-consideration in light of changing expectations of both costs and benefits of traditional higher education. Natural resistance to change, encouragement to maintain the status quo from both unions and tenured faculty, and requirements of accrediting bodies all add to the variety of voices and perspectives.

The current economy exerts financial pressure on both public and private institutions of higher education. The financial value of formal teaching and learning in the traditional university classroom is under more scrutiny than ever. The value of higher education in the professions is weighed against the probability of employment after graduation as well as starting salaries, in order to justify spending and debt accumulation. On-line for-profit educational institutions tout convenience, individual pace, and flexibility. The number and variety of free Massive Open Online Courses (MOOCs) are rapidly increasing and can offer high quality content that rivals the traditional.

Technology has brought wider access to content and pedagogical material on-line in both formal programs and informal tutorials. Emerging interconnected technologies transcend not only physical barriers of space and time but also provide public access to traditional academic jurisdictions and privileged functions previously available only to scholars. A result of the access to content, citizen science has thrived in many disciplines, challenging both the qualifications and full time nature of the academic research function. Otherwise unavailable data may be available at public library internet sites, for example some public libraries provide free premium access to Morningstar Investment Research Center, once available only to investment professionals and educational institutions.

In order to survive, the academy is under pressure to justify its cost as it competes with this proliferation of non-traditional education. The university must offer more transparency than ever before in order to show its value publicly. Further, higher education must emphasize its role as a pantheon of scholarship by engaging public discourse and collaboration.

The philosophy of higher education is of current interest both because the evolving environment demands change and because a traditional philosophy was never completely unified. The purpose of discourse is to construct a common ground for establishing a shared philosophy. Discourse is generally regarded as a formal conversation describing a topic within a community, and provides common ground for establishing a shared philosophy. The discourse which surrounds higher education extends beyond notions of what can be learned, read, thought, said, taught, and recorded. By its nature, discourse gives rise to definitions of and challenges to power. As a result, the higher education discourse also includes who, when, where, and how teaching and learning can or should take place, and what authority entitles the teacher and learner to participate in teaching and learning.

Brubacher (1977) championed a unified philosophy of higher education, citing multiple philosophies that fell short of an integrated whole. He posited that higher education was associated with a higher level of sophistication which was equally valuable in each discipline. The privilege of the academic was apportioned to those “obviously qualified”, with its value generally unchallenged, and with little incentive for public engagement, accessibility, transparency, and accountability.

Since Brubacher’s time, digital technology has emerged as the dominant technology, replacing paper as the primary medium for the storage and mass communication of ideas. This significant change in the ways of recording and communicating scholarship has created urgency to address the lack of a unified philosophy of higher education that represents the full spectrum of experiences. Such philosophy should offer a framework capable of addressing and gauging tensions in academic discourse.

One movement to cope with this changing environment has been the encouragement of interdisciplinary studies and the crossing of traditional boundaries. Moss (2011) used Serendipity by Design (SD) to explain an updated variation of Brubacher’s greater sophistication in higher education. SD describes a process to deliberately foster “an environment in which the kinds of unlikely and seemingly random connections that spark truly big ideas not only happen but can’t help but happen.” Moss articulated the necessity for providing open access to accumulated

knowledge, facilitating active engagement, promoting open access to knowledge, and welcoming and affirming diversity and different ways of knowing and doing.

This paper provides a framework for a discourse in a philosophy of higher education in this changing environment. The framework employs elements of Turner's (1985) change theory, which describes drama or disharmonic social processes arising from conflict situations. This framework provides a tool for establishing systemic reference points for dialogue in the academy towards a unified philosophy of higher education.

The purpose of this paper is to suggest ethnographic change theory as a framework for the discourse regarding the philosophy of higher education. This theory gives us an approach to thinking about the potential impact of environmental changes on the philosophy of higher education. Sustainability of the academy as currently defined and perceived is predicated on its ability to respond to changes while maintaining the integrity of its mission. Understanding the philosophy of higher education in the context of change theory can facilitate development of administrative and faculty strategies that support institutional sustainability.

This paper is organized as follows. In section II, Turner's theory of change is described, along with empirical studies which applied this theory in the educational environment. Section III describes the methodology employed in our review of the current state of the academy, as well as the limitations of our review. In section IV, the paper cites evidence and analysis regarding changes to the academy which have already occurred from the technological and financial pressures. The paper concludes in section V with a discussion of the changes in the context of the theory of change and suggests implications for a re-construction of higher education philosophy

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## THE IMPACT OF SUPPLY CHAIN COORDINATION ON THE ENVIRONMENT

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### ABSTRACT

Environmental responsibility has become an important ingredient to do business. The increased awareness of customers about the environment and the governmental regulations are pushing supply chain entities to minimize any negative influence of their operations on the environment, so much so that companies in today's world have to take joint responsibility with their suppliers for the environmental impact of their actions. In this paper, we study coordination and contracting between a buyer and a vendor under the existence of three emission regulation policies; cap, tax, and cap-and-trade. We investigate the impact of decentralized and centralized replenishment decisions on the total carbon emissions.

The buyer in this system faces deterministic, constant demand for a single product in the infinite horizon. The vendor produces at a finite rate and makes deliveries to the buyer on a lot-for-lot basis. Both the buyer and the vendor aim to minimize their average annual costs resulting from replenishment set-ups and inventory holding. It is worth noting that joint replenishment decisions in this setting have been previously studied by [1] and [2]. Different than these studies, we explicitly model the carbon emissions of the buyer and the vendor resulting from inventory holding, production/ordering setups, and procurement. We also assume the existence of a governmental emission regulation in the form of a tax policy, a cap policy, or a cap-and-trade policy.

The paper provides decentralized and centralized models for the buyer and the vendor to decide their ordering/production lot sizes under each policy. The solutions due to independent and joint decision-making are then compared both analytically and numerically. Finally, coordination mechanisms are proposed for this system to increase its profitability. It is shown that, even though such coordination mechanisms help the buyer and the vendor decrease their costs without violating the emission regulations, they may result in increased carbon emission under certain circumstances.

**Environmental regulations, buyer-vendor coordination, supply-chains**

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# USE OF MULTI CRITERIA DECISION MAKING TO SIMULTANEOUSLY ADDRESS DISASSEMBLY COST, RECYCLING AND CO<sub>2</sub> SAVING RATES

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## ABSTRACT

Environmental issues in supply chains have been serious for not only global warming but also material starvation. End-of-life assembly products at recycling factories should be disassembled environmentally and economically in consideration of not only low carbonization but also material circulation. Parts with higher recycling and CO<sub>2</sub> saving rates should be selected and manually disassembled, however, the manual disassembly brings higher cost instead of crushing the parts. Moreover, these parts selection also affects a disassembly line balancing.

This paper addresses the disassembly cost, recycling and CO<sub>2</sub> saving rates simultaneously for an optimal environmental and economic parts selection in a disassembly system design, and uses a multi criteria decision making among them to harmonize the low-carbon and closed-loop supply chains for the EOL assembly products by the disassembly.

**Keywords:** Closed-Loop and Low-Carbon Supply Chain, Environmentally-Conscious Manufacturing, Sustainable Manufacturing, Integer Programming with  $\varepsilon$  constraint

## INTRODUCTION

Nowadays, it is important not only to prevent global warming by low-carbon supply chain [1] but also to prevent material starvation by closed-loop supply chain [2]. Its promotion of the both closed-loop and low-carbon supply chains require disassembly systems which recycle End-of-Life (EOL) assembly products for recovery [3]. In the disassembly systems, parts/materials with higher CO<sub>2</sub> volumes should be disassembled in order to increase the CO<sub>2</sub> saving rate which decreases CO<sub>2</sub> emissions required for new production. On the other hand, ones with higher recycling rate should be also disassembled for material circulation. Nevertheless, ones with lower recycling cost should be also pursued for an economical realization at the same time. Therefore, the parts selection by non-destructive or destructive disassembly should be optimized in terms of the recycling rate, CO<sub>2</sub> saving rate and cost (profit). In addition, it is necessary to optimize disassembly line balancing since the disassembly precedence relationships are changed with the part selections.

This paper addresses the disassembly cost, recycling [4] and CO<sub>2</sub> saving [5] rates simultaneously for an optimal environmental and economic parts selection in a disassembly system design [4], and uses a multi criteria decision making among them by 0-1 Integer Programming with  $\varepsilon$  constraint [6][7] to harmonize the low-carbon and closed-loop supply chains for the EOL assembly products by the disassembly.

$$C = \sum_{j=1}^N c_j x_j \rightarrow Min \quad (1)$$

$$R = \sum_{j=1}^N r_j x_j \rightarrow Max \quad (2)$$

$$E = \sum_{j=1}^N e_j x_j \rightarrow Max \quad (3)$$

Subject to:

$$R \geq \varepsilon_{Re} \quad (4)$$

$$E \geq \varepsilon_{CO2} \quad (5)$$

In addition, another constraint of disassembly task precedence relationships is also set based on [11][12].

Based on the disassembly parts selection at the stage 1, the disassembly line balancing using 0-1 Integer Programming [6] is carried out at Stage 2. The objective function at the stage 2 is set as equation (6) for minimizing total number of stations under the parts selection [10].

$$\sum_{s=K_0+1}^K ky_{k,|J_{select}|} \rightarrow Min \quad (6)$$

Also, the constraints of the line balancing [11][12] are set based on [10].

### **DESIGN EXAMPLE OF DISASSEMBLY SYSTEM WITH MULTI CRITERIA OPTIMAL PARTS SELECTION FOR DISASSEMBLY COST, RECYCLING RATE AND CARBON EMISSIONS**

In order to validate the proposed design procedure of the disassembly system, an example of the assembly product and the disassembly problem is prepared. The prepared product example in this study is a cleaner [13] where their basic product/parts information is obtained with 3D-CAD. Using the Integer Programming with  $\varepsilon$  constraint, the Pareto optimal solutions are obtained for not only the recycling rate and cost but also the CO2 saving rate and cost by GLPK [14]. Since the CO2 saving rate for a part “motor” is too large for 95% of the whole in the example, it is assumed that the motor is certainly disassembled and that the total percentage of the CO2 saving rate is shown except the motor in this study.

Figures 1 and 2 show the behaviors of the recycling cost for the respective recycling and the CO2 saving rates in the case of the cleaner. The recycling cost basically increases as the recycling or the CO2 saving rate increases. Thus, the both recycling and the CO2 saving rates show the same tendency, however, each behavior is fluctuating by each part. One of the reasons is that the CO2 saving rates depend on material types for each part, therefore, the recycling rates of it are different from the CO2 saving ones. With the value of  $\varepsilon$ , even when cost is the same, the recycling and CO2 saving rates fluctuate each other.

In order to choose the parts selection which perform the disassembly line balancing at the stage 2, a scenario “(Recycling rate + CO2 saving rate) and cost coexistence” is here considered and discussed. As example of the disassembly problem is set as follows: Production Planning Period  $T_0 = 8,400$  [min] and Demands  $Q$  for collected EOL products during  $T_0 = 12,000$ .

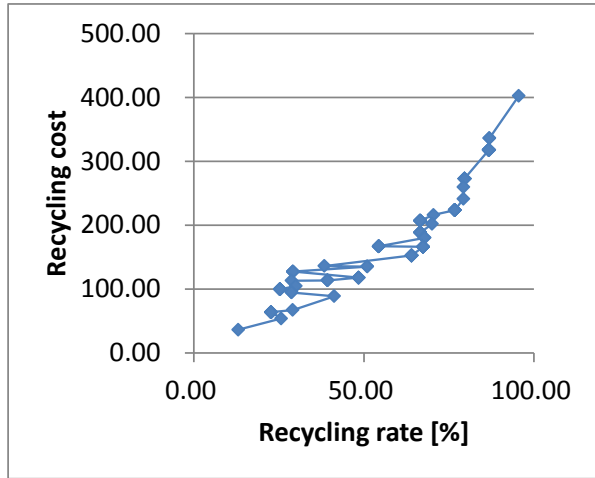


Figure 1 Behavior of recycling cost for recycling rate in the case of the cleaner

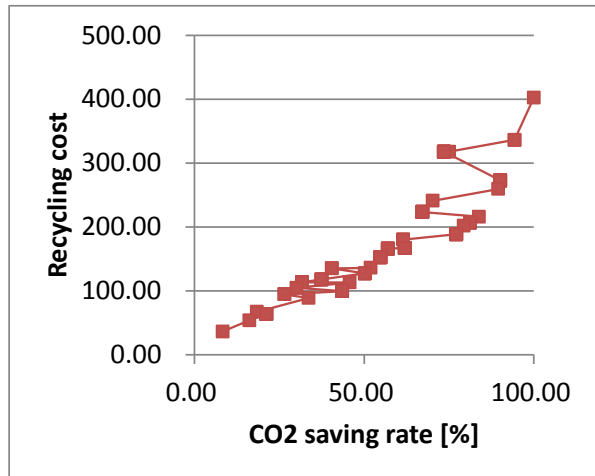


Figure 2 Behavior of recycling cost for CO2 saving rate in the case of the cleaner



## ACKNOWLEDGMENTS

This research was partially supported by the Japan Society for the Promotion of Science (JSPS), Grant-in-Aid for Young Scientists (B), 23710182 from 2011 to 2014 and the Environment Research and Technology Development Fund (E-1106) of the Ministry of the Environment, Japan.

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# OPTIMIZATION OF TRANSPORTATION OF PRODUCTS WITH MULTIPLE PERIODS FOR REVERSE SUPPLY CHAINS

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## ABSTRACT

In this paper, two multi-period models are proposed for a remanufacturing system, which is an element of a Reverse Supply Chain (RSC), and illustrated with numerical examples. The first model is solved using mixed integer linear programming (MILP) where the second model is solved using linear physical programming (LPP). The proposed models deliver the optimal transportation quantities of remanufactured products for N-periods within the reverse supply chain.

**Keywords: disassembly; reverse supply chains; mixed integer programming; physical programming; multi-period.**

## 1. INTRODUCTION

Lately, there has been an upward interest in reverse supply chains fueled by environmental deterioration. Firms include reverse flows to their systems for multiple reasons such as environmental and economic factors, government regulations and public demands. The augmentation of reverse flows in traditional supply chains necessitates making multiple, and often, conflicting decisions.

In this paper, the focus is on achieving the transportation of the right quantities of products (used, remanufactured and new) for multiple periods within a reverse supply chain while satisfying certain constraints. Two models to address this problem are proposed and illustrated using numerical examples. The first model is formulated using mixed integer linear programming (MILP). In order to capture the multi-objective aspect of the problem, the second model is formulated using linear physical programming (LPP).

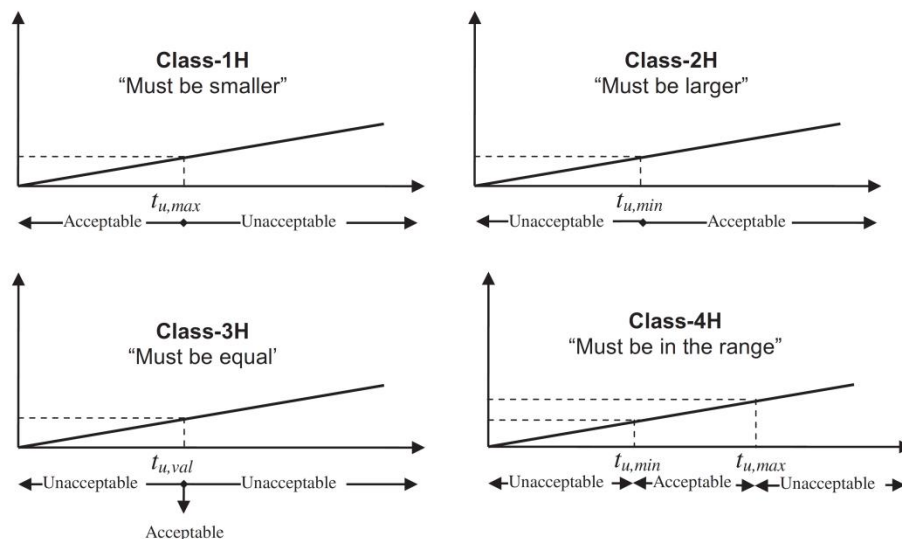
This paper is organized as follows. The next section presents a brief overview of linear physical programming. The notations used in this paper are given in Section 3. The mixed integer

linear programming formulation is presented in Section 4 and a numerical example given in Section 5. Section 6 and section 7 describe the proposed multi-period physical linear programming formulation and provide a numerical example, respectively. Finally some conclusions are given in Section 8.

## 2. LINEAR PHYSICAL PROGRAMMING

LPP is a multi-criteria decision making (MCDM) tool developed by Messac et al. 1996. In an LPP system there are four hard classes for constraints, and four soft classes for objectives. For a standard objective function, hard and soft class functions are illustrated in Figure 1 and 2, respectively. [1]

In Figure 2, six ranges are defined (viz., ideal, desirable, tolerable, undesirable, highly undesirable and unacceptable) for the objective functions in each class with corresponding target values ( $t_{u,s}$ ). In LPP, each objective ( $g_u$ ) belongs to a class and the piecewise linear class function ( $z_u$ ) is minimized. To preserve the piecewise linear nature, LPP make use of conditional programming. Since the class function keeps changing for each desirability range and must be minimized, the formulation needs to be in the following form: "IF  $g_u$  is in Class  $S$  THEN minimize the linear function  $z_u^s$ ". As a result, the deviations ( $d_{u,s}^+, d_{u,s}^-$ ) from the target values are used as the weighted sum of the objective function. In this form, the model conforms to the requirements of linear programming (LP). It should be noted that the weights in this function are calculated using linear physical programming weight (LPPW) algorithm [1][2]. See Ilgin and Gupta [3] for a review of the state of the art physical programming literature.



**Figure 1:** Hard classes function for Linear Physical Programming [4]

### 3. NOTATION

The nomenclature used in this paper is given below:

- $S_1$  Space occupied by one unit of remanufactured product (square units/product)
- $S_2$  Space occupied by one unit of used-product (square units/product)
- $CAP_v$  Capacity of remanufacturing facility  $v$  to remanufacture products
- $R_{ut}$  Cost per product retrieved at collection center  $u$  at period  $t$  (\$/product-period)
- $SH_u$  Shortage cost at collection center  $u$  per period  $t$  (\$/product-period)
- $H_u$  Holding cost at collection center  $u$  per period  $t$  (\$/product-period)
- $D_w$  Demand of re-processed products in demand center  $w$  (products/period)
- $X_{uvt}$  Decision variable representing the number of products to be transported from collection center  $u$  to remanufacturing facility  $v$  at period  $t$
- $Z_{vwt}$  Decision variable representing the number of products to be transported from remanufacturing facility  $v$  to demand center  $w$  at period  $t$
- $P_{vt}$  Cost of re-processing per product at remanufacturing facility  $v$  at period  $t$  (\$/product-period)

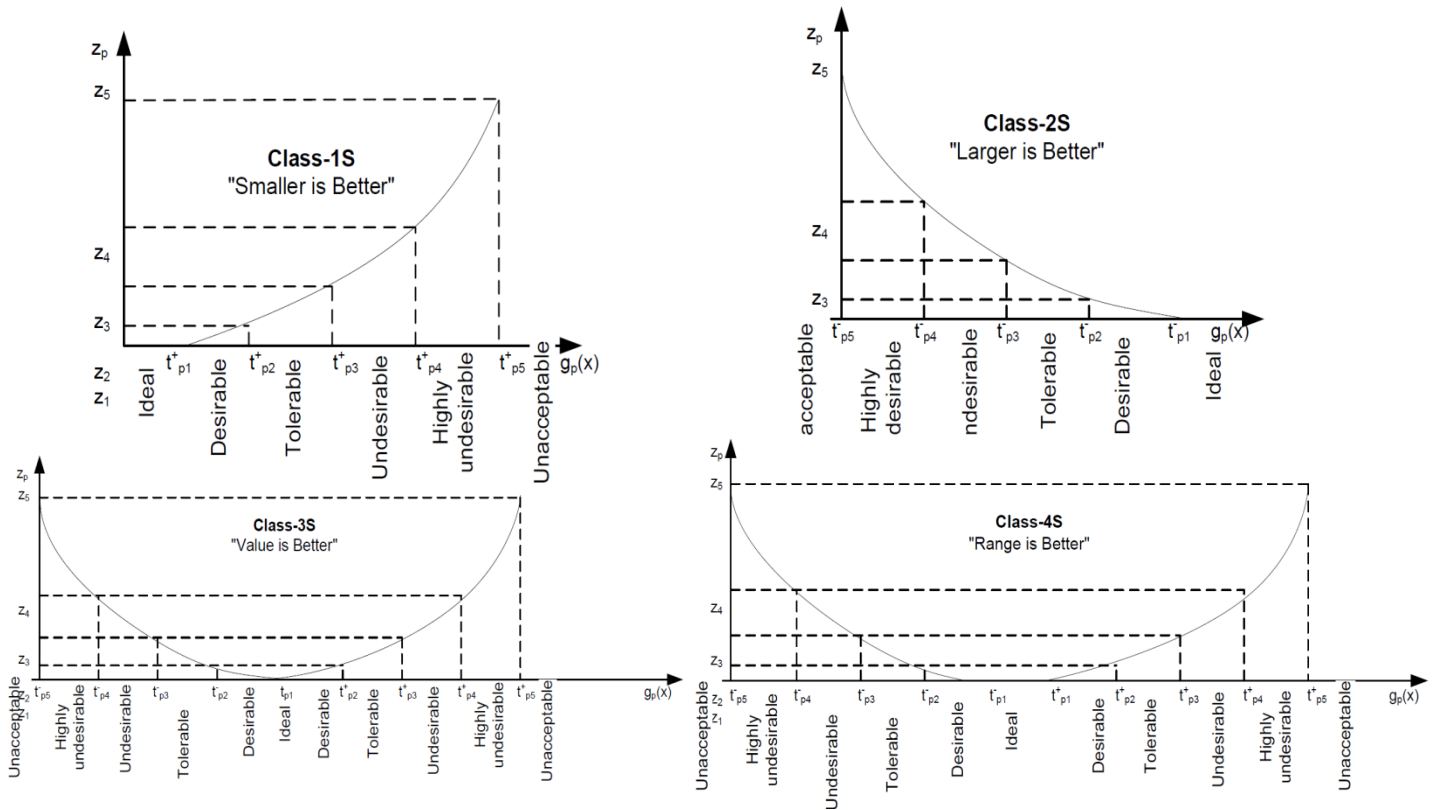


Figure 2: Soft Classes Functions for Linear Physical Programming [5]

- $C_u$  Storage capacity of collection center  $u$  for used products (square units)
- $C1_v$  Storage capacity of remanufacturing facility  $v$  for remanufacturing products
- $C2_v$  Storage capacity of remanufacturing facility  $v$  for used products (square units)
- $C_w$  Storage capacity of demand center  $w$  for remanufactured products (square units)
- $SUP_{ut}$  Supply at collection center  $u$  at period  $t$  (products/period)
- $TX_{uvt}$  Cost of transporting one product from collection center  $u$  to remanufacturing facility  $v$  at period  $t$  (\$/product-period)
- $TZ_{vwt}$  Cost of transporting one product from remanufacturing facility  $v$  to demand facility  $w$  at period  $t$  (\$/product-period)
- $u$  Collection center
- $v$  Remanufacturing facility
- $w$  Demand Center
- $t$  Periods number (i.e.  $t=1 \rightarrow$  1st period)
- $Y_v$  Binary variable (0/1) for selection of remanufacturing facility  $v$

#### 4. MIXED INTEGER LINEAR MODEL FORMULATION

The model formulates a multi-period mathematical model for the right mix and quantity of goods to be transported within the RSC and employs mixed integer linear programming technique to solve it. The model when solved identifies simultaneously the most economical used-product to re-process and the right mix and quantity of goods to be transported within the RSC. The final demand for the product is met either with new or remanufactured products. The model assumes that inventory cost of a used product at the remanufacturing facility is 25% of its retrieval cost ( $R_{ut}$ ), and for a remanufactured product it is 25% of its remanufacturing cost ( $P_{vt}$ ).

##### Minimize

$$\begin{aligned}
 \text{Retrieval costs} & \quad \sum_u \sum_v R_{ut} X_{uvt} + \\
 \text{Transportation costs} & \quad \sum_u \sum_v TX_{ut} X_{uvt} + \sum_v \sum_w TZ_{vwt} Z_{vwt} + \\
 \text{Remanufacturing costs} & \quad \sum_v \sum_w P_{vt} Z_{vwt} + \\
 \text{Inventory costs} & \quad \sum_u \sum_v \frac{R_{ut}}{4} \cdot X_{uvt} + \sum_v \sum_w \frac{P_{vt}}{4} \cdot Z_{vwt} + \{(D_w - SUP_{ut}) \cdot (Y)\} \cdot H_{ut} + \\
 \text{Shortage costs} & \quad \{(D_w - SUP_{ut}) \cdot (1 - Y)\} \cdot SH_{ut}. \tag{1}
 \end{aligned}$$

##### Subject to

Demand at each demand center must be met for all periods.

$$\sum_v Z_{vwt} \geq D_w ; \forall w, t \quad (2)$$

Total output of each remanufacturing facility is at most its total input.

$$\sum_u X_{uvt} \geq \sum_w Z_{vwt} ; \forall v, t \quad (3)$$

Total space occupied by remanufactured products at each remanufacturing facility is at most its capacity.

$$\sum_w S_1 \cdot Z_{vwt} \leq C_{1v} \cdot Y_v ; \forall v, t \quad (4)$$

Total space occupied by used products at each collection center is at most its capacity.

$$\sum_v S_2 \cdot X_{uvt} \leq C_u ; \forall u, t \quad (5)$$

Total space occupied by used products at each remanufacturing facility is at most its capacity.

$$\sum_u S_2 \cdot X_{uvt} \leq C_{2v} \cdot Y_v ; \forall v, t \quad (6)$$

Total space occupied by remanufactured products at each demand center is at most its capacity.

$$\sum_v S_1 \cdot Z_{vwt} \leq C_w \cdot Y_w ; \forall w, t \quad (7)$$

Quantities of transported products are non-negative numbers.

$$X_{uvt} \geq 0 ; \forall u, v, t \quad (8)$$

Total output of each remanufacturing facility is at most its capacity to remanufacture.

$$Z_{vwt} \geq 0 ; \forall w, v, t \quad (9)$$

Total quantity of used products supplied to remanufacturing facilities by each collection center is at most the supply to that collection center

$$\sum_w Z_{wvt} \leq CAP_v ; \forall v, t \quad (10)$$

$$\sum_v X_{wvt} \leq SUP_u ; \forall u, t \quad (11)$$

## 5. MILP NUMERICAL EXAMPLE

The example considers three periods, three collection centers, two remanufacturing facilities, and three demand centers. Let the supply of the used product per period be the  $SUP_{11}=SUP_{21}=SUP_{31}=SUP_{12}=SUP_{22}=SUP_{32}= SUP_{13}=SUP_{23}=SUP_{33}= 211.11$ . The other data used for implementation of the model are as follows:

$$R_{11} = 29; R_{21} = 25; R_{31} = 37; R_{12} = 29; R_{22} = 25; R_{32} = 37; R_{13} = 29; R_{23} = 25; R_{33} = 37; TX_{1A1} = 3; TX_{2A1} = 4; TX_{3A1} = 5.3; TX_{1A2} = 3; TX_{2A2} = 4; TX_{3A2} = 5.3; TX_{1A3} = 3; TX_{2A3} = 4; TX_{3A3} = 5.3; TX_{1B1} = 3.2; TX_{2B1} = 1.4; TX_{3B1} = 6.7; TX_{1B2} = 3.2; TX_{2B2} = 1.4; TX_{3B2} = 6.7; TX_{1B3} = 3.2; TX_{2B3} = 1.4; TX_{3B3} = 6.7; TZ_{A11} = 2.6; TZ_{B11} = 3.2; TZ_{A21} = 3.4; TZ_{B21} = 2.5; TZ_{A31} = 1.6; TZ_{B31} = 2.1; TZ_{A12} = 2.6; TZ_{B12} = 3.2; TZ_{A22} = 3.4; TZ_{B22} = 2.5; TZ_{A32} = 1.6; TZ_{B32} = 2.1; TZ_{A13} = 2.6; TZ_{B13} = 3.2; TZ_{A23} = 3.4; TZ_{B23} = 2.5; TZ_{A33} = 1.6; TZ_{B33} = 2.1; P_{A1} = 4; P_{B1} = 4.3; P_{A2} = 4; P_{B2} = 4.3; P_{A3} = 4; P_{B3} =$$

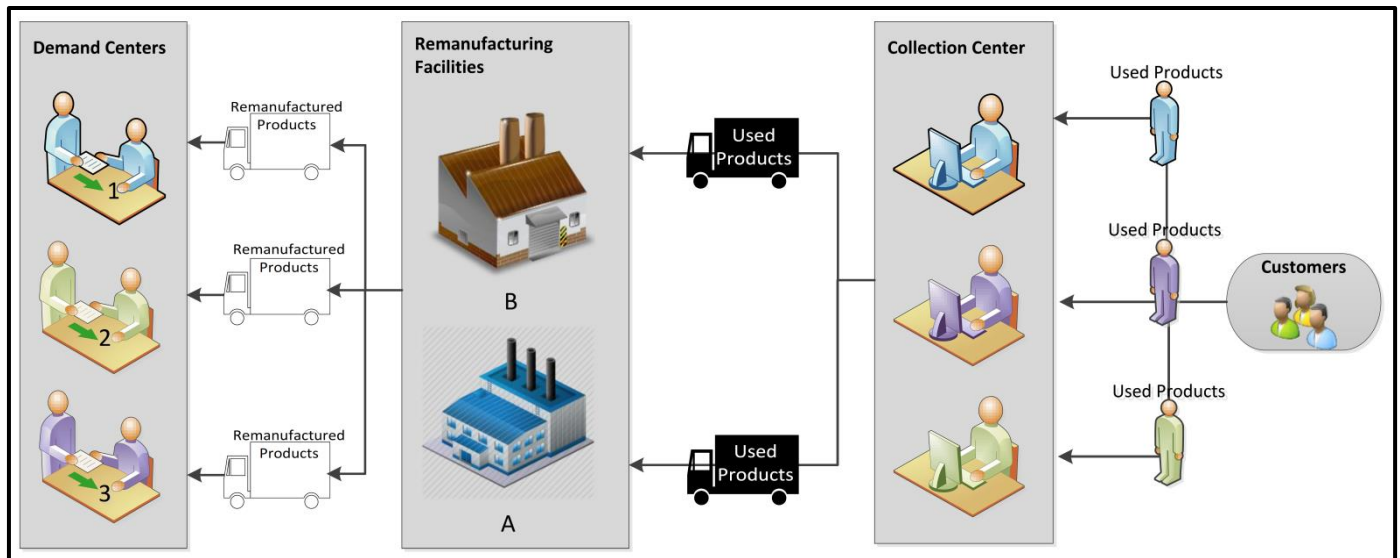
4.3;  $D_{11}= 200$ ;  $D_{21}= 300$ ;  $D_{31}= 250$ ;  $S_1=S_2=0.5$ ;  $C_{1A}= 550$ ;  $C_{1B}= 550$ ;  $C_{2A}= 550$ ;  $C_{2B}= 550$ ;  $C_1 = 550$ ;  $C_2 = 550$ ;  $C_3 = 550$ ;  $C_w = 500$ ;  $CAP_A = 400$ ;  $CAP_B = 350$ ;  $H = 2$ ,  $SH = 3.75$ .

Using LINGO 14.0 the following optimum solution is obtained:

**Table 1:** Optimum value of number of products to be transported from collection center  $u$  to remanufacturing facility  $v$  in period  $t$

Period ( $t$ )	Collection Center ( $u$ )					
	1		2		3	
	Remanufacturing Facility ( $v$ )		Remanufacturing Facility ( $v$ )		Remanufacturing Facility ( $v$ )	
	A	B	A	B	A	B
1	$X_{1A1} = 0$	$X_{1B1} = 0$	$X_{2A1} = 0$	$X_{2B1} = 171$	$X_{3A1} = 0$	$X_{3B1} = 0$
2	$X_{1A2} = 0$	$X_{1B2} = 212$	$X_{2A2} = 189$	$X_{2B2} = 212$	$X_{3A2} = 0$	$X_{3B2} = 23$
3	$X_{1A3} = 0$	$X_{1B3} = 0$	$X_{2A3} = 0$	$X_{2B3} = 0$	$X_{3A3} = 0$	$X_{3B3} = 0$

$X_{uv}$  = number of products transported from Remanufacturing facility  $v$  to Demand Center  $w$  in period  $t$ .



**Figure 3:** Reverse supply chain for both models for each period

**Table 2:** Optimum value of number of products to be transported from remanufacturing facility  $v$  to demand center  $w$  in period  $t$

Period ( $t$ )	Remanufacturing Facility ( $v$ )					
	A			B		
	Demand Center ( $w$ )			Demand Center ( $w$ )		
	1	2	3	1	2	3
1	$Z_{A11} = 0$	$Z_{A21} = 0$	$Z_{A31} = 0$	$Z_{B11} = 117$	$Z_{B21} = 0$	$Z_{B31} = 0$
2	$Z_{A12} = 84$	$Z_{A22} = 300$	$Z_{A32} = 17$	$Z_{B12} = 0$	$Z_{B22} = 0$	$Z_{B32} = 234$
3	$Z_{A13} = 0$	$Z_{A23} = 0$	$Z_{A33} = 0$	$Z_{B13} = 0$	$Z_{B23} = 0$	$Z_{B33} = 0$

$Z_{vw}$  = number of products transported from Remanufacturing facility  $v$  to Demand Center  $w$  in period  $t$ .

## 6. LINEAR PHYSICAL PROGRAMMING MODEL FORMULATION

The focus here is to achieve the right quantities of products (used, remanufactured, and new) to be transported within the RSC while satisfying customer demands. In this model the decision-making

criteria for a RSC is presented in terms of ranges of different degrees of desirability. The model considers a generic RSC consisting of collection centers, remanufacturing facilities, and demand centers. The following are the cost and revenue criteria which are included in the methodology.[6]

### 6.1 Class 1H criteria

Total Retrieval cost per period ( $h_1$ ) given by

$$h_1 = \sum_u \sum_v R_{ut} X_{uvt}; \forall t \quad (12)$$

### 6.2 Class 1S criteria (smaller is better)

Total Transportation cost per period ( $g_1$ ) given by

$$g_1 = \sum_u \sum_v T X_{ut} X_{uvt} + \sum_v \sum_w T Z_{vwt} Z_{vwt}; \forall t \quad (13)$$

Total *Remanufacturing* cost per period ( $g_2$ ) given by

$$g_2 = \sum_v \sum_w P_{vt} Z_{vwt} \forall t \quad (14)$$

Total *Inventory* cost at remanufacturing facilities per period ( $g_3$ ) given by

$$g_3 = \sum_u \sum_v \frac{R_{ut}}{4} \cdot X_{uvt} + \sum_v \sum_w \frac{P_{vt}}{4} \cdot Z_{vwt}; \forall t \quad (15)$$

Total *Inventory* cost at demand centers per period ( $g_4$ ) given by

$$g_4 = [\sum_u \sum_v Z_{uvt} - D_w] \cdot h \cdot Y; \forall t \quad (16)$$

Total *shortage* cost per period ( $g_5$ ) given by

$$g_5 = [\sum_u \sum_v Z_{uvt} - D_w] \cdot Sh \cdot (Y - 1); \forall t \quad (17)$$

### 6.3. Goal constraints

$$h_1 \leq \text{RETMAX} \quad (\text{Retrieval cost is not more than maximum allowed value}) \quad (18)$$

$$g_p - d_{pr}^+ \leq t_{p(r-1)}^+ \quad (\text{Deviation is measured from corresponding target value}) \quad (19)$$

$$g_p \leq t_{p5}^+ \quad (\text{Criterion value is in acceptable range}) \quad (20)$$

$$d_{pr}^+ \geq 0 \quad (\text{Deviation is nonnegative number}) \quad (21)$$

### 6.4. System constraints

$$\sum_v Z_{vwt} \geq D_w; \forall w, t \quad (\text{Demand at each demand center must be met for all periods}) \quad (22)$$

$$\sum_v X_{wvt} \leq \text{SUP}_u; \forall u, t \quad (\text{All products must be transported from each collection center}) \quad (23)$$

$$\sum_w Z_{vwt} = X_{uvt}; \forall v, t \quad (\text{Number of remanufactured products is equal to number of used ones}) \quad (24)$$

$$\sum_u S_2 \cdot X_{uvt} \leq C_{2v}; \forall v, t \quad (\text{Space occupied by used products is at most its capacity}) \quad (25)$$

$$X_{uvt} \geq 0; \forall u, v, t \quad (\text{Quantities of used products are non-negative numbers}) \quad (26)$$

$$Z_{uvt} \geq 0; \forall w, v, t \quad (\text{Quantities of remanufactured products are non-negative numbers}) \quad (27)$$



## 7. LPP NUMERICAL EXAMPLE

The example considers three periods, three collection centers, two remanufacturing facilities, and three demand centers. Let the supply of the used product per period be the  $SUP_{11}=75$ ;  $SUP_{21}=150$ ;  $SUP_{31}=25$ ;  $SUP_{12}=75$ ;  $SUP_{22}=150$ ;  $SUP_{32}=25$ ;  $SUP_{13}=75$ ;  $SUP_{23}=150$ ;  $SUP_{33}=25$ . The other data used for implementation of the model are as follows:

$R_{11} = 0.1$ ;  $R_{21} = 0.1$ ;  $R_{31} = 0.1$ ;  $R_{12} = 0.1$ ;  $R_{22} = 0.1$ ;  $R_{32} = 0.1$ ;  $R_{13} = 0.1$ ;  $R_{23} = 0.1$ ;  $R_{33} = 0.1$ ;  $TX_{1A1} = 0.02$ ;  $TX_{2A1} = 0.2$ ;  $TX_{3A1} = 0.1$ ;  $TX_{1A2} = 0.02$ ;  $TX_{2A2} = 0.2$ ;  $TX_{3A2} = 0.1$ ;  $TX_{1A3} = 0.02$ ;  $TX_{2A3} = 0.2$ ;  $TX_{3A3} = 0.1$ ;  $TX_{1B1} = 0.1$ ;  $TX_{2B1} = 3$ ;  $TX_{3B1} = 1.2$ ;  $TX_{1B2} = 0.1$ ;  $TX_{2B2} = 3$ ;  $TX_{3B2} = 1.2$ ;  $TX_{1B3} = 0.1$ ;  $TX_{2B3} = 3$ ;  $TX_{3B3} = 1.2$ ;  $TZ_{A11} = 4$ ;  $TZ_{B11} = 1$ ;  $TZ_{A21} = 5$ ;  $TZ_{B21} = 0.1$ ;  $TZ_{A31} = 0.04$ ;  $TZ_{B31} = 0.2$ ;  $TZ_{A12} = 4$ ;  $TZ_{B12} = 1$ ;  $TZ_{A22} = 5$ ;  $TZ_{B22} = 0.1$ ;  $TZ_{A32} = 0.04$ ;  $TZ_{B32} = 0.2$ ;  $TZ_{A13} = 4$ ;  $TZ_{B13} = 1$ ;  $TZ_{A23} = 5$ ;  $TZ_{B23} = 0.1$ ;  $TZ_{A33} = 0.04$ ;  $TZ_{B33} = 0.2$ ;  $R_{A1} = 0.2$ ;  $R_{B1} = 0.3$ ;  $R_{A2} = 0.2$ ;  $R_{B2} = 0.3$ ;  $R_{A3} = 0.2$ ;  $R_{B3} = 0.3$ ;  $d_{11} = 90$ ;  $D_{21} = 80$ ;  $D_{31} = 80$ ;  $D_{12} = 90$ ;  $D_{22} = 80$ ;  $D_{32} = 80$ ;  $D_{13} = 90$ ;  $D_{23} = 80$ ;  $D_{33} = 80$ ;  $S_1=S_2=0.5$ ;  $C_{2A} = 400$ ;  $C_{2B} = 400$ ;  $H = 2$ ;  $SH = 3.75$ .

The target values for each soft criterion are shown in table 3, and the incremental weights obtained by LPPW algorithm [1][2] are shown in table 4.

**Table 3:** Preference Table for the LPP Model

Criteria	$t_{p1}^+$	$t_{p2}^+$	$t_{p3}^+$	$t_{p4}^+$	$t_{p5}^+$
<i>g</i> <sub>1</sub>	100	200	300	400	500
<i>g</i> <sub>2</sub>	150	250	290	450	600
<i>g</i> <sub>3</sub>	70	150	250	300	450
<i>g</i> <sub>4</sub>	100	200	300	400	500
<i>g</i> <sub>5</sub>	70	150	250	300	450

**Table 4:** Output of LPPW Algorithm

Criteria	$\Delta\omega_{p2}^+$	$\Delta\omega_{p3}^+$	$\Delta\omega_{p4}^+$	$\Delta\omega_{p5}^+$
<i>g</i> <sub>1</sub>	0.025	0.085	0.132	0.024
<i>g</i> <sub>2</sub>	0.017	0.011	0.026	0.479
<i>g</i> <sub>3</sub>	0.013	0.031	0.881	0.012
<i>g</i> <sub>4</sub>	0.025	0.085	0.132	0.024
<i>g</i> <sub>5</sub>	0.013	0.031	0.881	0.012

Using LINGO 14.0 the following optimum solution is obtained:

**Table 5:** Optimum value of number of products to be transported from collection center *u* to remanufacturing facility *v* in period *t*

Period ( <i>t</i> )	Collection Center ( <i>u</i> )					
	1		2		3	
	Remanufacturing Facility ( <i>v</i> )		Remanufacturing Facility ( <i>v</i> )		Remanufacturing Facility ( <i>v</i> )	
	A	B	A	B	A	B
1	$X_{1A1} = 0$	$X_{1B1} = 0$	$X_{2A1} = 0$	$X_{2B1} = 0$	$X_{3A1} = 0$	$X_{3B1} = 0$
2	$X_{1A2} = 80$	$X_{1B2} = 4$	$X_{2A2} = 0$	$X_{2B2} = 0$	$X_{3A2} = 0$	$X_{3B2} = 95$
3	$X_{1A3} = 25$	$X_{1B3} = 0$	$X_{2A3} = 0$	$X_{2B3} = 0$	$X_{3A3} = 22$	$X_{3B3} = 25$

$X_{uv}$  = Number of products transported from collection center *u* to recovery facility *v* in period *t*.

**Table 6:** Optimum value of number of products to be transported from remanufacturing facility  $v$  to demand center  $w$  in period  $t$

Period ( $t$ )	Remanufacturing Facility ( $v$ )					
	A			B		
	Demand Center ( $w$ )			Demand Center ( $w$ )		
	1	2	3	1	2	3
1	$Z_{A11} = 0$	$Z_{A21} = 0$	$Z_{A31} = 0$	$Z_{B11} = 0$	$Z_{B21} = 0$	$Z_{B31} = 0$
2	$Z_{A12} = 0$	$Z_{A22} = 80$	$Z_{A32} = 0$	$Z_{B12} = 44$	$Z_{B22} = 0$	$Z_{B32} = 52$
3	$Z_{A13} = 0$	$Z_{A23} = 0$	$Z_{A33} = 29$	$Z_{B13} = 47$	$Z_{B23} = 0$	$Z_{B33} = 0$

$Z_{vwt}$  = Number of products transported from Remanufacturing facility  $v$  to Demand Center  $w$  in period  $t$ .

## 8. CONCLUSION

The multi-period transportation problem was evaluated in this paper using two models. The used products purchased from a number of consumers were sent to collection centers in order to process them in remanufacturing facilities to satisfy the various demands at the demand centers during different periods. The main objective was to find the optimum transportation policy of the right mix and quantities of goods within the RSC. MILP and LPP were used to model the problem.

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# **Organizational Capabilities as a Solution to the Problem of Government Inertia: The Case of T-Government and Big Data**

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## **ABSTRACT**

This work-in-progress paper examines the specific organizational constructs that can lead to improved organizational efficiency and competitiveness in the public sector. Our primary research question asks how can complex public sector bureaucracies improve performance and reduce inertia. Our theoretical model proposes that competition is a driver for change and innovation in the public sector, and we examine this construct using big data analytics as a tool for transformational government (t-government). The profit motivation characteristic of the private sector is absent in the public sector, yet we recognize that competitive forces are just as relevant. We review the relevant literature on bureaucracies, organizational capabilities and t-government and propose a case study methodology to develop this research.

## **KEYWORDS**

Organizational capabilities, t-government, big data, government

## **INTRODUCTION**

The notion that competitive forces induce efficiency-driven decision making in for-profit organizations is commonplace (Porter 2008). At the same time, a large literature also deals with for-profit organizations that have become inertial due to a number of common managerial cancers such as the escalation of commitment (Staw 1976), strategic persistence (Audia, Locke and Smith 2000) and managerial myopia (Miller 2002). In addition to these manager-specific issues, organizations themselves can become overrun with inefficiency due to misplaced complexity with respect to the organization's structural systems. This sometimes manifests itself in what is commonly known as bureaucracy. Bureaucratic prevalence in for-profit organizations can be particularly troublesome considering that flexibility is a needed characteristic in hypercompetitive environments (D'Aveni 1994).

But what about organizations that do not follow the profit motive and are, therefore, more normally classified as bureaucratic? If it is possible for private firms to underperform due to a tendency toward bureaucracy, is the converse true? In other words, is it possible for bureaucratic entities to perform better if they attempt to eliminate this inefficient complexity? These are the central research questions in this paper.

To address the above questions the rest of the paper proceeds as follows. First we examine the relevant literature in three areas. The first part of the literature review discusses the context of institutions and bureaucracies. This is followed by an examination of the specific pressures that exist in the government context. Lastly, we examine the specific context of t-

government and big data. The three nodes of the literature review then lead to the development of our theoretical framework, followed research implications and conclusion.

## LITERATURE REVIEW

### *Institutions and Bureaucracy*

Weber (1947) wanted to establish stable and efficient systems based on rationality. He discusses his purest bureaucratic organizational form i.e., the monocratic form, and argues that it is the only form of organization that is capable of attaining the highest degree of efficiency. He explains the features of his Monocratic Bureaucratic organization where the employees are obedient only in their official capacity. The organization is organized in a hierarchy with clear and specified spheres of influence. The officials are selected on the basis of technical qualifications. Remuneration and benefits are fixed based on the hierarchical system. Promotion is based on achievement and seniority. There are extensive rules laid down for the conduct of office. The system is controlled by trained professional officials. This system is rational as the sole means of control is individual knowledge of the officials. This knowledge in individuals who hold offices comes from two sources: technical training and their experience that supports and enhances their initial training and knowledge. Based on the above, Weber believed that a bureaucratic organization is the most competent form of organization. It can be constituted in any type of system and is most suitable for capitalist systems. It levels the social classes and eliminates social privilege.

Based on the preceding discussion the pure bureaucratic system as created and envisaged by Weber is based on impersonal authority and rules. Individuals have authority based on their expertise and not due to their personal charisma or that they hold a certain position or office. Rules and regulations in these organizations are impersonal and based on expediency and rationality. It is efficient as it is controlled by experts and because it is hierarchical with clearly demarcated spheres of interests. Finally, communication in such organization is vertical where instructions travel from top to bottom and compliance travels from bottom to top.

Bureaucracy has dominated organizational structures since the last quarter of the 19<sup>th</sup> century. In the 21<sup>st</sup> century where organizations are becoming flatter, more nimble, and less rigidly structured bureaucratic organizational structures still prevail. These facts do give some credence to the efficacy of bureaucratic structures but this does not mean that there are no issues with them. Over the years Weberian bureaucracy has been criticized by many. Gouldner (1954) argued that the Weberian bureaucracy ignored democratic principles in rules setting. It failed to distinguish between different parties in an organization and assumed that all groups have identical interests. Thus, rules and regulations, in Weberian bureaucracies, operated and existed without the intervention of the groups in an organization like the managers, supervisors, and ordinary workers.

Other than having a non-stakeholder orientation bureaucracies have been criticized as being rigid, non-flexible, and promoting over-conformity. Peter Blau (1963) argues that nobody can be at the same time a true and pure bureaucrat and an innovator. He argued that bureaucracy leads to over-conformity and ritualistic conformity. This factor increases the conscientious performance of ones duties but prevents innovation. Crozier (1964) also adds that Weber did not realize that a bureaucratic organization can only operate if it imposes dangerous levels of standardization on its members. Heckscher (2006) also resonates some of the above concerns and argues that in today's environment of knowledge worker and need of flexibility there is a need to develop collaborative organizations that are very much opposite to the bureaucratic organization

envisaged by Weber. Bureaucratic organization mostly has internal focus, while it is necessary for organizations to be sensitive and responsive to the external environment as well.

DiMaggio & Powell (1983) agree with the criticism of bureaucracy that it is rigid, difficult to change, and leads to conformity. They extend previous critiques on bureaucracy by asking the question that why is there increased homogenization among organizations. The authors argue that today homogenization and bureaucratization of organizations is happening due to 'structuration of organizational fields' in which organizations are becoming more similar without getting more efficient. Organizations want to avoid uncertainty in a rational way. They achieve this through 'structuration of organizational fields' when: there is increased level of interaction between organizations in similar field; clear inter-organizational structures and dominant patterns emerge; there is increase in information exchange; and there is increased awareness among all organizations in the field that they belong to the same field. Once a field in any business endeavor is established it will through some powerful elements (state, competition, and the professions) lead to assimilation of organizational structures.

At the organizational level the conformity imposed by other organizations lead to isomorphism, which is defined as "a constraining process that forces one unit in a population to resemble other units that face same set of environmental conditions." It means that organizations change to become compatible with the environment in which they compete for resources, power, legitimacy, and economic fitness. The tendency towards isomorphism is predicted by the following predictors: greater dependence of one organization on another; same sources of supply for organizations in a field; uncertainty in the field; ambiguity of goals of an organization; reliance on academic credentials and participation in forums that represent the field; centralization of resources where organizations in a field are dependent upon similar sources of support and resources; transaction with the agencies of the state; fewer alternative models; uncertainty of technology in the field; professionalization and structuration of the field.

DiMaggio & Powell (1983) point out that "weberians point to the continuing homogenization of organizational structures as the formal rationality of bureaucracy," but they argue that the already existing dominant bureaucratic structures are leading to isomorphism of existing and newly organizations in different fields.

### ***Alternative Pressures for Government***

In order to justify the observation that some governmental units operate more efficiently than do others, alternative sources of pressure must exist for governmental managers to make optimal decisions. We propose two specific catalysts that induce government managers to seek capabilities to attain a competitive advantage. The first group includes intra-organizational rivals. Intra-organizational rivals are those entities that are contained in the same macro-governmental unit, yet can be thought of as rivals. These are considered rivals due to the fact that overperforming units in one time period may derive future benefits from the overperformance (Pfeffer and Salancik 1978). In other words, units that show initiative and operate efficiently are more prone to get higher budget allowances (or similar perks) in the future. Therefore, in the absence of output rivals, governmental managers are catalyzed by the rivalry of units at their level for the finite resources of the macro-entity.

The second group includes stakeholders of the governmental unit. Whereas there are no shareholders present in the study of government decision-making, there are multiple stakeholders including other government branches, vendors and individual residents. In this setting, pressure to change may be derived from voters, who are both affected by, and effect, the governmental

unit in question. For example, voters who are frustrated by long lines at a unit's location or by long forms to fill out for certain approvals may find it advantageous to apply pressure to the unit to induce change. This pressure could materialize itself in voting one set of decision-makers out of office if conditions do not change (or if an alternative group of decision-makers promise to reduce the inefficiency).

### ***T-government and Big Data***

T-government is the seamless integration of businesses, citizens and other relevant stakeholders into the government value chain through the use of information and communication technologies (ICTs). T-government is also described as the ultimate evolutionary stage of electronic government (e-government) (Ghoneim, Irani, & Sahraoui, 2011; Layne & Lee, 2001; Siau & Long, 2005). E-government refers to the adoption of ICTs by government institutions with a goal of improving public sector services (Weerakkody & Reddick, 2013). Early e-government projects were characterized by static web-pages that simply displayed information to website visitors. Overtime, e-government projects evolved into a more interactive environment with features such as message boards, e-mail, chat, downloadable forms and online transactions such as electronic tax filing.

The adoption of e-government and ultimately t-government by public sector institutions are constrained by barriers such as security and privacy concerns; citizen access and the digital divide; implementation and maintenance costs; and organizational inertia due to resistance to change (Fahnbulleh, 2005). However, even though some of these challenges may seem insurmountable to governments that are already constrained by global economic conditions and local budgetary demands, e-government development continues. A recent United Nations (U.N.) report analyzing 172 countries showed that e-government is a global phenomenon on a growth trajectory through the utilization of innovative technologies such as cloud computing, crowd sourcing and mobile applications (United Nations, 2012). The U.N. report further states that an important issue is to, "widen the scope of e-government for a transformative role of the government towards cohesive, coordinated, and integrated processes (United Nations, 2012)."

As e-government continues to evolve, there is an opportunity to improve public sector capabilities by transforming internal government functions. Vertical integration of suppliers into the value chain, and horizontal integration across government entities is part of the advance of e-government towards a more integrated platform (Layne & Lee, 2001). Transforming government services through the use of ICTs has the potential for significant returns however this can be constrained by a high degree of complexity and costs (Siau & Long, 2005). E-government is usually classified into four main groups based on the relevant stakeholder: G2C – government to citizen; G2G – government to government; G2B – government to business; and G2E – government to employee. Even though both research and practice have been heavily biased towards the G2C domain, reducing current government inefficiencies requires attention to other categories as well. To fully realize the potential of t-government, use of tools such as big data analytics can be critical towards mitigating some of the risks involved.

Big data refers to datasets that exceeds the current capabilities of database management systems software products for collecting, storing, analyzing, and managing the data (Manyika et al., 2011). Further, big data is characterized by unstructured data types that cannot be neatly represented in rows and columns. Three main attributes describe big data: 1. volume illustrated by the daily creation of more than 2.5 exabytes of data; 2. velocity illustrated by the daily rapid creation of new data; and 3. variety illustrated by multiple sources of data capture (McAfee &

Brynjolfsson, 2012). In the government context big data is generated from a variety of sources including transactions, web-interactions, audio, video, social media, and logs. Management of this data repository leads to the need for effective analysis. Data analytics refers to the variety of tools and techniques employed to decipher and add meaning to big data.

## **THEORETICAL FRAMEWORK**

### ***Organizational Capabilities and Stakeholders***

To combat homogenization (DiMaggio and Powell 1983), organizations need catalysts for change. In competitive settings, these catalysts can come from a number of actors, most notably rivals. However, other stakeholders are key in differentiating organizations from their peers since stakeholders are crucial sources of external information (Garg, Walters and Priem 2003). Decision-making based off a distribution of heterogeneous information sources leads to management having the ability to see multiple future states of the world to plan accordingly. In doing so, entities that embrace numerous stakeholders as key information sources, also have the ability to garner key capabilities that lead to superior performance.

Capabilities can be defined as non-ad hoc routines with an intended purpose that allow the organization to survive (Winter 2000, 2003). Conditional on survival, capabilities allow organizations to extract value and earn a competitive advantage over rivals (Makadok 2001). To attain capabilities, managers must be cognizant of both the organization's constraints as well as its opportunities in order to deploy value-creating strategic initiatives (Adner and Helfat 2003). Evidence from the management literature has shown that firms focused on specific capabilities have been rewarded with either dominant market positions or superior economic performance.<sup>1</sup> The mechanism for this advantage lies with the firm becoming expert in certain arenas as a result of the pressure to survive.

For for-profit firms, the leading sources of pressure are from competitive rivals (external) and shareholders (internal). Rivalry shapes firms since it is rivals who are most prone to bankrupt others by de-legitimizing the products, services and processes that were once commonplace but subsequently become obsolete. One only needs to think of the demise of Blockbuster Video at the hands of the more nimble Netflix for a mental model. Shareholders are a firm's residual claimants (Jensen and Meckling 1976) and, as such, are only advantaged if the firm is profitable. Since their wealth is staked to management's decisions, shareholders have the ability and motive to apply pressure toward efficient solutions.

However, at organizations that lack a profit motive, these pressures differ. In fact, at the government level, both of these primary pressures are inconsequential. First, governmental entities are legal monopolies that do not have external rivals to contend with. As an example, the Department of State in Pennsylvania does not have external competition. If an individual needs a driver's license or an occupational license, there is no alternative to this one governmental unit that is authorized to issue such documents. Secondly, governmental entities do not have residual claimants equivalent to shareholders. As such, it may appear that managerial decision-making by government leaders lacks the pressure that private leaders need in making efficient and optimal decisions.

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<sup>1</sup> Sample works include Dutta, Narasimhan and Rajiv 2005; Kotha, Zheng and George 2011; Yam, Lo, Tang and Lau 2011; Rothaermel and Deeds 2004

### ***Theoretical Model***

We theoretically examine the occurrence of transformational government (t-government), and its integration of big data into the value chain of government entities to induce efficient operations. The basis of our argument is that government<sup>2</sup> tends to be bureaucratic because of the lack of competitive pressures upon it and, therefore, operates at levels that for-profit firms would consider sub-optimal. In order for t-government to be present, leaders of governmental bodies must fight this tendency toward inefficiency. Theoretically, the literatures on organizational capabilities (Makadok 2001; Adner and Helfat 2003) and stakeholder management (Freeman 1984; Mitchell, Agle and Wood 1997) may help to explain why some governments employ efficiency-based systems (i.e. big data analytics) and others do not. Figures 1 and 2 are process models that represent our argument graphically. In Figure 1, survival is the outcome for both government entities and private entities. Even though there is an equifinal outcome, the mechanisms to achieve the outcomes differ. Government entities survive due to their monopolistic position in spite of the fact that they are inefficient. The inefficiency is rooted in the fact that their primary pressure is budgetary in nature and this leads to managerial decision-making based off of internal constraints. On the other hand, the second diagram in Figure 1 shows that private firms are motivated by competitive forces that lead to survival through efficiencies. Put simply, firms that do not make decisions based off of information gleaned from their external environment (most notably, their rivals), have low efficiency. Unlike government, however, these firms fail in the face of non-monopolistic industry structures.

Figure 2 represents an alternative for governmental entities. In this model, we introduce competitive pressures into the managerial decision-making process. The pressures are induced by (i) intra-organizational competition and (ii) stakeholders. We propose that governmental entities that are catalyzed by these pressures make decisions based off of efficiency modeling and, therefore, they thrive similar to for-profit firms. This success derives from essential capabilities that are built-up as a result of the differential pressures that the organization must acknowledge.

### **PROPOSED METHODOLOGY**

Based on the exploratory and evaluative nature of this work we have decided to design it as a qualitative, inductive work (Schutt, 2006) by using case study methodology. The context of this study will be selected horizontal institutions at the state level. Multiple methods including interviews, observations and secondary data will be used to understand their specific competitive environment, and t-government through big data position. The main purpose of this work will be to achieve a thick description of the phenomenon under investigation. These methodological choices are also supported by the state of research. We believe that little work has been done in the area of organizational capabilities in the government domain, and therefore needs development of theory.

Qualitative research is appropriate as in this study, when researchers aim at the social construction of reality in which a phenomenon is studied (Gephart, 2004; Eisenhardt & Graebner, 2007). In this regard the grounded theory method is a useful way to design and conduct the theory. Grounded theory studies are designed to conducted rigorous research by using flexible of research process to tackle unanticipated events (Eisenhardt & Graebner, 2007).

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<sup>2</sup> In this work, “government” means both large-body entities such as a U.S. state or parts of that large body such as The Department of Veterans Affairs of a U.S. state. In general, our unit of analysis is biased toward the latter of these two meanings.



The precepts of grounded theory development<sup>3</sup> enable researchers to deal with data from diverse sources and aid in theory development, especially when studying a complex social phenomenon (Strauss, 1990). Grounded theory, “is the process of iteratively and inductively constructing theory from observations using a process of theoretical sampling in which emergent insights direct selection and inclusion of the “next” information or slice of data” (Gephart, 2004: p459). It is most suited to, “efforts to understand the process by which actors construct meaning out of intersubjective experience” (Suddaby, 2006: p634). In such studies robustness of is maintained by refining raw data through constant comparisons, theoretical sampling, saturation, and by employing multiple techniques of collecting data (Suddaby, 2006).

Finally, case study approach is appropriate for this work as it will help sharpen existing theory and use cases as illustrations to make conceptual contributions (Siggelkow, 2007). Cases are “rich empirical descriptions of particular instances of a phenomenon that are typically based on a variety of data sources<sup>4</sup>” (Eisenhardt & Graebner, 2007: p25). To maintain in such studies close adherence to the data is maintained.

### **RESEARCH IMPLICATIONS**

Government bureaucracies are notorious for their over reliance on paper-based methods for processing and storing transactional data. This phenomenon is typified by the presence of huge filing cabinets, manila folders, and paper forms used by employees, citizens and businesses for government interaction. To combat this problem, in 1998 the United States federal government passed the Government Paper Elimination Act (GPEA) which required federal agencies to use electronic means instead of paper, when possible, for all official business. The deadline for implementation was October 2003. The GPEA thus played a key role in the early growth of e-government and the adoption of ICTs for government processing (Fletcher, 2002). In effect, the GPEA placed an emphasis on the use of technology to support government functions, and treated electronic data collection and maintenance with the same significance as paper based filing. This federal act was a key driver to some of technology adoption that continues today.

The federal government of the United States consists of fifteen different executive departments (Table 1). Each department manages data collected from employees, citizens, businesses they interact with, other government agencies, and other related entities. Large amounts of data both from paper based files, and electronic sources are collected on a daily basis. The federal government employs approximately 4.1 million people (Barro, 2013), and even with furloughs and reduced labor hours, data growth continues. As governments continue to collect and store vast amounts of data, there is a greater need to analyze the data and generate value to improve the internal functioning by transformation different processes.

### **CONCLUSION**

Limited resources, global recessions and citizen outrage are catalysts for improved public sector management. Government bureaucracies are plagued by these realities and must respond to stay competitive. One mechanism to facilitate this change is through the effective adoption ICTs. The e-government to t-government environment presents an opportunity to reduce government waste and inertia. In fact, strategic planning is integral to e-government success to ensure “efficacy, transparency, responsiveness, participation and inclusion in the delivery of public services

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<sup>3</sup> A methodology that helps to arrange and analyze data through techniques like memo writing, coding, and theoretical sampling (Strauss, 1990).

<sup>4</sup> Eisenhardt & Graebner (2007) make this comment when they discuss Yin (1994)

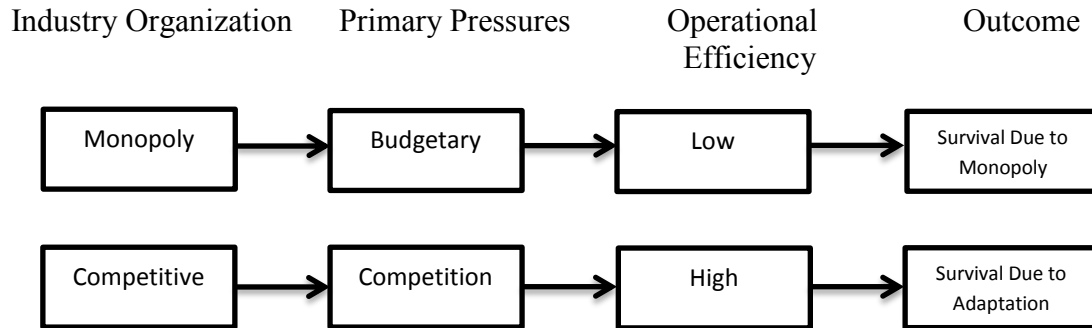
(United Nations, 2012).” As the private sector has adopted mechanisms such as big data analytics to improve internal processes, value can also be harnessed in the public sector by transforming government.

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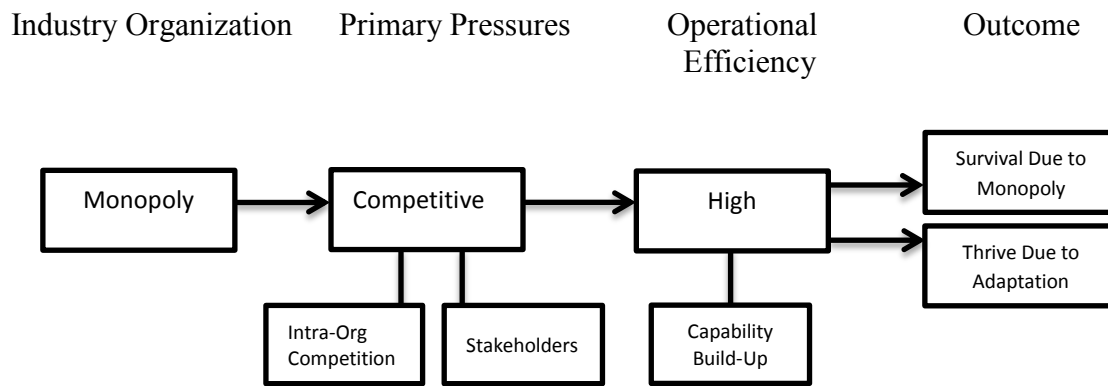
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**FIGURE 1: Government vs. Private Flow Chart**



**FIGURE 2: Introduction of Competitive Pressures into Government**



**TABLE 1: Executive Departments of Federal Government**

Agriculture	Commerce	Defense	Education	Energy
Health and Human Services	Housing and Urban Development	Homeland Security	Interior	Justice
Labor	State	Transportation	Treasury	Veteran Affairs

## **Integration of Knowledge Management and Project Management**

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### **Abstract**

This study concentrates on the use of knowledge management techniques to create, locate, capture, share, and disseminate organizational project management expertise. Project management expertise contains two types of knowledge, tacit and explicit, and each employs a different strategy for capturing and disseminating knowledge. Explicit knowledge can be documented and is therefore, more easily attainable. Tacit knowledge is experiential, difficult to document, and not easily captured. The research examines these strategies and their impact on improving the overall project management process. In addition, it provides recommendations for enhancing the competitive position of an organization.

## LESSONS IN MERGERS & ACQUISITIONS FROM CHARLEMAGNE

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### ABSTRACT

Business history is replete with examples of failed M&As. Yet despite the high failure rate, M&A activities not only persist but have accelerated. Successful integration and post-merger management remain the sticking points for those seeking to design, lead, and manage M&A such that they result in enhanced shareholder wealth. Interestingly, many of the lessons learned over the past 30 years regarding successful M&A integration and management were being practiced as early as A.D. 774 by Charlemagne. In this paper, we draw on Charlemagne's strategies in creating, unifying, and managing his vast empire to apply to modern M&A activities. While military campaigns and business building may not be identical, enough similarities exist to allow us to learn from one of history's greatest empire-builders.

### BACKGROUND AND INTRODUCTION

Business history is replete with examples of failed mergers and acquisitions (M&A). With so many M&A deemed failures by the measure of enhancing shareholder wealth, why has M&A activity not only persisted but accelerated over the past fifty years? There are many potential benefits associated with M&A: merged enterprises are larger and therefore, may command greater bargaining power with suppliers and buyers; by acquiring a competitor, the newly merged company may enjoy greater market power; acquiring an existing business (versus starting a business as a greenfield) eliminates substantial market risk while maintaining cash flows; the resources and capabilities possessed by the acquired business may be transferred to the acquirer in ways that allow for greater efficiencies and/or an enhanced competitive advantage. Few, if any of these potential benefits can be realized, however, unless the businesses are successfully integrated and managed. Successful integration and post-merger management remain the sticking points for those seeking to design, lead, and manage M&A such that they result in enhanced shareholder wealth. Interestingly, many of the lessons learned over the past 30 years regarding successful M&A integration and management were being practiced as early as A.D. 774 by Charlemagne.

On Christmas Day, A.D. 800, Pope Leo III crowned the Frankish King Charlemagne as the first Holy Roman Emperor, punctuating the king's supremacy over Western Europe. Stretching from modern day Germany all the way to Northern Spain, Charlemagne's empire encompassed ethnic groups from across the continent and yet remained coherent enough to rival the Western Roman Empire centuries earlier (Becher, 2011). Figure 1 shows the size of Charlemagne's empire relative to the land mass of the United States today. From the perspective of some 1,300 years ago, that was quite the empire-building endeavour indeed. Today Charlemagne is often considered one of the greatest European rulers before Napoleon (Napoleon in fact saw himself as a second Charlemagne in his relations with the Church) and a key player in the creation of a modern European identity (McKitterick, 2008). Even by A.D. 799, poets were already praising Charlemagne as the "King and Father of Europe" (Wilson, 2005, p. 2). For the first time in their history, Charlemagne united the independent tribes and peoples of Western Europe into a coherent political, cultural, and economic

empire, the likes of which had never been seen before (Wilson, 2005). Even centuries after his death and the dissolution of his kingdom, its core principles have lived on, embodied in today's European Union. As David Wilson (2005) writes, it was really with Charlemagne that the very idea of a European identity first began.



(Figure 1: Relative size of Charlemagne's empire circa AD 780)

This paper will examine Charlemagne's administrative policies to manage such a diverse population, in particular his practices of cultural accommodation, use of religion in government, and, when necessary, brute force. Through this combination of peaceful and sometimes violent administrative policies, Charlemagne managed to unite the scattered peoples of Western Europe and create one of the greatest continental empires since the fall of Rome.

## CULTURAL INTEGRATION

While Charlemagne's military campaigns conquered new lands and subjects to add to the empire, it was his policy of preserving, not erasing, their distinct cultures that allowed him to maintain and administer the growing kingdom. Though he still enforced a common imperial law, local traditions were, for the most part, untouched as long as they did not conflict with the King's decrees; as Derek Wilson (2005) writes, Charlemagne "tended to adopt Florentine's third option of allowing subject peoples to live under their own laws...thus most of Charlemagne's subjects lived under their own tribal leaders and their own laws" (p. 102). Even Charlemagne's imperial edicts were often modified to fit the needs of particular regions, exemplified by the Emperor's imperial capitularies that explained the Frankish laws to specific newly conquered territories (Williams, 2010).

Charlemagne's policy of culturally integrating new territories also often allowed community or tribal leaders to maintain their positions in the local administration. This allowed for community participation in regional government to ensure a solid foundation for Frankish rule (Wilson, 2005). In addition, Charlemagne often greatly rewarded local leaders who accepted Frankish control or offered them positions of great importance in the empire's administration, as Wilson describes was

the case with the rebellious Saxon warchief Widukind, who “was won over with rich gifts, a promise of pardon and, probably, appointment to official positions in the Frankish state” (2005, p. 47). Through these methods, an efficient Frankish administration of the entire empire could be maintained, led by the central government in Francia and executed at the local level by regional governments more familiar with the local customs.

Charlemagne’s cultural integration can be traced back to one of his first conquests, that of the Lombards, demonstrating the importance of the policy from the very beginning. Having conquered Lombardy in A.D. 774, Charlemagne immediately added to his office the title “King of the Lombards,” maintaining a distinct Lombardi identity within the larger Frankish kingdom (Balzaretto, 1996). Indeed, while Charlemagne implemented decrees to gradually extend Frankish custom across Italy, he continued to respect a separate Lombardi culture within the empire, continuing to refer to himself as “Charles by the Grace of God King of the Franks and the Langobards [i.e. Lombards] and Patricius of the Romans” in all official charters given to his monasteries and bishops (Balzaretto, 1996). To further reinforce this notion of a distinct Italian culture within the greater empire, Charlemagne even had his son, Pippin, baptized by Pope Hadrian on Easter Sunday of A.D. 781, officially bestowing the title of King of Italy upon him (Balzaretto, 1996). All of these measures undertaken by Charlemagne helped maintain a distinct Lombardi cultural identity within the greater Frankish Empire, facilitating a general acceptance of Frankish rule. The Lombardi case thus demonstrates Charlemagne’s method of cultural accommodation in new territories, policies that avoided imposing overly-controlling Frankish customs and thus contributed to the coherence of his empire.

Charlemagne’s use of cultural accommodation (a “loose-tight fit” (Banford, Ernst, & Fubini, 2004)) with each new conquest is supported by empirical evidence of successful M&As. The expected benefits from M&A are dependent upon appropriate and effective integration of the acquired business with the business(es) of the acquirer (Haspeslagh & Jemison, 1991; Schweiger, et al., 1993; Schweiger & Goulet, 2005; Schweiger & Weber, 1989; Weber & Schweiger, 1992). Despite the fact that the lack of integration has been found to be positively correlated with M&A failure, too much integration can be problematic as well, as the likelihood of culture clashes increase (Weber & Schweiger, 1992). Seeking a high level of integration can also be costly in terms of the increase in managerial resources required (Cording, Christmann, & King, 2008; Haspeslagh & Jemison, 1991), and may result in a loss of healthy and valuable autonomy of the acquired business, which may hurt its performance (Chatterjee, Lubatkin, Schweiger, & Weber, 1992; Vaara, 2002, 2003; Very et al., 1997). Thus, M&A integration is needed to successfully transfer socially-complex, knowledge-based resources and capabilities (Puranam, Singh, & Zollo, 2003; Ranft & Lord, 2000, 2002); however, these same integration strategies can frustrate key knowledge holders in the acquired business and result in employee turnover and disrupt value-creating organizational routines and networks within the acquired organization, thus destroying some of the anticipated value of the M&A (Puranam, Singh, & Chaudhuri, 2009; Puranam et al., 2003; Puranam, Singh, & Zollo, 2006; Puranam & Srikanth, 2007; Ranft & Lord, 2002; Ranft, 2006; Spedale, van Den Bosch, & Volberda, 2007). In a study of cross-border acquisitions by firms based in the UK, Ahmmad, Glaister, Weber, and Tarba (2012) found that the degree of acquisition autonomy, as well as the level of commitment to the acquisition by the acquiring firm, were both positively correlated with top management retention—a key factor in M&A value creation.



## RELIGION AND COMMON VALUES

Equally important to Charlemagne's reign was the use of religious conformity to not only unite the peoples of Europe but also to lend his dynasty legitimacy. Under Charlemagne, Europe saw its first examples of religious crusades, military actions motivated primarily to rid others of their pagan practices. Throughout the latter half of the eighth century, Charlemagne's armies continued to bring new subjects under his rule, and campaigns of religious conversion almost always followed. Indeed, as Chandler describes, "wherever his soldiers went, priests and monks followed" (2002, p. 507). Before conquered subjects could be accepted into the kingdom though, all signs of their previous religion needed to be wiped out, replaced by a devout loyalty to Christianity and thus the Christian king himself. This was seen as early as A.D. 772, when Charlemagne destroyed the sacred Saxon site of Irminsul, a vast tree trunk the pagans believed to be a pillar to the heavens (Wilson, 2005). As Chandler writes, such religious conversion "was the prerequisite for the integration of conquered lands into the kingdom" (2002, p. 521).

Charlemagne's campaigns against the Saxons, as seen at Irminsul, demonstrate his use of force to expand the religious following of his empire. During the rest of his Saxon wars, Charlemagne realized no military victory would be possible without such forced conversion. Thus, through a combination of aggressive "re-education," the destruction of Saxon pagan customs and temples, as previously mentioned, and the use of military force, Charlemagne eventually succeeded in not only defeating the Saxons but also replacing their pagan practices with his Christian customs and traditions (Chandler, 2002).

Religion played an equally important role in establishing the legitimacy of Charlemagne's power. Even before the reign of Charlemagne, his father, Pippin the Short, had tied the dynasty's fate to Christianity in his coup to overthrow the reigning Merovingian dynasty. While the Merovingians had claimed to be the representatives of God's will, the Pope had never endorsed this assertion, a fact Pippin quickly exploited (Wilson, 2005). After overthrowing the Merovingians and installing his own family, the Carolingians, on the Frankish throne, Pepin strengthened his ties to the Vatican, emphasizing his indirect support from the Pope and coronation at the hand of the Archbishop Boniface, lending his dynasty the legitimacy the Merovingians had lacked. (Williams, 2010). Even the coronation ceremony itself served to demonstrate the Carolingian dynasty's place with God, as Pippin was crowned in a ceremony of unction, the religious anointment of sacred oils traditionally used only by the Vatican to appoint new popes (Williams, 2010).

Yet religious conformity was not only crucial in the aftermath of military campaigns; it also proved essential to the political order of the empire itself. As such, religion played a critical role in the king's revival of classical education and studies through the Carolingian Renaissance as well (Chandler, 2002). As Wilson (2005) continues, this restoration of classical studies and educational reforms were not ends in themselves, but rather another element in the king's plan to create his own Christian civilization.

As king, Charlemagne had always had a great appreciation for education and, as such, saw it as his responsibility to impart this upon his subjects. Thus, during his reign, the Renaissance saw an unprecedented increase in the creation of new schools and in the printing of books (more often than not religious texts and the Bible), helping to create a larger clergy to promote Christianity in the empire (Wilson, 2005). In fact, the ninth century saw more than three times the number of manuscripts written in Western Europe than the previous 800 years put together (Wilson, 2005, p. 120). With such a revival of education and promotion of Christianity across the empire, Charlemagne was able to not only expand Christianity's following but also exploit it to unify his subjects and maintain stability in the kingdom.

Unification of purpose, or mission, is crucial for the success of M&A. Charlemagne demanded and instilled a common religion as a means by which to assure consistent **values** among all parts of his empire. M&As always involve managing cultural differences of a degree—corporate culture and/or national culture. Depending upon the integration approaches used, these cultural differences can cause conflicts and misunderstanding (Kogut & Singh, 1988; Krug & Hegarty, 1997; Vermeulen & Barkema, 2001), or the differences can improve M&A performance as a result of the acquiring firm gaining access to unique and valuable resources, capabilities, and routines of the acquired firm (Morosini, Shane, & Singh, 1998). Proactive M&A leaders, together with a dedicated integration team (Inkpen et al., 2000), that establish a unifying mission underpinned by meaningful values, set clear expectations of both the acquired and the acquiring organization, and actively manage the change process find greater M&A success (Hyde & Paterson, 2002). Consistent values and a unifying mission weave together the disparate parts of any organization, and Charlemagne achieved this unity in his empire by insisting upon a common religion.

### **BRUTE FORCE AND APPROPRIATE DOWNSIZING**

Yet, if Charlemagne's peaceful policies of cultural integration or religious conversion failed to bring opponents under Frankish rule, his use of brute force could be counted on to accomplish the task. Nowhere else was the use of this naked force more apparent than in Charlemagne's campaigns against the Saxons: as Hywell Williams describes, "killing as many Saxons as possible, and forcing the survivors to become Christians, was a major preoccupation of Charlemagne's reign" (2010, p. xiii). After Charlemagne's more peaceful attempts to conquer the Saxons had failed, including efforts to bribe and reward Saxon leaders who voluntarily accepted his rule, Charlemagne succeeded only after going to the extremes and embarking on a campaign of pure destruction, pillaging Saxon land, burning villages, and destroying all pagan temples in his path (Wilson, 2010).

The last twenty years of the eighth century offer one of the best examples of Charlemagne's use of force to accomplish what peaceful means could not. A.D. 782 saw the beginning of two decades of open Saxon rebellion against their Frankish rulers, starting with an attack on a Frankish army and the killing of several Frankish elite. In retaliation, Charlemagne stormed Saxony, where local leaders quickly offered the King the heads of all the Saxons involved in the attack. The result was the Massacre of Verden, the beheading of 4,500 Saxon soldiers in a single day (Wilson, 2010).

Yet even this failed to deter the Saxon rebels, who continued openly revolting until Charlemagne went one step further, openly driving Saxons from their lands and systematically burning Saxon crops and settlements. As one of the contemporary Frankish historical records notes, Charlemagne "threw everything into disorder with killings and burnings. By ravaging in this fashion throughout the whole period of the winter he inflicted immense destruction on well-nigh all the regions of the Saxons" (Williams, 2010, p. 76). Yet complete destruction was not Charlemagne's ultimate goal, and by the end of A.D. 784, he began peaceful negotiations again, resulting in the baptism of the warchief Widukind with Charlemagne watching over as his godfather. Thus, though Charlemagne's policies of more peaceful expansion sometimes failed against staunch resistance, Charlemagne proved his ability to overcome these obstacles through brute force and by any means necessary to accomplish his goals.

Leadership is considered a critical success factor in M&A activity: decisive action, setting clear directions for each unit, stabilization of the workforce, and consistent and frequent communication

that is validated by actions (Bastien, 1987; Schweiger et al., 1993; Schweiger & DeNisi, 1991) are all positively related to successful acquisitions (Angwin & Meadows, 2009; Hyde & Paterson, 2002; Sitkin & Pablo, 2005; Vasilaki 2011). It is paramount to reduce uncertainty about what the acquisition will mean for each employee, and managing this uncertainty—and the insecurities that accompany it—is the responsibility of the leader(s). The value-creation motive driving some M&A is efficiency enhancement, and this can require the elimination of jobs and the closure of entire business units that are considered redundant. These downsizing moves are best done decisively (Light, 2001) and communicated clearly by the leaders (Schweiger et al., 1993). Those employees whom the acquiring firm wishes to retain following the downsizing must be reassured as to their role in the newly combined enterprise. The strategy and the acquisition's role in this strategy, the cultural and organizational alignment of the combined company, and the creation of new, value-creating interrelationships must be made clear to those remaining. Those individuals who cannot or will not embrace the changes necessary for a successful M&A are often dismissed or leave voluntarily. Clearly Charlemagne understood that there are times when full participation in the new empire is not a possibility, and that downsizing is necessary.

## CONCLUSION

As leader of the Franks and the first Holy Roman Emperor, Charlemagne managed to bring together the peoples of Western Europe for the first time, planting the seeds for a European identity that remains even today. As one of the most influential leaders in the continent's history, Charlemagne's imperial administration remains a prime example of the accommodation and integration of diverse peoples into one kingdom. Through a mix of cultural toleration, use of religion to legitimize his reign and unite his people, and when necessary, brute force, Charlemagne ensured that even such a diverse body of European peoples could come together, making him one of the most accomplished European leaders the continent has ever seen. Charlemagne's integration strategies have stood the test of time and have found empirical support in the research conducted on mergers and acquisitions. In order to be considered successful, M&As must be appropriately integrated by cultural accommodation, unified by a meaningful mission which is underpinned by common values, and populated by members who are committed to the common mission.

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## EXPLORING VALUE ACTIVITIES FOR INTERNATIONAL MEDICINE

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### ABSTRACT

In recent years, Asian countries have provided international medicine services such as bariatric surgery. Facing the competition in the international medicine market, the providers need to understand the value activities of international medicine from the view of value chain. This study analyzed the value chain and value activities across national boarder. The research adopted case study method and deep interviews with patients and medical staff for a bariatric center in Taiwan. The results showed that the value chains of international medicine services could be divided into three parts: the value activities before coming to Taiwan, the value activities in Taiwan, the value activities after leaving Taiwan. In general, the bariatric center could deal with the value activities in Taiwan and need to handle the other two value activities. Some value activities, such as preoperative monitoring before coming to Taiwan and postoperative following after leaving Taiwan, would need the coordination and integration mechanism across national boundary. The conclusion is that international medicine provided by a bariatric center would consider the whole value chain which should coordinate the value activities across national boundary.

**Keyword: value activity, international medicine, bariatric center**

### INTRODUCTION

In order to provide the international medicine for weight loss surgery, the bariatric centers would need to deal with the value activities across national boundary. When obese patients search for weight loss surgery information and decide to go abroad for surgery, they think over not only the operation but also the pre-operation and post-operation care. Because an increasing obese patients need surgery, bariatric centers should consider the following questions. What are the value activities for patients before coming to Taiwan? What are the value activities for patients in Taiwan? What are the value activities for patients after leaving Taiwan? The issue would be discussed in the following section.

## **THEORETICAL BACKGROUND**

The value chain is composed by different value activities and value chain could be divided into primary activity and support activity (Porter, 1985). The primary activities include inbound logistics, operations, outbound logistics, marketing and sales, and service. The support activities include firm infrastructure, human resource management, technology development, and procurement. The value chain of health care could also consist of primary activities (service delivery activity) and support activities (Ginter, Swayne, & Duncan, 2002). Although the value chain could be divided into primary activity and support activity, their value activities are different between general service and medical service. The primary activities of medical service contain monitoring/preventing, diagnosing, preparing, intervening, recovering/rehabilitating, and monitoring/managing; the supporting activities are composed by knowledge development, informing, measuring, and accessing (Porter & Teisberg, 2004). Three diseases are described to show the value activities such as chronic kidney disease, stroke and vascular disease, and breast cancer (Porter & Teisberg, 2004).

Recently, medical tourism is promoted by economic consideration (Newman, 2006), long waiting time, or not allowed operation in home country (Woodman, 2008). Medical tourism is that patients take their medical service cross national boundary (Pollock & Williams, 2000). Recently, the outsourcing for medical service is increasing (Connell, 2006), and the international market for medical tourism is emphasized (Smith & Forgione, 2007). Because international medicine belong to medical service, the framework suggested by Porter and Teisberg (2004) could be used to analyze value activities for international medicine.

## **METHODOLOGY**

The bariatric center is a division of a hospital which is a large scale hospital and has more than 1000 beds in Taiwan. This study adopted case study and deep interviews with patients and medical staff in a bariatric center to explore the value activities for international medicine. Several medical staff and foreign patients who attend to receive bariatric surgery were interviewed in the bariatric center. When patients were interviewed, the medical staff would help clarify some medical problem. The interactive dialogue would be helpful to explore the necessary information from both medical staff and patients.

## **FINDING**

In addition to the bariatric surgery performed in Taiwan, medical information before coming to Taiwan should be collected across the national boundary and the following care after leaving Taiwan would be the concerning point for patients. If bariatric center could not deal with whole value activities, patients would not decide to have the

bariatric surgery. When researchers interview with patients and medical staff, the process for value activities will be described by patients and medical staff. The primary activities are divided into monitoring/preventing, diagnosing, preparing, intervening, recovering/ rehabilitating, and monitoring/managing. The supporting activities are composed by knowledge development, informing, measuring, and accessing.

### **Value activities before coming to Taiwan**

#### *Monitoring/preventing*

- Primary activity. Medical records would be evaluated for the indication of bariatric surgery to screen proper patients. When patients need bariatric surgery, their medical records should be transfer to bariatric center. From the medical records, medical staff could assess the risk and take prevention programs. Generally, medical records should include ill history, medical history, lifestyle, body mass index, drug use, and other related records.
- Supporting activity. In addition to general records, bariatric surgery needs some specific data such as body fat, waistline, blood pressure, psychological assessment. Because medical records and units may be different for different country or region, data may need to be revised into the same form for comparison.

#### *Diagnosing*

- Primary activity. The diagnosis is the most important value activity for bariatric surgery. Medical staff of bariatric center will discuss the medical and surgical conditions for patients who need to be evaluated physiological and psychological situations. Diagnosis and treatment planning will be confirmed and discussed by the surgeon and patients through a telecommunication or another communication tools.
- Supporting activity. According to the personal situation, the advanced measurement may need to be done such as X-ray film, abdominal ultrasound imaging, bone density, cholesterol, triglyceride, and blood sugar. If the value of body mass index (BMI) belongs to morbid obesity, heart ultrasound imaging and lung function would be taken.

### **Value activities in Taiwan**

#### *Preparing*

- Primary activity. Proper operation for patients would be evaluated for anesthesia and surgery. Members who are involved in the team work would make sure that patient could bear the physical pressure during anesthesia and operation.
- Supporting activity. The anesthesia evaluation and related preoperational information should be collected and assessed before anesthesia.

### *Intervening*

- Primary activity. According to patient's condition, the surgeon select the proper surgery. Different conditions need to consider some types of bariatric surgeries such as adjustable gastric band, sleeve gastrectomy, gastric plication, and gastric bypass surgery.
- Supporting activity. The team member will inform patients the expected result after surgery and educate patients how to deal with the post-operation situation such as abdominal pain or bloating.

### *Recovering/rehabilitating*

- Primary activity. Team member would take care of wound and avoid surgical complication. Patients would be encouraged to take a walk after surgery for recovering gastric function.
- Supporting activity. Patients are educated to adjust their diet and lifestyle to maintain the long-term effect of bariatric surgery.

### **Value activities after leaving Taiwan**

#### *Monitoring/managing*

- Primary activity. Case managers will follow up the condition of patients and see any complication after surgery. Through different types of bariatric surgery, the weight change of patients should be controlled and monitored to match the expected weight.
- Supporting activity. The lifestyle and daily diet of patients should be followed up by case managers. Patients would keep in touch to make sure the effect of bariatric surgery.

## **CONCLUSION**

To describe the bariatric surgery value activities for international medicine, the bariatric center should consider the place where value activities would be held. The value chain of international medicine contain different value activities which is not on the same location and bariatric center would rethink how to deal with the value chain beyond national boundary. The coordination mechanism before coming to Taiwan and after leaving Taiwan would be adopted to deal with the uncertainty. Bariatric center which want to promote international medicine should rethink the whole value chain whether in the country or abroad.

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## AN APPROACH TO REFLECT THE MOBILE CONTEXT IN STUDYING THE USAGE OF MOBILE APPLICATION STORES

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### ABSTRACT

Recent rapid technology development has increased the electronic devices' capability to perform everyday tasks. Mobile technologies have benefited both firms and individuals. Consequently, Mobile Application Stores (MAS) has become a new solution market which promises the development of a new revenue stream for operators, handset OEMs and application developers. Therefore, more understandings on MAS user's behaviors are required by operators as well as developers in order to improve the product/service quality and to attract users. Despite the existence of prior researches related to the MAS, there is a lack of studies on user's usage that reflect the new attributes of the MAS context. This study tried to examine the factors that are influencing the usage of MAS with consideration of MAS perspective.

In this research, along with adopted Subjective Norm from previous studies, we redefined Critical Mass, and proposed Level of Openness to develop our new research model to explain the MAS use. An online questionnaire was conducted to collect 253 responses from mobile phone users, who had experienced with MAS. The data test results show that all of the proposed hypotheses were supported. Among the examined factors, Critical Mass had the most significant impact on Intention to Use. The new construct, Level of Openness, also had a positive impact on Intention to Use. This finding could lead researchers to extend efforts with respect to Level of Openness as a potentially interesting factor in MAS context..

**Keywords: Mobile Application Store (MAS), AppStore, MAS Usage, Critical Mass, Level of Openness**

### INTRODUCTION

Mobile applications are softwares which run on an individual's mobile device and assist the user in performing various tasks pertaining to a vast pool of categories. Mobile applications are found on almost all the mobile devices currently on the market. From high-end smart phones to entry level devices, all are offered with certain pre-installed applications and will facilitate the downloading of an increasing number of additional applications. Some authors suggest that the industry must move beyond "nice-to-have" services and devise new "must-have" services that positively affect people's lives (Jarvenpaa, et al. 2003). With the newly arrived products, mobile applications, mobile technologies greatly benefit both firms and individuals. Since early 2000s, scholars and industry representatives have focused on the future of electronic wireless media, predicting that the real phase of e-commerce growth would be in the area of mobile commerce (Hampe, et al., 2000; Varshney, et al., 2000; Kalakota & Robinson, 2001; Varshney & Vetter, 2001; Li, 2002).

Mobile applications were originally offered as a general productivity and information retrieval tool, for example, with email capabilities, calendars for time management, databases for contacts, and as a source of stock market and weather information. However, technology development that allows wider bandwidth and faster data transformation has created new opportunities for mobile applications. Additionally, extensive public demand and the availability of developer tools have extended the rapid expansion of mobile applications into many other categories, such as mobile games, GPS and location-based services, banking, order-tracking, and ticket purchases. The explosion in the number and variety of applications has made discovering them a challenge, which in turn has led to the creation of a wide range of reviews, recommendations, blogs, subject-oriented magazines, and dedicated online application-discovery services. The popularity of mobile applications has continued to rise as their usage has become increasingly prevalent across mobile phone users (Ludwig 2012). Mobile Application Stores (MAS) has become a new solution market which promises the development of a new revenue stream for operators, handset OEMs and application developers (Andreas, 2008).

Many researchers have attempted to explain the usage and adoption of the IS system; however, the mobile context features new attributes that distinguish the mobile context from other systems such as ubiquity, convenience, localization, personalization (Clarke, 2001), and socialization (Åkesson, 2007). The uncertainties inherent in mobile commerce in general, and MASs in particular, are still not fully explained in prior studies. Thus, a comprehensive understanding of this promising market is required.

In this research we aimed to identify some new critical factors and examine their influence on the usage of MAS. The main contribution of this research is an explanation of user behavior with respect to the MAS context. The findings of this research provide information to MAS operators and developers regarding the issues that most concern users and suggestions to attract and encourage the MAS usage.

## LITERATURE REVIEW

Since late 1990s, many studies aimed at identifying and predicting the emerging drivers and inhibitors to a mass-market adoption of m-commerce. Different authors and studies have underlined very different factors as key drivers/inhibitors to m-commerce adoption (Anckar et al., 2003).

The Theory of Reasoned Action (TRA), proposed by Ajzen and Fishbein (1975 & 1980), is a model for the prediction of behavioral intention encompassing both predictions of attitude and predictions of behavior. The components of TRA are three general constructs: behavioral intention (BI), attitude (A), and subjective norm (SN). TRA suggests that an individual's behavioral intention depends on the individual's attitude concerning the behavior and subjective norms ( $BI = A + SN$ ). If an individual intends to behave in a certain manner, it is likely that the individual will do so. TRA has been empirically tested and has contributed to the explanatory power of IS-usage models (Taylor & Todd, 1995b). The majority of IS studies concerning the adoption and usage of information technology have relied on models derived from TRA and its extensions (Khalifa & Cheng, 2002).

The technology acceptance model (TAM) (Davis 1989) is an influential extension of Ajzen and Fishbein's TRA, and it is an IS theory originally developed to predict user adoption of a new technology. The model suggests that when presented with a new technology, a number of factors (perceived usefulness and ease of use) influence a user's decision with respect to how and when they will use the technology. TAM is generally considered as the most influential and common theory in the IS field (Lee et al., 2003). Prior research suggested that the TAM should be extended by incorporating additional variables to improve its specificity and explanatory power (Hu et al. 1999, Moon and Kim 2001).

Venkatesh and Davis (2000) proposed an extended TAM or TAM2, in which attitude was eliminated from the model because it was found to be a weak mediator.

Some studies have extended TAM and applied it to examine behavioral intention. Gefen et al. (2003) integrate trust-based antecedents and the technological attribute-based antecedents found in TAM into a theoretical model to study intended use of online shopping. The study shows that consumer trust is as important to online commerce as the widely-accepted TAM use - antecedents, perceived usefulness, and perceived ease of use (Gefen et al. 2003). Considering that TAM stems from technology-driven e-commerce, Pavlou (2003) proposed a model that integrated trust and perceived risk. Trust and perceived risk are incorporated with perceived usefulness and perceived ease, given the implicit uncertainty of the e-commerce environment. Trust and perceived risk were found to be direct antecedents of intention to transact, suggesting that uncertainty reduction is a key component in consumer acceptance of e-commerce that deserves particular attention. Moreover, the author proved that even though hypothesized as a direct antecedent of transaction intentions, trust also acts as an indirect antecedent through perceived risk, perceived usefulness, and perceived ease of use. This finding validates the conceptualization for the imperative role of trust in e-commerce and explicitly describes its precise effects (Pavlou 2003). Similarly, Chiu et al. (2009) integrate two major variables of TAM, trust and fairness, to construct a model for investigating the motivations behind customer loyalty intentions towards online shopping. The results provide strong support for the theoretical model of relationships among perceptions of fairness, trust, perceived usefulness, perceived ease of use, satisfaction, and loyalty intention towards online shopping (Chiu et al. 2009).

Alain et al. (2012) extended TAM by defining the determinants of perceived usefulness, adding additional constructs (cost, trust, and demographic profiles) to study factors that affect Chinese consumer intention to adopt 3G. The main findings of the research were that social influence and service quality are both important determinants of perceived usefulness of 3G, whereas cost and trust were found to have no direct relationship with the adoption of 3G.

DeLone and McLean IS success model (DeLone and McLean 1992) is an adaption of studies performed by Shannon and Weaver (1949) and Mason (1978). To develop a comprehensive definition of IS success that covers information systems in many different perspectives, DeLone and McLean reviewed the existing definitions of IS success and their corresponding measures, and then classified them into six major categories: Information quality, System quality, Actual Use, User Satisfaction, Individual Impact, and Organizational Impact. The authors created a multidimensional measuring model with interdependencies between the different success categories. Ten years after the publication of their first model and based on the evaluation of the many contributions to it, DeLone and McLean proposed an updated IS success model (DeLone and McLean 2002, 2003). The updated model added Service quality as an additional dimension, combined Individual and Organizational impact to form Net benefits, and partially divided the Use construct into Intention to use and Actual Use. Although the model has been updated, it requires further validation before it can serve as a basis for the selection of appropriate IS measures (Wu and Wang 2006). The IS success model should be extended further to account for the particular relationships between e-commerce systems and their environments in various organizational contexts (Mollar and Licker 2001).

Lee et al. (2011) studies Smartphone App Store Use by classifying Smartphone users into three adoption stages (first: Early Adopter, second: Late Adopter, third: Potential Adopter). The adoption stage groups are compared with a focus on the individual characteristics of users (Innovativeness, Conspicuous consumption, Self-efficacy and Social influence) and user perceptions towards technology (Perceived usefulness and Perceived ease of use of Smartphone Application Store). Lee et al. found that there are differences among adoption stage groups in terms of individual characteristics (with the exception of social influence), perceptions towards technology, Intention to use, and application categories. Gender groups and device OS's groups were also found to differ.

## THE RESEARCH MODEL AND HYPOTHESES

Kim noted that the important core principle of an application store is to draw critical resources – applications – from the outside, instead of primarily relying on firm-centric planning. Application stores have attracted attention from practitioners and scholars (Kim et al, 2010). However, the adoption of mobile services has not yet met expectations, and uncertainties abound that are creating the need to explore the challenges and opportunities (Åkesson, 2007). As part of m-commerce, MASs are considered a potential market solution that promises a new revenue stream (Andreas, 2008). Currently, there is a lack of research concerning user adoption of MASs, thus additional studies on this topic are required to provide comprehensive insights for MAS stakeholders.

The research question addressed in this study is that in the context of the new characteristics associated with MAS, “What are the factors that influence MAS usage?”

The prior research from the IS field fails to fully explain the phenomenon. Many prior studies have been conducted, which employ traditional adoption models and theories such as the Technology Acceptance Model (TAM) (Davis 1989; Davis, Bagozzi et al. 1989), the Theory of Planned Behavior (TPB) (Ajzen 1991), the Diffusion of Innovation (DOI) theory (Rogers 2003), and DeLone and McLean’s IS success model (DeLone and McLean 1992, 2002, 2003). However, many authors have noted that the traditional adoption models are insufficient and do not provide a comprehensive explanation of the factors that affect individual intentions to adopt or reject the use of mobile commerce services (Pedersen and Nysveen 2002; Pedersen and Ling 2003; Yu, Liu et al. 2003; Kim, Chan et al. 2005; Nysveen, Pedersen et al. 2005).

A significant reason for this insufficiency lies in the type of role(s) played by m-commerce service users compared to the role(s) played by traditional technology users (AlHinai et al, 2007). With respect to traditional technology adoption, the main determinants that influence individual acceptance are related to the interaction of the user with the technology and/or interaction of the user with the individuals around the user. However, a MAS is different. MAS users are typically service customers. The main purpose of accessing the store is to search for an application, download it, and actually use it. Depending on the application, the user may be required to pay fees to obtain the application. There is therefore a continuous interaction between the mobile customer and the provider – the MAS operator or developer. Such interaction involves a wide range of adoption determinants that might not be relevant with respect to traditional technology adoption (AlHinai et al, 2007). Therefore, the ease of accessibility and interaction would affect MAS usage and attract future users.

Consistent with traditional technology adoption, MAS users are technology users. Prior studies inspecting this role mainly use traditional theories. Based on these theories, researchers have studied the effects of factors such as usefulness, ease of use, satisfaction with a service, content and system quality, and the impact of technical issues such as bandwidth and line capacity. With respect to a MAS, users must possess a smart device to connect to the store, download, and use the application (install it on the user’s device) and are therefore somewhat familiar with the device. The user’s need in this case is the application rather than the service itself. The meaning of usefulness seems not to focus on the system (the store). New and improved technology in computing and telecommunication enables users to access mobile services anytime, anywhere, in mass-scale through a multitude of devices (Lyytinen & Yoo, 2002). Therefore, technical issues such as bandwidth or line capacity are less of a concern and the importance of traditional factors such as usefulness, ease of use, system quality, and the likelihood of technical issues are having less effect on user MAS adoption.

MAS users are typically members of a social network of friends, family, colleagues, or groups of interest. This type of network influences an individual’s perceptions, opinions, and actions concerning different objects including the services and products offered. Individuals often share their views, ideas, and experiences or recommend products or services to others. Equally, individuals may oppose or discourage unfavorable services to each other. Therefore, depending on the level of interaction with others, a user’s decision to adopt or reject a certain product or service is not made wholly by the user but is influenced by

the opinions and recommendations from others. Many social networks such as Facebook, Google+, Twitter, Tumblr, Naver, Daum, YouTube, LinkedIn, and KakaoStory have facilitated the expansion of individual networks. Consequently, this enhances the social effect on user decisions. Social factors such as the subjective norm should be a factor for consideration in the study of MAS adoption and usage.

This study accounts for the differences in the new context. To study MAS usage, we chose the most significant potential determinants of user intention that are related to the MAS context and propose the following research model and hypotheses:

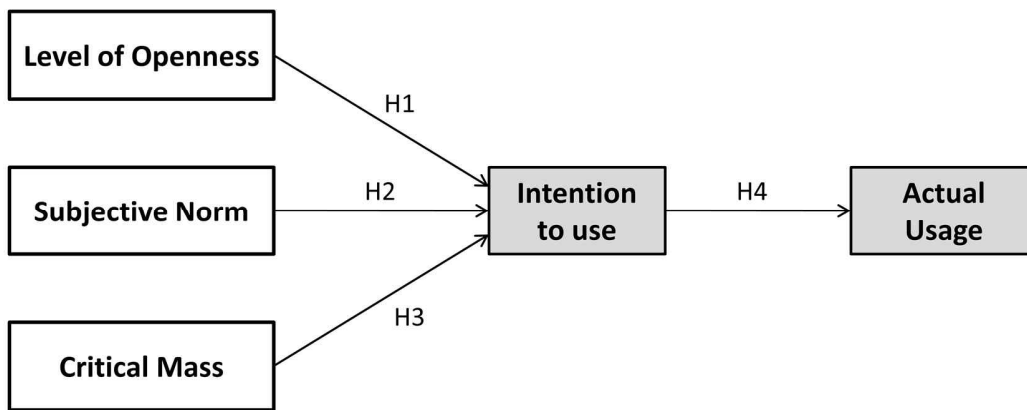


Figure 1: Proposed Research Model

**Level of Openness**

A variety of MASs exist on the market. Technology continues to create different applications for different platforms, providing users with different options for downloading and for use on smart phones. Each store possesses unique characteristics that both unify and distinguish it from others. It is often difficult to distinguish the different MASs in the market because all seem to provide their customers with the best and latest applications. Once a user specifically searches for an application, the user begins to recognize the differences that each store possesses. Each store attempts to provide innovative and entertaining applications for the user, but also uses a specific approach to attract users to the store.

The first store, Apple’s AppStore, opened in 2008. Since then, MASs have dramatically increased the number of applications available and many companies have joined this potentially lucrative market such as Google Play Store, BlackBerry World App, Windows Phone Store, and Nokia Ovi Store. The two biggest operators, Apple AppStore and Google Play Store are considered representative of two different approaches in store management. Apple enforces strict rules that monitor and control all participants. All applications must be verified and approved by Apple to be offered on the store website, whereas Google welcomes developers with requirements that are not so strict.

The Apple AppStore can be considered a closed ecosystem, whereas GooglePlay Store is an open ecosystem in terms of the management approach. The more access rights that a user or developer has to the store system, the more convenient and easier it is for the user or developer to use. Consequently, this level of access could attract users to the MAS; however, it also could decrease the security level. If a user possesses more rights to access a system, they can perform activities that may harm the system or the user’s device when they use the application. The tradeoff between security and convenience should be a consideration of the MAS operator to obtain the most benefit from the store.

To study the effect of closed or open ecosystems on user intention, we propose a new construct called Level of Openness, which is defined as the degree of user accessibility to view, use, and distribute applications in a shared MAS environment. Although there is no prior research with respect to Level of Openness, this new construct is expected to have a relationship with user intention to use an application.

Therefore, the construct may influence a consumer's decision to use a MAS and is hypothesized as follows:

**H1:** There is a positive relationship between Level of Openness and the User's Intention to use a MAS.

### **Subjective Norm**

Individuals today are linked to each other digitally in many different ways. MAS users are also members of social networks through which they interact with others in daily life and share thoughts and experiences. In the traditional IS environment, word of mouth is considered one of the most effective channels through which positive and negative ideas and perceptions are spread within a social setting. Ignoring such effects in m-commerce adoption research would result in an incomplete understanding of the power of social networks and their impact on beliefs, attitudes, and perceptions (AlHinai, 2007). In the digital age, "a cyberspace supported by computer-based information technology, centered upon communication and interaction of participants to generate member-driven contents, resulting in a relationship being built up" (Lee et al, 2003) refers to virtual or online communities that allow the formation of social relationships (Lu et al, 2010). An individual is motivated to comply with the referents even if the individual does not favor the behavior. The referents may be superiors (e.g., parents or teachers) or peers (e.g., friends or classmates) (Taylor and Todd, 1995a; Taylor and Todd, 1995b). Moreover, MAS users can build relationships and gain new acquaintances that share the same interests, relationships, or transactions. They also can read, trace for other's ideas, and experience or share their own life events. MAS users can gain knowledge concerning an application from thousands of people who have actually experienced it. Consequently, MAS-user beliefs, attitudes, and perceptions are influenced by those around them and virtual community members. The Subjective Norm in this context, defined as the extent to which an individual's perception regarding the use of the MAS is influenced by the judgment of those who are significant to the user, would affect user intention of MAS to a greater extent than user intention of traditional IS systems. Therefore, we posit the following hypothesis:

**H2:** The Subjective Norm positively influences user Intention to Use a MAS.

### **Critical Mass**

Despite impressive model design and advanced hardware configuration evident in the latest smart phones, many users would agree that the applications position the smart phone among competitors. The experiences of Nokia, RIM, and HP were the result of a failure to encourage the creation of superior application markets. These three companies were defeated following the presentation of Apple's App Store and the Android Market, which is known as Google Play Store today. However, applications are providing more value and capabilities to smart phones rendering them magical machines that serve daily needs. Without applications, devices would be dull and would resemble the dumb phones of the past. Applications are becoming the primary driver of mobile industry development in terms of the device and the business perspectives. Applications carry an increasingly important role in markets such as the MAS.

Many prior studies considered critical mass to represent the number of people using the IS system. Achieving a critical mass of users is the key to successful groupware acceptance (Lou et al., 2000). Because the majority of current IS systems are based on a community of users, the implications for managers is that achieving a critical mass of users should be of high priority during IS implementation (Seen et al., 2007). However, with respect to MAS, usage factors differ and the sustainability of an application store business depends on the number of high-quality new applications (Kim et al, 2010). Kim argued that an extensive selection of applications is able to attract various users continuously and, therefore, will attract more outside developers to the platform. Attracting developers results in additional applications and more visitors to the store.

The application stores that boast a larger quantity of downloads (such as Apple's AppStore and Google's PlayStore) also have a greater number of applications, whereas stores with fewer applications experience fewer downloads and lower success rates. Therefore, we define Critical Mass as a sufficient number of

applications in a MAS to ensure that the rate of usage becomes self-sustaining and creates further growth. We assume that it is a determinant of a consumer's intention to use and has an associated impact on intention to use. Therefore, we posit the following:

**H3:** Critical Mass positively influences the consumer's Intention to Use a MAS

**Intention to Use**

Intention to use has been found by related IS studies to be a determinant of Actual Use. In the context of MAS, Intention to Use is also expected to have a positive impact on MAS usage. Therefore, we posit the following:

**H4:** An user's intention to use positively influences the Actual Usage of a MAS.

**THE RESEARCH METHODOLOGY AND HYPOTHESES TESTING**

**Research Methodology**

This model included the following five constructs: Level of Openness, Subjective Norm, Critical Mass, Intention to Use, and Actual Use.

We conducted an online survey at [kislab.kookmin.ac.kr/app/](http://kislab.kookmin.ac.kr/app/). After removing the incomplete data, 253 responses were selected for hypotheses testing. All of the respondents were smart phone users and either current students at Kookmin University or employees at an IT company. The participants were undergraduates (116 people or 46%) and graduates (137 people or 54%). Among them, 67% (170) of the respondents were male and 33% (83) were female. Although all of respondents were smart phone users and had experience using MAS, 179 individuals (69%) downloaded and used free applications, whereas the remainder bought their applications. The majority of respondents who bought applications spent less than US\$10 per month (65 people) and some spent more than US\$10 per month (12 people) on applications. Table 1 shows the characteristics of the collected data:

Table 1: Collected Data Characteristics

Variables	Number	Percentage	Variables	Number	Percentage
Gender			Device Operating System		
Male	170	67%	Apple iOS	95	38%
Female	83	33%	Android	158	62%
Age			Times/month using MAS		
20 to 25	127	50%	Up to 10	186	74%
26 to 30	54	21%	10 to 30	61	24%
31 to 35	35	14%	More than 30	6	2%
36 to 40	14	6%			
More than 40	23	9%			
Education			Times/month purchased		
Under graduate	116	46%	None	176	69%
Graduate	137	54%	One	45	18%
			2 to 10	30	12%
			More than 10	2	1%
MAS used			US\$/month spent		
AppStore	95	38%	None	176	69%
GoogleApp	122	48%	Up to 1	20	8%
SK T-Store	26	10%	1 to 10	45	18%
LG AppStore	5	2%	More than 10	12	5%
Samsung	5	2%			
AppStore					

Our model was employed to examine the effects of influencing factors on MAS usage. The unit of analysis in this study was individual MAS user. The level of analysis was a group of individuals with experience using a MAS.

To operationalize these constructs, based on related literature we used a multi-item method to develop a set of items for each construct and to form a web-based questionnaire. Each construct item was measured for each question using a seven-point Likert scale, ranging from strongly disagree (one point) to strongly agree (seven points). When possible, measurement items that had already been used and validated by prior research were adopted. Numeric codes from one to seven were assigned to the candidate value of the input variables. Accordingly, simple numeric operations can be applied to these input values for analysis.

**Analysis of reliability and validity**

First, we conducted a factor analysis to determine the factorial validity of the scales. The Principal Components Analysis is a factor extraction method used to form uncorrelated linear combinations of the observed variables. The first component has maximum variance. Successive components explain progressively smaller portions of the variance and are all uncorrelated with each other. Principal components analysis is used to obtain the initial factor solution. The Varimax Method is an orthogonal rotation method that minimizes the number of variables that have high loadings on each factor. This method simplifies the interpretation of the factors. Based on the results of the analysis, we deleted items LO3 and AU4. Table 2 shows the results of the Principal Components Factor analysis with Varimax rotation.

Table 2: Principle Components Factor analysis with Varimax rotation

Factor	1	2	3	4	5
CM1	.738		.152	.212	.215
CM2	.778	.138	.137	.140	.167
CM3	.714		.203		
SN1		.702	.127		
SN2		.814	.146		
SN3	.170	.774		.164	
SN4		.853			.133
SN5	.255	.826		.156	
SN6	.166	.826		.167	
IN1	.200	.136	.716		
IN2	.140	.139	.842		
IN3	.201	.139	.800		
IN4	.281	.276	.579	.130	
IN5	.343	.240	.623		.167
IN6	.268	.165	.712		.146
AU1				.859	
AU2				.857	
AU3	.118			.826	
AU5		.152		.882	
AU6		.222		.832	
LO1	.205	.111			.843
LO2	.162				.770
LO4		.101	.360		.640



We also conducted reliability and validity analysis for our scales. Table 3: The results of the reliability and validity analysis shows that the average variance extracted (AVE) for every construct was above 0.5, which means that the scales had good convergent validity (Bagozzi & Yi, 1988). To evaluate the internal consistency of the measurement model, we adopted composite reliability (CR). In our scales, all of the CR values were above 0.7, indicating that the scales had good reliabilities (Nunnally, 1978). Thus, our scales were valid and reliable for hypothesis testing.

Table 3: The results of the reliability and validity analysis

Factor	Item	Standard Error	T-Statistic	AVE	CR
Level of Openness	LO1	0.0562	13.8582	0.839	0.636
	LO2	0.0444	19.5025		
	LO4	0.0537	13.8157		
Subjective Norm	SN1	0.0229	36.0756	0.938	0.717
	SN2	0.0530	14.0952		
	SN3	0.0131	69.1029		
	SN4	0.0541	13.9182		
	SN5	0.0173	53.1855		
	SN6	0.0143	64.1037		
Critical Mass	CM1	0.0270	32.5573	0.916	0.785
	CM2	0.0158	58.2213		
	CM3	0.0228	37.7099		
Intention to use	IN2	0.0155	57.9205	0.934	0.704
	IN1	0.0547	14.6320		
	IN3	0.0136	66.0616		
	IN4	0.0397	19.2845		
	IN5	0.0257	32.1198		
	IN6	0.0265	31.7466		
Actual Use	FU1	0.0417	23.1624	0.675	0.795
	FU2	0.0493	19.4738		
	PU3	0.1663	10.7750		
	PU5	0.1955	10.9661		
	PU6	0.1978	11.3154		

**An analysis of the Hypotheses testing**

We performed the proposed hypotheses testing using PLSGraph v03.00. A summary of the test results is presented in Figure 2: Hypotheses test results:

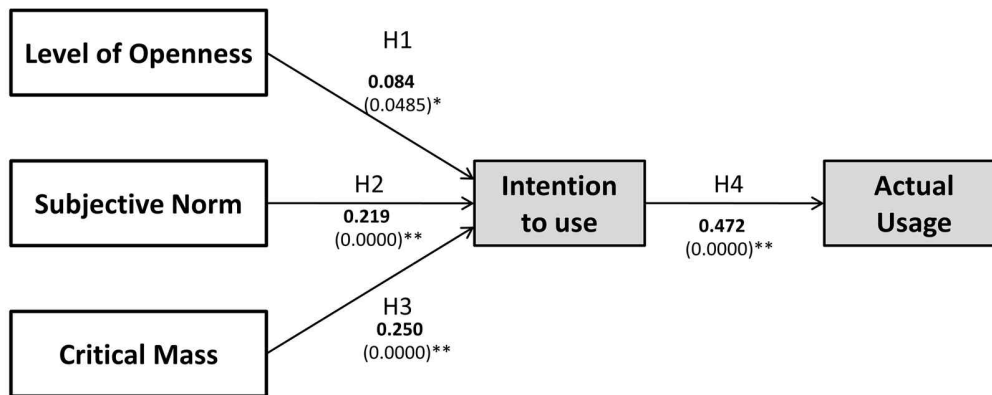


Figure 2: Hypotheses test results  
 ( ): p-value (statistically significant), \*: 95% / \*\*: 99%

The impact of Level of Openness was significant ( $=0.084$ ,  $p<0.05$ ), therefore Hypothesis H1 was supported. Subjective Norm has positive relationships with Intention to Use ( $=0.219$ ,  $p<0.01$ ), hence hypothesis H2 was supported. Hypothesis H3 was supported ( $=0.250$ ,  $p<0.01$ ), implying that Critical Mass has positive influence on Intention to Use. All the antecedent factors of our model can explain 44.2% of Intention to Use. Finally, Intention to Use has a significant impact on Actual Usage ( $=0.472$ ,  $p<0.01$ ). Thus, Hypothesis H4 was also supported.

In this research, we examine certain factors that affect MAS usage to determine the factor influence on Intention to Use and the Actual Use of MAS. Based on data collected from an online questionnaire, we found that all of the proposed factors significantly influence user Intention to Use MAS and indirectly affect the Actual Usage of MAS. The following is a detailed explanation of the research results.

First, our research results are consistent with the findings of previous studies; Intention to Use has a positive impact on Actual Usage. This is considered an established relationship by IS system usage and adoption research.

Second, Subjective Norm has a positive impact on Intention to Use. This is consistent with previous studies from a more traditional context (Khalifa and Cheng 2002, Babita et al. 2008, Chen and Cheng 2009, Paul et al. 2010). Subjective Norm is one of the main factors of a user's decision with respect to the choice of application.

Third, earlier studies considered Critical Mass to be the number of users that would trigger the usage of the IS system (Oliver et al. 1985, Lou et al. 2000, Seen 2007) and these studies understood that achieving a Critical Mass of users is central to successful system acceptance (Lou et al., 2000). In this study, using the argument that the sustainability of an application store business depends largely on the number of high-quality new applications (Kim et al, 2010), we defined Critical Mass as the number of applications in an MAS that is sufficient to sustain usage rates and create growth. The research result confirms that the proposed Critical Mass has a positive impact on Intention to Use and is the most significant influencing factor among the factors studied. This result explains the recent dramatic increases in MAS use and the popularity of those MASs that offer a wider selection of applications such as Apple's AppStore or Google's PlayStore.

Finally, we proposed a completely new construct, Level of Openness, which represents the extent of accessibility to view, use, and distribute applications in an MAS. Typically, the higher the Level of Openness the less secure the MAS, therefore, level of openness could be expected to negatively impact Intention to Use. However, the result show that Level of Openness has a positive effect on Intention to

Use. This demonstrates that MAS users prefer openness and convenient usage. This factor could also explain why many individuals are converting from iPhone use to Android phone use because android phones function in a less restricted environment.

## CONCLUSION

### Results summary

This paper addresses a phenomenon that has attracted increasing attention from both service users and service providers: the Mobile Application Store (MAS). New attributes that are not relevant to the traditional market such as mobility, ubiquity, localization, personalization, socialization, and convenience imply that MAS usage portends yet to be discovered concerns.

Following a prior research review on IS systems and e-commerce adoption, we proposed a research model to study the factors that are related to the MAS environment and influence MAS usage. In addition to the Subjective Norm that was adopted from previous studies, we redefined Critical Mass and proposed a new concept called Level of Openness as the determinant of MAS usage. A survey was designed and data was collected using a web-based questionnaire.

Our research results show that all of the proposed links were supported. Among them, Critical Mass has the most significant impact on Intention to Use. This finding could partially explain why MAS represents a growing business sector with a dramatically increasing number of applications. Subjective Norm also has a significant impact on Intention to Use, demonstrating that in the context of an MAS, the influence of other people remains closely related to MAS usage. The new construct, Level of Openness, was found to have a positive effect on Intention to Use. This finding could encourage researchers to study this factor in the MAS context.

### Theoretical and practical contribution

All the hypotheses were supported and our research has certain theoretical contributions and practical implications. In contrast to previous studies, this research proposed a new definition of Critical Mass and defined Critical Mass as the number of products (applications) in the market (MAS) rather than the number of system users. The results show significant influence of the new concept, Critical Mass on Intention to Use. Another contribution of this study is the proposal of a new construct, Level of Openness. The new attributes of MAS allow users to flexibly interact and contribute to the market; therefore, MAS operator controls and the service to users can influence user behavior. This new construct could be explored in future research.

Our research also has certain practical implications. First, Subjective Norm has the most significant and positive impact on Intention to Use among the factors examined. The new technology of the current digital age has caused an explosion in the virtual community. Moreover, the plethora of applications has facilitated user communication within unlimited boundaries of time and space. The virtual social network has become an unavoidable phenomenon that our physical community is gradually attracted to and affected by. This suggests that MAS operators should employ the Subjective Norm effect to attract users. An effective way to encourage MAS use is to focus on user interfaces and functionalities to facilitate user communication with respect to comments on service and applications. MAS operators can create their own MAS community to direct and converge user intention with respect to their market and to provide the channels for users to communicate with developers. If encouraging interaction among members is insufficient, operators should determine how to motivate well-practiced users to share their experiences and suggestions. This would inform the community that the MAS can respond to all user needs and benefit the user. Social influence can create substantial return on a small investment.

Second, in comparison to other factors, Critical Mass demonstrates a significant impact on Intention to Use. A greater quantity of applications attracts user intention with respect to MAS usage. This finding suggests that operators should encourage developers to contribute more applications to the MAS.

Third, the positive impact of Level of Openness on Intention to Use suggests that MAS users prefer open, more convenient access to the market. Despite a negative relation between system openness and security, the MAS operator should find appropriate ways to manage security issues, rather than strictly controlling and reducing user and developer accessibility. The more openness and ease of use, the more practical the use of MAS.

### **Limitations and future researches**

The current research also has certain limitations. First, the sample data is gathered from a small portion of MAS users. Most participants are Kookmin University students, and 69% of the respondents use MAS for free without paying for applications. Therefore, the influence of these studied factors may partly reflect the behaviors of the MAS users because they may act differently depending on their career, education, needs, and intention to pay for applications. The data should be collected from a wider range of users.

Second, there are two main approaches to MAS management. A key difference is considered to be operator management, control, and monitoring of the application store, which we called Level of Openness. Although this factor positively impacts Intention to Use, it is predictable that Level of Openness could also influence other factors. When users and developers have increased accessibility to a store, they are more likely to detrimentally affect the store as well as the users. Thus, security levels are lower. The Level of Openness also contributes to the system's ease of use; therefore, it could affect User Satisfaction. The effect of Level of Openness does not therefore provide complete information that can distinguish these approaches and predict future movements.

Finally, this research examined certain selected factors that are considered to be closely related to the MAS context. Although the results show important findings, this model does not fully explain overall MAS-user behavior.

We suggest directions for future research based on the results of this research. First, the study results may not reflect complete MAS-user behavior. Therefore, additional data from a wider variety of users should be collected. Second, we considered only general Actual Use of MAS. Users often have different intentions with respect to free and paid applications. Therefore, it would be more appropriate to distinguish between free use and paid use in future studies. Third, there are currently two main application store groups represented by Apple's AppStore and Google's PlayStore and significant competition exists between them. The obvious difference between the two stores is operator management, control, and monitoring of the store, implying that the main difference is the Level of Openness. In addition to its effect on factors such as Intention to Use, Level of Openness could impact factors such as Trust, system Ease of Use, and User Satisfaction. Therefore, Level of Openness could be an interesting construct for scholars to explore further. Finally, this research investigates certain factors that influence usage in the new context of MAS. In the future, to examine complete user behavior with respect to MAS, the factors studied here could be integrated with the full models that are widely accepted and validated within the IS field such as TAM, TBP, UTAUT, and the Delone and McLean IS success model.

### **Acknowledgements**

This work was supported by the BK21+ Research Fund from Korean Government. This work was also supported by the 2013 research fund from Kookmin University, South Korea.

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## THE NEEDS OF THE MANY: ANALYZING INDIVIDUALS' NEEDS RELATING TO E-GOVERNMENT ADOPTION

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### ABSTRACT

Public trust in government has declined dramatically since its high in the late 1960s, mostly because citizens have not felt as though they are being heard. Rather, citizens have felt as though governments are closed off from their citizens. It has been suggested that the use of Information Technologies, namely e-government portals, may be able to help raise public confidence and trust that governments are conducting themselves in the best interest of citizens. However, there are many challenges facing proponents of this method. This study looks at citizens' needs and expectations regarding e-government portals and how trust and risk factor into citizens' intention to use e-government portals. This research develops a model based on the expectations of citizens, as well as how trust and risk influence citizens' intentions to use e-government portals.

**Keywords: E-Government, Expectation, Needs, Privacy, Risk, Security, Trust.**

### INTRODUCTION

E-government is defined as "the use of information technology to enable and improve the efficiency with which government services are provided to citizens, employees, businesses and agencies" [1]. Rather than simply an informational tool, e-government is gravitating toward a more interactive experience, one through which citizens and government officials have an open line of communication and where communities can connect with each other [2]. E-government includes informational exchanges, certainly, but it also includes services, such as the ability to renew a driver's license online, file an online tax return, request documents (e.g. copies of one's birth certificate) and forms (e.g. a passport application), as well as the ability to contact one's elected representatives, to name a few. Through the use of e-government portals, citizens are able to have access to governmental information and services 24 hours a day, 7 days a week [3], allowing citizens a convenience never before experienced.

Since the 1960s, government trust and participation has declined tremendously. In the late 1950s, a majority of people polled conveyed trust in the federal government; in 2002, that number was less than half [4]. People have lost trust and, as a result, are less participative and less involved in their governments. Officials are proposing e-government as a way to make government practices more participative, thus allowing citizens to once again feel as though their opinions and thoughts are being heard. Although it has been suggested that the use of e-government portals could ultimately help to improve public trust and confidence in government, because of the more integrative interaction between citizens and elected representatives [5], citizens have been hesitant to accept many of the services that e-government could potentially offer [6]. It is therefore important to have a better understanding of users' needs which users



want e-government portals to satisfy. The current study takes a step in this direction by focusing on the needs and expectancy of individuals to propose a model for analyzing factors that influence individuals' intention to use e-government portal.

The rest of this paper is organized as follows. The upcoming section presents the research background. It is followed by our proposed research model and methodology. In the end we present our conclusions.

## RESEARCH BACKGROUND

E-government is slated to play an important role in our society. Yet, many people are not taking advantage of the services provided. In spite of its advantages, adoption of e-Government services by citizens is still rather slow to catch on [7]. There are many articles on factors influencing the acceptance and adoption of e-Government services, and Hofmann and colleagues [7] provide a comprehensive review of the prior literature. They developed a framework by categorizing the related work in the field of e-Government acceptance, constructs used in the studies and research settings. They clustered the constructs into technology characteristics referring to a user's perception of the used technology (for example: perceived ease of use, effort expectancy, perceived usefulness, performance expectancy, perceived compatibility), environmental characteristics, reflecting external influences (facilitating conditions, etc.), service characteristics describing the features of the considered e-Government service (for example: information quality, accuracy, privacy, mobility) and user characteristics including the user's experience and skills as well as trust (self-efficacy, etc.).

Belanger and Carter [8] provide an extensive historical assessment of the development of electronic government research. They found that some popular e-government services include downloading government forms, retrieving official government statistics, renewing a driver's license, finding public policy information and retrieving recreational/tourist information. Rana and colleagues [9] conducted a literature review on challenges and critical success factors of e-government adoption research. They observed that perceived usefulness, information precision, support from the government, interface design, quality, appeal, efficiency, accessibility, security, privacy, efficiency, confidence, trust, availability, were among the key important factors influencing e-government adoption and success. So as to avoid repetition, we encourage interested readers to refer to the articles [7-9].

According to Hofmann and colleagues [7], prior research on e-Government acceptance builds on models of IT acceptance, which include Theory of reasoned action (TRA), the theory of planned behavior (TPB), the Technology acceptance model (TAM), the unified theory of acceptance and use of technology (UTAUT) and the diffusion of innovation theory. Belanger and Carter [8] recommend that as the field of e-government is maturing, the field should move from technology adoption studies to value-based studies by recognizing the context or nature of the technology studied and understanding how e-government links to its constituents. The current study attempts to fill this gap by focusing on the needs and expectancy of individuals that influence individuals' intention to use e-government portals.

## RESEARCH MODEL

Expectancy theory and needs theory are two well-founded theories of organizational behavior and motivation [10]. IS researchers have also found that users' expectations influence their adoption and satisfaction with the information systems. According to the needs theory, individuals are motivated to take action to satisfy their needs [11]. As observed by Au and colleagues [12], one of the major commonalities of these theories is that different types of needs do exist among human beings. It is therefore important to determine the importance individuals place on different categories of needs as it has potentially caused a lot of user resistance in IS implementation [13]. In the current study, we focus on three different categories of needs which include work performance (existence) need, relatedness need and self-development (growth) need along with E-government portal performance expectation.

### **E-Government Portal Performance Expectation**

According to Bhattacharjee [14], "expectation provides the baseline or reference for [users] to form evaluative judgments about the focal product or service" (p. 354). User expectations of IS Performance are defined as "a set of beliefs held by the targeted users of IS associated with the eventual performance of IS and with their performance using the system" [15, 16]. When users perceive an e-government portal to perform in accordance with their expectations, they are more likely to intend to continue using the portal. Therefore,

***H1: E-Government Portal Performance Expectation is positively related to intention to use e-Govt. Portals***

### **Work Performance Fulfillment Expectation**

User expectations of Work Performance Fulfillment are defined as "a set of beliefs held by the targeted users of IS associated with the eventual performance of IS with respect to fulfilling their needs in carrying out required tasks" [15, 16]. These are the basic and fundamental needs that an information system is expected to fulfill. An IS user expects that a task be relatively simple to perform. It is expected that information be easily accessible and that tasks are streamlined and easy to follow and carry out. If, for example, a user is attempting to find information about the steps required to obtain a passport, then he or she expects these steps to be listed clearly and concisely and that all related forms and applications be readily available. Individuals who perceive e-government portal to accomplish their work performance fulfillment expectations are more likely to intend using e-government portals. Therefore,

***H2: Work Performance Fulfillment Expectation positively related to intention to use e-Govt. Portals.***

### **Relatedness Fulfillment Expectation**

User expectations of Relatedness Fulfillment are defined as "a set of beliefs held by the targeted users of IS associated with the eventual performance of IS with respect to fulfilling the socially oriented needs of the user" [15, 16]. Socially oriented needs refers to the citizen's need to communicate directly with their elected officials, to feel as though their elected officials are really hearing them, and that they, as citizens, are actively influencing the decisions that are being made by elected officials. Socially oriented needs may also refer to the citizen's need to connect with other citizens. For instance, veterans visiting the [www.va.gov](http://www.va.gov) website are able to connect with other veterans to share their stories and seek support for crises. There are options

for individual chats with a crisis counselor ([www.veteranscrisisline.net](http://www.veteranscrisisline.net)) as well as a place where veterans are able to make a community of shared experiences and gain support from other veterans who have, perhaps, gone through a similar experience ([www.maketheconnection.net](http://www.maketheconnection.net)). Individuals who perceive e-government portal to accomplish their relatedness fulfillment expectations are more likely to intend using e-government portals. Therefore,

***H3: Relatedness Fulfillment Expectation is positively related to intention to use e-Govt. Portals.***

### **Self-Development Fulfillment Expectation**

User expectations of Self-Development Fulfillment are defined as “a set of beliefs held by the targeted users of IS associated with the eventual performance of IS with respect to fulfilling their higher-order needs, in terms of individual self-growth and self-advancement [15, 16]. In an e-government setting, citizens want to feel as though they are participative. In order to be participative, citizens expect to be able to access information about their government and elected officials both quickly and easily. Citizens expect to be allowed to educate themselves on both the issues being discussed as well as the actors who are discussing them. When citizens feel as though information is given to them freely, they will be more likely to be satisfied with e-government. Conversely, if citizens feel as though access to information, knowledge, is being deliberately denied to them, they will be less satisfied. Individuals who perceive e-government portal to accomplish their self-development performance fulfillment expectations are more likely to intend using e-government portals. Therefore,

***H4: Self-Development Fulfillment Expectation is positively related to intention to use e-Govt. Portals.***

### **Trust in Government**

Trust in government is defined as “one’s perceptions regarding the integrity and ability of the agency providing the service” [6]. Trust in government is a very special kind of trust because there is no equal mutuality in the trust – the government is the trusted party and the citizen is the trusting party, but not the other way around [17]. When a citizen trusts a government department, e.g. the Internal Revenue Service, then he or she will be more likely to trust an e-service provided by that department [18, 19]. Likewise, trust in e-government services, especially when such services lead to more governmental transparency, will allow citizens to be more confident in their government’s ability to make decisions that are in the citizens’ best interests. Individuals who have trust in government are more likely to intend using e-government portals. Therefore,

***H5: Trust in government is positively related to intention to use e-Govt. Portals.***

Individuals who trust in government are more likely to also feel as though their expectations are met when using an e-government portal. However, individuals who do not inherently trust their government may feel as though their expectations are not being met and, consequently, will be less likely to intend to use e-government portals. Therefore,

***H5a: Work Performance Fulfillment Expectation is positively related to intention to use e-Govt. Portals more strongly for individuals who trust the government than those who do not trust the government***

***H5b: Relatedness Fulfillment Expectation is positively related to intention to use e-Govt. Portals more strongly for individuals who trust the government than those who do not trust the government***

***H5c: Self-Development Fulfillment Expectation is positively related to intention to use e-Govt. Portals more strongly for individuals who trust the government than those who do not trust the government***

### **Perceived Risk**

Risks arise when conditions in external environment jeopardize the reliability of e-services [20]. When discussing risk, it is generally discussed in terms of gains and losses [6]. Perceived risk is defined as “consumer’s belief about the potential uncertain negative outcomes from using e-government services” [21]. Users take into account any risks that may be involved when participating in an online transaction, including an information exchange. When there is an information exchange online, a person is potentially risking the interception of their personal information. Depending upon the task being performed, a user may be required to reveal personal information about them in an e-government exchange. For instance, if one is filing an on-line tax return, the person’s social security number and income will need to be disclosed. Therefore, if one feels as though the risk is too high, that the e-government entity will not safeguard information, then one will less likely be intend using e-government portals. Therefore,

***H6: Perceived Risk is negatively related to positively related to intention to use e-Govt. Portals***

Individuals who believe that their needs could be fulfilled by the use of e-government portal but perceive the presence of the risk to be high are less likely to use e-government portals as compared to those who perceive the presence of the risk to be low. Therefore,

***H6a: Work Performance Fulfillment Expectation is positively related to intention to use e-Govt. Portals more strongly for individuals who do not perceive risk associated with the use of portals than those who perceive the risk***

***H6b: Relatedness Fulfillment Expectation is positively related to intention to use e-Govt. Portals more strongly for individuals who do not perceive risk associated with the use of portals than those who perceive the risk***

***H6c: Self-Development Fulfillment Expectation is positively related to intention to use e-Govt. Portals more strongly for individuals who do not perceive risk associated with the use of portals than those who perceive the risk***

### **Perceived Security Control**

Perceived security control is defined as “the degree of importance the web site places to protect against unauthorized entry, misuse or takeover” [22]. An individual paying a parking ticket online with his or her debit card, for example, wants to be sure that the site through which his or her banking information is being exchanged is secured from any attacker who may attempt to access such financial information. Alternatively, a citizen would need to be assured that any electronic correspondence to and from a government agency is also secure [18]. If security controls are thought to be extremely low, more the individual will perceive to be potential

uncertain negative outcomes from using e-government services. The user will believe that his or her information is not safe and may choose to conduct their business through other means. Therefore,

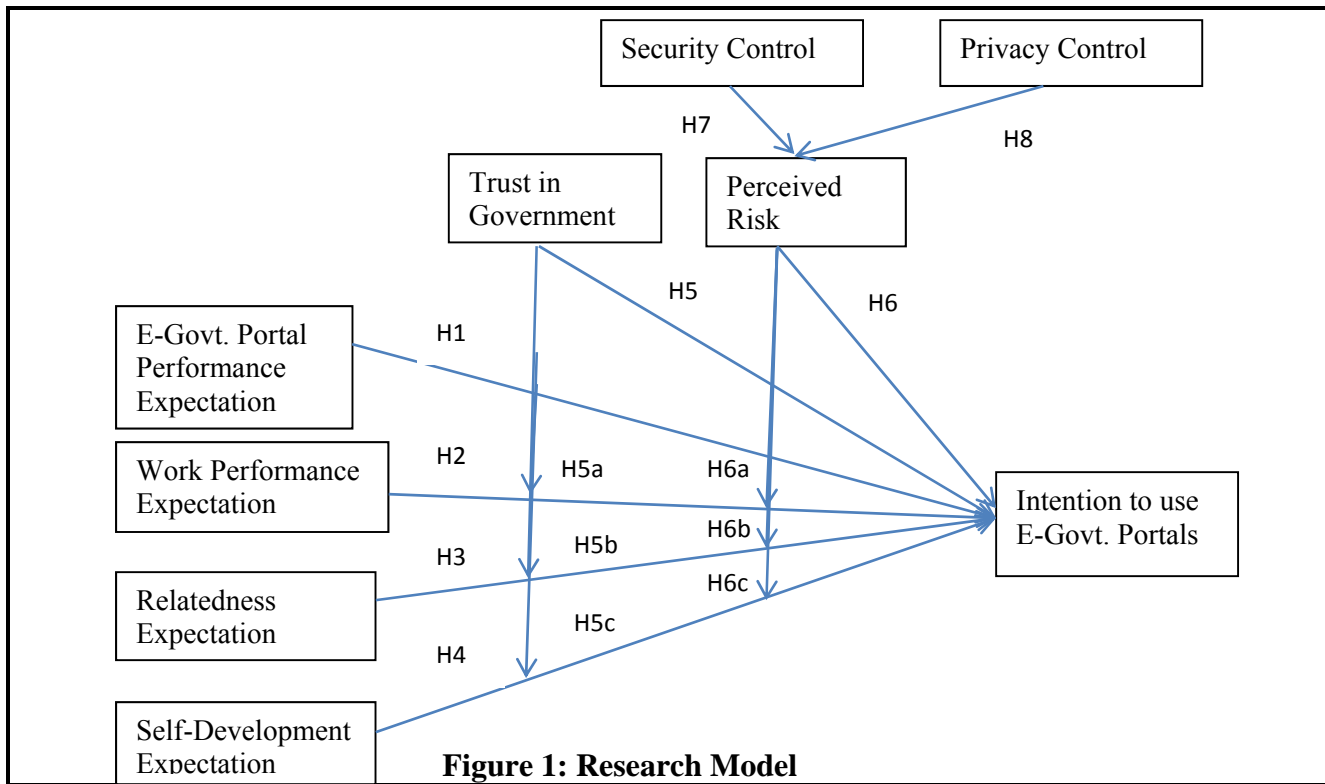
***H7: High level of Perceived Security Control is negatively related to Perceived Risk***

**Perceived Privacy Control**

Privacy refers to a person’s desire to only share personal information with an intended party, meaning that when one divulges personal information to one party, that party will not share said information with any other party [23]. Perceived privacy, for our purposes, refers to the level at which an individual believes governments will refrain from using any divulged personal information in any way besides for the purpose of which it was given. Control is defined as “the ability to exert personal control over the service” [24]. Perceived privacy control, therefore, refers to the level at which citizens believe they can control the personal information shared with the government and how the government uses such information. Because of the compulsory nature of a government’s information requests, there is a special duty in using such information only for its intended purpose [25]. If an individual believes that he / she has less control over his / her information, more the individual will perceive to be potential uncertain negative outcomes from using e-government services. Therefore,

***H8: High level of Privacy Control is negatively related to Perceived Risk***

Figure 1 shows the research model for the study.



## METHODOLOGY

We will conduct survey to collect the data and use partial least square analysis to analyze the data and validate results. A questionnaire will be developed by adopting standard survey development procedures and using validated measures available in the literature.

## CONCLUSION

The adoption of e-government practices has been suggested to help raise political participation and trust in government back to pre-1960 levels. In order to accomplish this goal, e-government portals are going to need to strive to allow citizens to easily find what they are looking for. For many years now, the public has been kept virtually in the dark about decisions being made. It was hard for the average person to find the answers to their political questions. The adoption of e-government portals is one step that can be taken to help citizens to find their answers and it helps governments be more open with their citizens. Because e-government portals are available 24 hours a day, 7 days a week, there are few limits to how many citizens can be reached, how many services could potentially be offered. Through the use of these portals, citizens could potentially begin to regain trust that their governments are acting in the best interest in the many, rather than speculating that such governments are acting on the best interests of the few. Our proposed model investigates an important issue that needs careful attention in today's environment.

The proposed study contributes to IS theory by formulating a theoretical model based on the needs and expectations of individuals for determining their intention to use e-government portals. The results can also be used to advance our understanding of developing appropriate training and intervention mechanisms to encourage individuals to use e-government portals.

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## **TEAM TRAINING: ENHANCEMENT OF ORAL COMMUNICATION AMONG COLLEGE STUDENTS**

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This research examines utilization of an *Oral Communication* rubric developed by a team of faculty from different universities in the U.S. The study explores techniques that can enhance students' in class presentation and discussion. These techniques, central message, language, delivery method, organization, and supporting material, are assessed in improving the oral communication of students. The final part of this study concentrates on the results of implementation of these techniques across general education courses in different universities.



**Paper Proposal for the  
The Northeast Decision Sciences Institute 2014 Annual Conference  
Philadelphia, PA 2014  
March 27 – 29, 2014**

**Do Graduate Students Think They Can Communicate?  
What Are Their Perceptions Of Their Communication Competencies?**

**By  
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## **Do Graduate Students Think They Can Communicate? What Are Their Perceptions Of Their Communication Competencies?**

### **Abstract**

Research studies, journal articles, and job postings have emphasized communication competency for many years. Prospective employers as well as communication and business professors have emphasized the importance of these competencies, also. Many studies concentrate on what prospective employers are looking for in business college graduates, how to present these skills to business students to emphasize their importance in the workplace, and how students perceive the relevance of these communication skills.

Our study, however, compared how business graduate students rated their own level of competency at the onset of a required managerial communication course with their self-ratings at the conclusion of the course. These students, from two public universities, were asked to rate themselves on 35 communication skills that are addressed in the course. The skills included interpersonal relations, listening, speaking, asking, and answering questions, team communication, interviewing, meeting management, and writing routine documents, reports, and proposals. The assessment instrument consisted of 5-point Likert-type scales.

Pre-post comparisons were made for each of the 35 skills in an attempt to determine the extent to which self-perceptions changed because of taking the course. Findings indicate that students felt their level of competency had changed positively for all the skills.

### **Introduction**

Demand from the business sector is one of the reasons that business colleges require a course in communication skills in our graduate business program. Potential employers tend to believe that a student who successfully completes the course has mastered the course topics. They see a student's final grade in the course as a valid descriptor of the student's learning outcomes. However, the extent to which students agree with the instructor's assessment of the student's achievement -- as indicated by the final grade -- is unknown. Nor does the final grade indicate whether the student perceives the relevance or importance of these communication skills for his/her career success. Sanchez and Hynes (2001) did find in their online communication skill study that students' perceptions of their entering and exiting skills levels provided much more detail on the nature of the learning that actually took place.

As you can see from the following table, various methods have been used to evaluate communication competencies of students.

Learning Objective	Method
Knowledge	Standardized tests
Attitudes	Retention rates
Competencies	Pre-post measures

This study attempts to capture students' self-assessments of their learning in a graduate managerial communication course. We as managerial communication professors wanted to know how the students perceived their communication skills before being introduced to these skills in a semester course and after they finished the course. We wanted to know how business graduate students would rate their own level of competency at the onset of a required managerial communication course and at the conclusion of the course. These students, from two public universities, were asked to rate themselves on 35 communication skills that are addressed in the course. The skills included interpersonal relations, listening, speaking, asking and answering questions, team communication, interviewing, meeting management, writing routine documents, reports, and proposals. The assessment instrument consisted of 5-point Likert-type scales.

### Literature Review

English, Manton and Walker (2007) surveyed 200 of the largest firms in Dallas and found that the most highly rated traits these managers looked for in business college graduates were "integrity and recognition of appropriate confidentiality in communication" (p 414). The next highest-rated trait they wanted the business college graduate to possess was "the ability to produce neat and well organized documents that use correct grammar, punctuation, and spelling" (p. 414); plus, "the ability to proofread documents and understand the principle of effective communication" (p 414). In light of the recent corporate scandals, it is understandable that the human resource managers would rate "integrity and recognition of confidentiality in communication" very high. In fact, the second highest traits they are looking for in business graduates align with what we, as business communication professors, have been emphasizing for years.

Kirmer and Sellers (2009) analyzed survey responses from 94 campus recruiters in an attempt to clarify which communication skills recruiters valued most highly. They found that oral communications skills—formal speaking, teamwork, interpersonal communication, and listening—rated highest. Hynes and Sigmar (2009) surveyed approximately 100 campus recruiters representing 45 businesses and government agencies to find the importance of various communication skills. The recruiters ranked courses in “daily workplace relationships” and team communication as more important for success than business writing, presentations, office technology, and intercultural business communication. Koc (2011) found that the “ability to verbally communicate with persons inside and outside of the organization” was ranked higher than the ability to write reports by recruiters in a survey conducted by the National Association of Colleges and Employers. Hynes’ (2012) research agrees with the studies above. She found that “interpersonal communication appeared to be just as important, if not more so, than business writing or making professional presentations” (p. 7).

Hartman and McCambridge (2011) bring some insights into how to present key communication skills to the Millennials. Millennials are individuals born between 1980 and 2000. They are described as “technologically sophisticated multitaskers, capable of significant contributions to tomorrow’s organizations, yet deficient in communication skills” (p. 22). According to Hartman and McCambridge (2011), the Millennials are the largest majority of college students in the United States, and, apparently, we need to find new ways to emphasize the importance of communication skills in the workforce.

Ameen, Bruns, and Jackson (2010) surveyed 576 students in a principles of accounting course in 1998 and 322 in 2006 from four universities. Their results indicate, “students continue to regard the accounting profession as one that requires few oral communication skills even though the profession and academia have demonstrated the importance of these skills” (p 65).

Many business leaders complain that recent college graduates lack the fundamental communication skills, especially writing, necessary to gain success in the business world. The leaders place this problem on the universities’ professors and administrators. However, the problem goes beyond the professors and administrators (Hines & Basso, 2008).

Business communication professors, as well as other writing professors, have to review basic writing rules briefly and move on to other topics such as presentations, research, writing emails, letters, reports, etc. that have to be covered in the course. The limited classroom instruction time mixed with the need to introduce students to a variety of written communication in different media leave little time to actually “teach” a business student how to write effectively and efficiently in a semester. If a student does not have

the use of basic grammar, then they are not going to have fundamental communication skills (Hines & Basso, 2008). Most students “perceive” themselves as good “communicators”. Once they are introduced again to the rules of core writing skills such as proper sentence structure, punctuation, subject-verb agreement, etc., they often realize that they may not be as competent as they thought (Hines & Basso, 2008).

Hines and Basso (2008) also found that a significant number of communication professionals report relatively low scores when rating the writing proficiency of entry-level employees. Their data seems to suggest that communication professionals think higher education does an inadequate job of preparing these workers for writing-intensive careers. The study does support the idea that higher-ranked communication practitioners reported lower perceptions of good writing skills among entry-level communication workers than lesser-ranked practitioners.

Students need to be able to apply the skills and competencies they are learning in the college classroom to the “actual workplace.” It seems the college professors and business employers should work together to prepare the students for the actual workplace. Not only does that mean that college professors should teach the skills and competencies that they and the employers think are necessary, but also incorporate practical application of these skills and competencies so students can perceive their competency in these skills and global competencies (Weisblat & Bresciani, 2012).

Maes, Weldy, and Icenogle (1997) report the results of two studies done in 1995 that identify the competencies, characteristics, and skills that managers consider when selecting graduates for entry-level positions. The first study clearly identified oral communication as the most important competency for entry-level positions. It was even more important than written communication. In the second study, managers rated the importance of 13 oral communication skills. The top four oral communication skills were: (1) following instructions, (2) listening, (3) conversing, and (4) giving feedback. These oral communication skills were consistently rated as most important, regardless of industry or size of organization (Maes, Weldy, & Icenogle, 1997).

“In the dynamic and evolving world of project management, communication remains constant as a desirable and critical competency for managing projects” (Henderson, 2008). Henderson (2004 & 2008) found that managers’ decoding competency positively influences their teams’ satisfaction and productivity. Also, their encoding competency positively influences their teams’ productivity and, unexpectedly, their team’s satisfaction. For geographically dispersed teams, managers’ competency in decoding and encoding positively influences their teams, also (Henderson, 2008).

This is just a sampling of the studies that are published on business communication competencies. They mainly concentrate on what prospective employers are looking for in business college graduates, how to present these skills to business students to emphasize their importance in the workforce, and how students perceive the relevance of these communication skills.

## Methods and Procedures

### Subjects

The subjects in this study were graduate students enrolled in a required managerial communication course in two public universities. One hundred and forty-three (143) student subjects were used in this study. As you can see from the table below, the largest percentage of students were Professional MBA students (45.7%) or MBA students (28.2%). About half of the students were part-time students (42.7%) and half were full-time students (57.3%). A majority of the students was employed full-time (72%). Only 8.1% were employed part-time, and 19.9% were not employed. The students' undergraduate majors were Business Administration (24.1%), Liberal Arts (10.7%), Computer Science (4.5%), Science/Engineering (37.5%), Education (1.8%), and other (21.4%).

### Demographics

Graduate Program	
MBA	28.2%
MS in MIS	12.7%
M. Acct.	13.4%
Professional MBA	45.7%
Part-time or Full-time student	
Part-time Students	42.7%
Full-time Students	57.3%
Employed	
No	19.9%
Yes, Part-time	8.1%
Yes, Full-Time	72.0%
Undergraduate Major	
Business Administration	24.1%
Liberal Arts	10.7%
Computer Science	4.5%
Science/Engineering	37.5%
Education	1.8%
Other	21.4%

## Procedures

The students were asked to rate themselves on 35 communication skills that are addressed in the course. The skills included interpersonal relations, listening, speaking, asking and answering questions, team communication, interviewing, meeting management, writing routine documents, reports, and proposals. The assessment instrument consisted of 5-point Likert-type scales. The instruments were administered twice to the students – once at the onset of the course, and again at the conclusion of the course, but before final grades were calculated.

Pre-post comparisons were made for self-rated scores on each of the 35 skills in an attempt to determine the extent to which self-perceptions changed as a result of taking the course.

We wanted to find answers to the following questions:

1. How did the students perceive their communication competencies at the onset of a graduate MC course?
2. How did the students' perceived competency levels change at the conclusion of the course?
3. Which competencies changed the most?
4. Which competencies changed the least?

## Results

Interpersonal Relations Skills	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I convey warmth and empathy when communicating at work.	3.75	3.91	-2.26	.026
I remain open-minded in relationships.	3.80	4.03	-3.64	.000
I resist judging or comparing people.	3.26	3.69	-6.17	.000
I foster liking and trust among my coworkers.	4.03	4.15	-2.09	.039

Listening	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I am motivated to listen to others.	3.83	4.08	-3.76	.000
I listen empathically.	3.63	3.95	-4.51	.000
I am alert to verbal and nonverbal cues.	3.61	3.98	-4.03	.000
I use feedback techniques such as paraphrasing.	3.34	3.74	-4.36	.000

Speaking	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I state my point simply and succinctly.	3.59	3.97	-5.28	.000
I support my opinion with facts, reasons, or examples.	3.59	3.89	-3.57	.000
I avoid technical terms (jargon) when talking with lay people.	3.37	3.80	-5.16	.000
I give clear, logically organized instructions.	3.24	4.05	-9.22	.000
I know how to begin and conclude a business presentation.	3.34	3.90	-6.80	.000

Asking Questions	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I ask various types of questions for different purposes.	3.51	3.85	-4.61	.000
I recognize hostility and resistance in question form.	3.70	3.99	-4.15	.000
I check my understanding of a question before replying.	3.47	3.79	-4.27	.000



Team Communication	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I interact cooperatively with teammates to achieve our goal.	4.07	4.31	-4.28	.000
I can diagnose the problem when my team isn't working well.	3.55	3.85	-4.24	.000
I understand the fundamentals of group dynamics.	3.69	4.08	-6.02	.000
I can motivate and lead a team to achieve high performance.	3.58	3.90	-4.42	.000

Interviews and Meetings	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I participate in job selection interviews satisfactorily (either as an interviewer or applicant).	3.52	3.97	-6.35	.000
I participate in performance appraisal interviews satisfactorily (either as a supervisor or subordinate).	3.47	3.89	-5.91	.000
I know how to begin and conclude an interview.	3.30	4.15	-9.52	.000
I make valuable contributions to business meetings.	3.50	4.08	-8.08	.000
I am competent in leading meetings.	3.31	3.95	-7.92	.000

Writing Routine Business Documents	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I compose letters and memos in standard business format.	3.41	4.08	-7.98	.000
I compose documents that are well organized.	3.68	4.13	-5.40	.000
I plan documents by considering my purpose and audience.	3.82	4.19	-4.68	.000
I revise documents for conciseness, clarity, courtesy, and completeness.	3.86	4.20	-4.94	.000
I proofread documents for surface errors (spelling, mechanics).	3.96	4.24	-4.06	.000

Reports and Proposals	Pre-Test Mean	Post-Test Mean	T-Values	P-Values
I know how to compose all the parts of a standard business report and proposal.	2.89	3.83	-10.5	.000
I can write an Executive Summary.	2.77	3.76	-9.93	.000
I organize formal reports logically.	3.24	3.97	-8.33	.000
I write persuasive proposals that achieve their goal.	3.08	3.81	-8.29	.000

## Findings

Findings indicate that students felt their level of competency had changed positively for all the skills. This study compared how business graduate students self-rated their level of communication competency at the beginning and end of a required managerial communication course. Thirty-five communication skills were addressed in the course. Pre-post comparisons were made for each of the skills to determine which perceptions changed after taking the course. Findings indicate that students felt their level of competency had changed positively for all the skills.

## Implications

In our College of Business Administration, students are asked to complete a course evaluation form at the end of every course. The form includes a section where students are asked to rate their progress on the acquisition of knowledge, skills, and competencies. One item asks the extent to which students perceive progress on “developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course” (IDEA #24). This item stimulated our thinking about students’ ability to critically evaluate their own competencies. We hypothesized that, when presented with a list of communication skills, they could more accurately analyze their level of competency after completing the course than at its onset. That is, after taking the course, they had a better understanding of what they knew and what they did not know, what they could do well, and what they could not do well.

One of the implications of our results may be that, once the students are aware of their improvements or non-improvements in different areas, they may try to change their process of learning. A second implication of our results is that we as instructors may need to change our style of teaching and/or course content to better suit the expectations of the students and their future employers.

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Learning Objective	Method
Knowledge	Standardized tests
Attitudes	Retention rates
Competencies	Pre-post measures

## What is the Role of Business Educators in Preparing Future Leaders

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### ABSTRACT

The purpose of the study is to gain insight from experienced and practicing industry leaders, experts in the field of corporate ethics, and philosophy/ethics scholars, as to the value of a business ethics education. Specifically, what are the desired learning outcomes of a business ethics course, as it relates to knowledge, skill and disposition?

**Keywords:** Ethics, Business Education

### BACKGROUND AND LITERATURE REVIEW

The AACSB is viewed as the premier accrediting authority over business programs in the U.S. Its mission is to advance quality management education through accreditation and thought leadership. A report of the AACSB suggested that “business schools are vital societal institutions that create value in a myriad of ways. Ample evidence is presented that dismisses the sometimes cited critical perception that business schools exist exclusively to serve profit-seeking businesses or salary-minded students” (AACSB 2010, 3). Embracing the perception that business program graduates are *not* to be solely focused on profit seeking, suggesting a broader societal purpose of commerce, makes it intuitively easy for curriculum gatekeepers to establish Business Ethics as an essential building block for student learning.

As influential as *The Association to Advance Collegiate Schools of Business* (AACSB) is upon management and business education, there are no explicit standards for the student learning outcomes related to Business Ethics. The AACSB has supported, since the 1980s, the inclusion of business ethics courses; but, it has been suggested that many schools only do the minimum (Luthar and Karri 2005, 357). Jennings (2004, 13) suggested that there had been little from the AACSB “on moral absolutes or ‘bright line’ virtue ethics such as honesty, fairness or even false impressions in financial disclosures.” Rather the MBA curriculum “trained students in the importance of smoothing out earnings so as to maximize shareholder value, the often-stated role of business.”

The regional accrediting authorities, such as *The Middle States Commission on Higher Education*, expect academic institutions to establish evidence of student learning as relates to the institution’s stated program goals and expected learning outcomes. Also, there appears to be a

lack of consensus as to the role business ethics education plays (Nicholson and DeMoss 2009). Does it “make the workforce more honest?” or “teach people to think for themselves?” Are teachers to focus on the discipline of ethical theory and then expect students to apply the theory, or is case-study review the correct strategy? (Shaw 2012).

It had been suggested that business schools had served as a negative influence on business leaders with too much focus on analytical skills, teaching students how to cut corners in order to gain a competitive advantage; further suggesting that this educational style contributed to the downward spiral of corporate leaders’ ethical behaviors (Mitroff 2004; Cavico and Mujtaba 2009; Heller and Heller 2011, 31; Zingales 2012). Others have suggested that business schools are not to be held accountable for the ethical, financial and economic crisis; rather, it is the lack of individual character that is the cause (Heller and Heller 2011, 31). Milner et al. (1999) found that business students score lower on ethical scales coming *into* school when compared to non-business majors, suggesting a selection bias rather than an influence of the business education. Regardless of cause, corporate scandals, disappointment in boards’ governance oversight, the increase in regulatory regulation, the reach of the global market, criticism of scholars, and the increased focus on corporate social responsibility have collectively placed a renewed focus on Business Ethics (Jackson 2006).

A review of fifty ethics courses from AACSB accredited undergraduate programs revealed that the course content included four needed areas: (1) the responsibility of business in society, (2) ethical decision-making, (3), ethical leadership, and (4) corporate governance. But the authors suggest that these topical areas were inconsistently covered and that “added emphases is needed in the classroom to raise students’ awareness of the importance of a broader horizon of ethical issues confronting the workplace and society” (Heller and Heller 2011, 34). More foundational ethics training has been suggested such as ethical egoism, utilitarianism, morality, and philosophy, that will lead the individual to greater self-reflection (Cavico and Mujtaba 2009; Jennings 2004).

Whether educational scholars agree or not, *employment* in either the for-profit or not-for-profit sector is among the desired outcomes of a business student’s education. Therefore the views and expectations of employers are valuable inputs as the faculty builds the curriculum for its students.

## METHODOLOGY

The preliminary results of an exploratory study will be shared at the NEDSI Conference. Feedback will be sought at the NEDSI Conference on these insights. These insights will be incorporated into a more fully developed research article that will be published at a later date.

This study use methods most effective within the qualitative paradigm.

Subjects: To reduce research bias, triangulation will include subjects with varying professional positions as related to this topic. Three subject groups will be interviewed: (1) Senior Leaders

who influence the culture of their organizations as well as make leadership decisions related to selection and promotion; (2) Individuals who design, establish, and/or lead corporate ethics programs; and (3) Ethics scholars.

Data collection: The data will be collected using the method of in-depth interview. Open-ended questions will allow the subject to express his or her view, experiences, and opinions related to this topic.

Data analysis: Content analysis will be used to systematically reduce the data allowing the themes to emerge.

Discussion and Conclusion: Following analysis, the themes emerging from the data will be related back to the literature with recommendations made and strategies suggested.

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# **ANALYSIS OF VENDOR ENVIRONMENTAL COSTS IN THE JELS MODEL WITH SUSTAINABILITY**

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## **ABSTRACT**

This paper presents the development and evaluation of two models of environmental cost reduction in the joint economic lot size model including sustainability (JELSE). The first model considers the option of reducing vendor fixed environmental cost in JELSE and the second involves vendor variable environmental cost reduction in the JELSE. Numerical results for both models are given. Performance of these two models is compared and some specific conclusions are drawn

## **1. INTRODUCTION**

The co-maker concept has become accepted practice in many successful global business organizations. The basic tenet of this philosophy is that vendor (supplier) and purchaser are value chain partners in manufacturing and delivering a high quality product to the purchaser's customers. This viewpoint has led to the development of a class of inventory models known as Joint Economic Lot Size (JELS) models. These models consist of lot size formulas based on the joint optimization of vendor and purchaser costs.

The term JELS was coined by Banerjee (1986) who used classical optimization to derive the joint economic lot size formula which is a function of demand, the annual inventory carrying charge, the vendor's annual production rate, setup cost, and unit production cost, and the purchaser's order cost and unit purchase cost. The JELS, in general, is not the optimal lot size for either the purchaser or vendor operating independently. Thus, some cost is involved on both parties' part to operate at this mutually beneficial level. Banerjee investigates the cost-tradeoffs involved in adopting the JELS from both the purchaser's and vendor's points of view. Essentially, one party will be at a disadvantage if the JELS is adopted. This situation can be ameliorated by the advantaged party offering some price concession to the other party. The JELS model presented in Banerjee (1986) assumes that the vendor produces on a lot-for-lot basis in response to orders from a single purchaser, demand is deterministic, and the vendor is the sole supplier.

Since this early research many authors have worked at refining the JELS so that it is a better representation of what actually occurs in manufacturing practice. Affisco *et al.* (1988) integrate the concepts of joint economic lot size and vendor setup cost reduction. For the case of a single vendor and purchaser and assuming a logarithmic investment function, they derive relationships for the

optimal joint economic lot size, optimal vendor's setup cost, and the optimal joint total cost per year. Results of a numerical example indicate that significant savings in joint total cost can accrue from investing in decreased setup costs on the part of the vendor. As in the case of the JELS with constant setup cost, adoption of the joint economic lot size including investment results in one of the parties being at a cost disadvantage and a major question is the method by which joint cost savings may be equitably distributed. Further work by Affisco *et al.* (1991) extends this approach to the case of one-vendor and many-nonidentical-purchasers. Much the same results are achieved as in the single vendor and purchaser case.

Finally, Affisco *et al.* (1993) investigated the one-vendor, many-nonidentical-purchasers JELS model with vendor setup cost reduction and purchaser order cost reduction. The results indicate that there are significant cost savings for the JELS over independent optimization when such investments are made. This suggests that when an environment of cooperation between the parties has been established the JELS is a superior policy. Beyond this the JELS model was found to be superior to other integrated joint lot sizing models that appeared in the literature at that time.

Chikan (2007) advances the proposition that due to fundamental changes in the global economy the classical inventory paradigm developed in the 20th century must be updated. Of specific interest to this research is one of the changes discussed by Chakin - Responsible Economy. In the Responsible Economy, actors within the economy are forced to consider not only their own interests but those of other stakeholders, including the human and natural environments. Sustainable development may be defined as development that meets the need of the present without compromising the ability of future generations to meet their own needs. Perhaps a 1989 Stockholm statement by Peter Wallenberg, the former President of the International Chamber of Commerce, best represents the challenge for modern manufacturing organizations:

"The onus of proving that sustainable development is feasible rests primarily on the private business sector, as it controls most of the technological and productive capacity needed to conceive more environmentally benign processes, products and services, and to introduce them throughout the world."

One response to this charge was the development of ISO 14000, an international environmental standard patterned after the ISO 9000 international quality standard as detailed in Affisco (1998), Affisco *et al.* (1996) and Affisco *et al.* (1997). Today many manufacturing firms require suppliers to be certified to ISO 14000 as a prerequisite for doing business. Affisco (2012) details the movement toward developing an equivalent international standard for energy management.

Recently there has been some initial research focused on modifying classical inventory mathematical models to include the issue of sustainability. Bonney and Jaber (2011) examine some possible environmental consequences of common inventory activities and suggest that all functions within the product life cycle including inventory planning and control should be looked at from an environmental point of view. A simplified model was constructed to illustrate how, in principle, one could determine inventory parameters in an environmental context. This suggests that the parameters that we frequently use to determine inventory levels may need to be re-assessed.

Arslan and Turkay (2010) develop a set of lot sizing models with different assumptions about environmental costs and how they could be included in individual EOQ models. One specific approach is that of modifying the classical Wilson EOQ for the carbon footprint of the inventory system. The carbon footprint consists of the set and amount of greenhouse gases released by an organization due to its operations. One approach to modeling this is through direct accounting which treats the carbon footprint as an additional source of economic cost. Estimates of these costs may be obtained from the cost accounting system. In this revised EOQ model the optimal ordering quantity is governed by the trade-off between replenishment and inventory holding costs with the only change of added environmental cost components. Due to this trade-off, the refined optimal ordering quantity may be larger, smaller or equal to the EOQ depending on the values of the cost components.

Affisco et al. (2013) investigate the impact of environmental costs on the Joint Economic Lot Size (JELS) model. Specifically, the classical JELS model of Banerjee (1986) is modified to include environmental economic costs for both the vendor and purchaser. Classical optimization results in closed forms for the JELS with sustainability considerations (JELS<sub>E</sub>) and the corresponding optimal joint total cost. An interesting finding from numerical examples is that when the ratio of fixed to variable environmental costs is smaller than the corresponding ratio of traditional costs, the JELS<sub>E</sub> is smaller than the JELS and the joint optimal total cost also decreases. This suggests that research into the impact of reducing environmental costs is warranted. Since in the JELS experience vendor environmental costs are generally more significant than those of purchasers, this paper investigates the result of decreasing them in the JELS model with sustainability conditions.

Sections 2, 3, and 4 of this paper restate the JELS and JELS<sub>E</sub> models including some numerical results; Section 5 modifies the JELS<sub>E</sub> model for the case of investment in vendor fixed environmental cost reduction and Section 6 presents numerical results for this new model; Section 7 modifies the JELS<sub>E</sub> model for the case of investment in vendor variable cost reduction and Section 8 presents numerical results for this second new model; Section 9 compares the performance of the two new models; and finally, Section 10 is the paper's Conclusion.

## 2. THE BASIC MODEL

Consider a system in which a single vendor produces on a lot-for-lot basis in response to orders from a single purchaser, demand is deterministic, and the vendor is the sole supplier. Under these conditions the JELS may be obtained by minimizing the joint total relevant cost given by Banerjee (1986) as

$$JTRC(Q) = \frac{D}{Q}(S + A) + \frac{Q}{2}r\left(\frac{D}{R}C_v + C_p\right) \quad (1)$$

where

$D$  = Annual demand or usage of the item,

$R$  = Vendor's annual production rate for this item,

$A$  = Purchaser's ordering cost per order,

$S$  = Vendor's setup cost per setup

$r$  = Annual inventory carrying charge, expressed as fraction of dollar value,

$C_v$  = Unit production cost incurred by the vendor,

$C_p$  = Unit purchase cost paid by the purchaser,

$Q$  = Order or production lot size in units,

and  $R \geq D, C_v \leq C_p$  .

The result of classical optimization yields the following formula for the JELS,

$$Q_j^* = \sqrt{\frac{2D(S+A)}{r\left(\frac{D}{R}C_v + C_p\right)}} \quad (2)$$

And the corresponding optimal joint total relevant cost

$$R \quad Q = \sqrt{\left[ r (S A) / p_v \quad p \right]} \quad (3)$$

### 3. JELS WITH SUSTAINABILITY CONSIDERATIONS

In this section we consider the situation where the carbon footprint of the activities of the vendor and purchaser is considered when developing the joint economic lot size. The approach we use in this formulation is direct accounting by which we treat the carbon foot print as an additional source of economic cost. We let  $f_v$  represent the vendor's fixed cost of environmental impact per setup due to setup and its associated activities (i.e. movement of fixtures, dies, and other transportation costs);  $f_p$  represent the purchaser's fixed cost of environmental impact per order due to ordering and its associated activities;  $C_{ev}$  represent vendor's variable cost of environmental impact due to production and production related activities; and finally,  $C_{ep}$  represent purchaser's variable cost of environmental impact due to ordering related activities. The values for these cost parameters can be extracted from cost accounting of organizational environmental and energy management activities. Although these values have historically been difficult to obtain, they are more readily available in

the current global economy due to ISO environmental and energy standards compliance efforts. Including these additional cost parameters in our modeling results in the following relationships for vendor costs

$$TC_v(Q) = \frac{D}{Q}(S + f_v) + \frac{QD}{2R}r(C_v + C_{ev}) \quad (4)$$

and purchaser costs

$$TC_p(Q) = \frac{D(A + f_p)}{Q} + \frac{Q}{2}r(C_p + C_{ep}) \quad (5)$$

Combining (4) and (5) gives the following relationship for joint total relevant cost with sustainability considerations

$$JTRC_E(Q) = \frac{D}{Q}(S + A + f_v + f_p) + \frac{Q}{2}r\left(\frac{D}{R}(C_v + C_{ev}) + (C_p + C_{ep})\right) \quad (6)$$

The result of classical optimization yields the following relationships for the joint economic lot size with sustainability considerations

$$Q_{jE}^* = \sqrt{\frac{2D(S + A + f_v + f_p)}{r\left[\frac{D}{R}(C_v + C_{ev}) + (C_p + C_{ep})\right]}} \quad (7)$$

and optimal joint total cost

$$JTRC_E(Q_{jE}^*) = \sqrt{2Dr(S + A + f_v + f_p)\left(\frac{D}{R}(C_v + C_{ev}) + (C_p + C_{ep})\right)} \quad (8)$$

It should be noted that if the environmental costs are zero, Eqns. (7) and (8) reduce to Eqns. (2) and (3) respectively.

#### 4. JELS<sub>E</sub> NUMERICAL EXAMPLES

The relationship between the JELS with sustainability considerations (JELS<sub>E</sub>) and the traditional JELS depends on the values of the cost parameters. That is, the value of  $Q_{jE}^*$  relative to that of

$Q_j^*$  is determined by the tradeoff between the holding and replenishment costs including the addition of the environmental costs. To investigate this relationship we determine the indifference point by setting  $Q_{jE}^* = Q_j^*$ . Some simple algebraic manipulation results in the following three scenarios:

$$Q_{jE}^* = Q_j^* \text{ iff } \frac{S + A}{(D/R)C_v + C_p} = \frac{f_v + f_p}{(D/R)C_{ev} + C_{ep}}$$

$$Q_{jE}^* > Q_j^* \text{ iff } \frac{S + A}{(D/R)C_v + C_p} < \frac{f_v + f_p}{(D/R)C_{ev} + C_{ep}}$$

$$Q_{jE}^* < Q_j^* \text{ iff } \frac{S + A}{(D/R)C_v + C_p} > \frac{f_v + f_p}{(D/R)C_{ev} + C_{ep}}$$

If we consider a single inventory cycle then we may say that the two joint economic lot sizes are equal if the ratio of the traditional fixed replenishment costs (vendor's setup cost and purchaser's order costs) to the joint inventory value is equal to the ratio of the fixed environmental costs of vendor and purchaser to the joint environmental inventory value. The joint environmental inventory value reflects the vendor and purchaser variable environmental inventory costs for the production and purchase of one lot of goods.

Table 1 presents simple examples of each of these three scenarios. Consider the case of an inventory item provided to order by a vendor on a lot-for-lot basis. A single purchaser periodically orders and buys a batch of this item from the vendor, who is the buyer's sole source for this item. The vendor and purchaser have agreed to cooperate in accordance with the results of the JELS model. The following parameters are known:  $D=1000$  units/year,  $R=3200$  units per year,  $S = \$400/\text{setup}$ ,  $A = \$100/\text{order}$ ,  $r = 0.2$ ,  $C_v = 20$ , and  $C_p = 25$ . In addition to the traditional inventory parameters, four environmental cost parameters  $[f_v, C_{ev}, f_p, C_{ep}]$  take on three values in sets as follows  $[400, 25, 5, 30]$ ,  $[400, 20, 100, 25]$ , and  $[400, 17, 75, 12.5]$

The results in Table 1 indicate that when the ratio of fixed to variable traditional inventory costs is equal to the ratio of fixed to variable environmental costs, the two joint lot sizes are equal but the joint optimal cost for the JELS with sustainability considerations is substantially greater than that for the traditional JELS. This is not surprising due to the added environmental costs. Of more interest is the finding that when the ratio of fixed to variable environmental costs is smaller than the corresponding ratio of traditional costs, the  $JELS_E$  is smaller than the JELS.

Table 1  
Comparison of JELS and JELSE

Traditional Ratio	Environmental Ratio	Traditional JELS		Sustainability JELS		% Cost Difference vs. JELS
		$Q_j^*$	Joint Optimal Cost (\$)	$Q_{jE}^*$	Joint Optimal Cost (\$)	
16	10.71	400	2,500	362.00	5,000.06	100.00
16	16	400	2,500	400.00	5,000.00	100.00
16	26.67	400	2,500	445.79	4,374.29	74.97

### 5. VENDOR FIXED ENVIRONMENTAL COST REDUCTION

In this section we consider the option of investing in vendor fixed environmental cost reduction in the  $JELS_E$  model. We consider the vendor fixed environmental cost,  $f_v$ , to be a decision variable and pursue the objective of minimizing the sum of the investment cost for changing  $f_v$  and the joint total relevant cost with sustainability considerations. Specifically we seek to minimize

$$f(Q, f_v) = ia_{f_v}(f_v) + JTRC_E(Q) \tag{9}$$

subject to

$$0 < f_v \leq f_{v0} \tag{10}$$

where  $i$  is the cost of capital,  $a_{f_v}(f_v)$  is a convex and strictly decreasing function of  $f_v$  representing the cost of changing the vendor fixed environmental cost to the level  $f_v$ ,  $JTRC_E(Q)$  is the joint total relevant cost with sustainability considerations given by equation (6), and  $f_{v0}$  is the original vendor fixed environmental cost before the investment is made.

To obtain the  $JELS_E$  including investment in vendor fixed environmental cost reduction, we minimize (9) over  $Q$  and  $f_v$  by classical optimization techniques. Of course, if the optimal vendor fixed environmental cost does not satisfy the restriction (10) we should not make any investment, and Eqn. (7) holds. When the investment function is sufficiently convex,  $f(Q, f_v)$  can be explicitly minimized. Such a case is that of the logarithmic investment function.



## The Logarithmic Investment Function

The logarithmic investment function has been used extensively in the literature over the last thirty-five years. Here we assume that the vendor fixed environmental cost  $f_v$  declines exponentially as the investment amount  $a_{fv}$  increases. This results in the following relationship

$$f_v = f_{v_0} e^{-\rho a_{fv}} \quad \text{for } 0 \leq a_{fv} < \infty \quad (11)$$

where  $f_{v_0}$  is the original vendor fixed environmental cost and  $\rho$  is the percentage decrease in  $f_v$  per dollar increase in  $a_{fv}$ . Taking the natural logarithm of both sides of equation (11) gives

$$a_{fv}(f_v) = \alpha - \beta \cdot \ln(f_v) \quad \text{for } 0 < f_v \leq f_{v_0} \quad (12)$$

where

$$\alpha = \frac{\ln(f_{v_0})}{\rho} \quad \text{and} \quad \beta = 1/\rho.$$

We are now ready to prove the following theorem when  $a_{fv}(f_v)$  as represented in equation (12) is used in equation (9).

### Theorem 1

If  $f_{v_0}$  and  $\rho$  are strictly positive, then the following hold:

(i)  $f(Q, f_v)$  is strictly convex iff

$$Q > Df_v^2 / 2ib(S+A+f_v+f_p)$$

(ii) The optimal vendor's fixed environmental cost and the optimal joint economic lot size are given by

$$f_v^{**} = \min(f_{v_0}, f_{jEfv}^*)$$

$$Q^{**} = \min(Q_{jE}^*, Q_{jEfv}^*)$$

where

$f_{v0}$  = original vendor fixed environmental cost before investment

$$f_{jEfv}^* = \frac{i^2b^2 + ib\sqrt{i^2b^2 + 2Dr\Gamma_E(S + A + f_p)}}{Dr\Gamma_E} \quad (13)$$

$$Q_{jE}^* = \sqrt{\frac{2D(S + A + f_v + f_p)}{r\Gamma_E}} \quad (14)$$

$$Q_{jEfv}^* = \frac{ib + \sqrt{i^2b^2 + 2Dr\Gamma_E(S + A + f_p)}}{r\Gamma_E} \quad (15)$$

and

$$\Gamma_E = (D/R)(C_v + C_{ev}) + (C_p + C_{ep}).$$

(iii) The resulting optimal total cost per unit time is given by

$$f(Q^{**}, f_v^*) = \min (JTRC_E(Q_{jE}^*), JTRCI_{Efv}(Q_{jEfv}^*, f_{jEfv}^*))$$

where

$$JTRC_E(Q_{jE}^*) = \sqrt{2Dr\Gamma_E(S + A + f_v + f_p)}$$

and

$$JTRCI_{Efv}(Q_{jEfv}^*, f_{jEfv}^*) = ib \cdot \ln \frac{f_{v0}}{f_v^*} + \frac{Q_{jEfv}^*}{2} r\Gamma_E + \frac{D}{Q_{jEfv}^*} (S + A + f_v^* + f_p)$$

and

$Q_{jEfv}^*$  is given by equation (15)

$f_{jEfv}^*$  is given by equation (13).

### Proof of Theorem 1

(i) Let

$$f(Q, f_v) = ia_{f_v}(f_v) + JTRC_E(Q) \quad \text{for } 0 < f_v \leq f_{v0}$$

where

$JTRC_E(Q)$  is given by equation (6).  $f(Q, f_v)$  is strictly convex if the minors of its Hessian determinant are strictly positive.

The first principal minor of the Hessian determinant is

$$|H_{11}| = \frac{2D(S + A + f_v + f_p)}{Q^3}$$

which, of course, is strictly positive. The second principal minor is

$$|H_{22}| = \frac{2D(S + A + f_v + f_p)ib}{Q^3 f_v^2} - \frac{D^2}{Q^4}$$

It can be easily shown that  $|H_{22}| > 0$ , iff

$$Q > \frac{Df_v^2}{2ib(S + A + f_v + f_p)}.$$

Hence, part (i) holds.

(ii) The optimal values of the decision variables may be found by solving the two simultaneous equations given by

$$\frac{\partial f}{\partial Q} = \frac{-D(S + A + f_v + f_p)}{Q^2} + \frac{r}{2} \Gamma_E \quad (16)$$

$$\frac{\partial f}{\partial f_v} = \frac{D}{Q} - \frac{ib}{f_v} \quad (17)$$

The solution to these equations results in equations (15) and (13) respectively. The stationary point  $(Q_{jEfv}^*, f_{jEfv}^*)$  is a relative minimum if it satisfies the convexity condition of part (i). We may restate the convexity condition as

$$Q > \frac{Df_v}{ib} \left( \frac{f_v}{2(S + A + f_v + f_p)} \right)$$

further, we may solve (17) for Q which gives

$$Q = \frac{Df_v}{ib}$$

Therefore, the convexity condition will be satisfied if and only if

$$\frac{f_v}{2(S + A + f_v + f_p)} < 1.$$

Since S, A,  $f_v$ ,  $f_p$  are all greater than zero, the condition is satisfied and we have a local minimum at,  $(Q_{jEfv}^*, f_{jEfv}^*)$ , and part (ii) holds.

(iii) The proof of this part results from substituting the optimal values of Q and S into the appropriate joint relevant total cost formulas.

## 6. JELSI<sub>Efv</sub> NUMERICAL EXAMPLES

Assume all the parameter values presented in Section 4 remain in place. In addition, the vendor may invest in reducing vendor fixed environmental cost according to a logarithmic investment function with parameters  $i = 0.10$  and  $\rho = 0.0005$ . Table 2 presents the results of calculations for

the JELS with sustainability considerations (JELS<sub>E</sub>) and environmental JELS with investment in vendor fixed environmental cost reduction (JELSI<sub>Efv</sub>). The results show the expected reduction in vendor fixed environmental cost and accompanying smaller lot size for all three scenarios originally presented in Section 4.

Table 2

Comparison of JELS<sub>E</sub> and JELSI<sub>Efv</sub>

Traditional Ratio	Environmental Ratio	Sustainability JELS (JELS <sub>E</sub> )		Investment JELS JELSI <sub>Efv</sub>			Percent Decrease in		
		Q <sub>jE</sub> *	Joint Optimal Cost (\$)	Q <sub>jEfv</sub> *	fv*	Joint Optimal Cost(\$)	Lot Size	Vendor Fixed Env Cost	Joint Optimal Cost (\$)
16	10.71	362.00	5,000.06	285.28	57.06	4,329.89	21.19	85.74	13.40
16	16	400.00	5,000.00	326.25	65.25	4,440.79	18.44	83.69	11.18
16	26.67	445.79	4,374.29	363.33	72.67	3,906.29	18.50	81.83	10.70

A closer look at Table 2 reveals that investment in vendor fixed environmental cost reduction results in the greatest percentage decrease in vendor fixed environmental cost, lot size, and joint optimal cost when the environmental ratio is less than the traditional ratio. .

## 7. VENDOR VARIABLE ENVIRONMENTAL COST REDUCTION

In this section we consider the option of investing in vendor variable environmental cost reduction in the JELS<sub>E</sub> model. We consider the vendor variable environmental cost,  $C_{ev}$ , to be a decision variable and pursue the objective of minimizing the sum of the investment cost for changing  $C_{ev}$  and the joint total relevant cost with sustainability considerations. Specifically we seek to minimize

$$f(Q, C_{ev}) = ia_{C_{ev}}(C_{ev}) + JTRC_E(Q) \quad (18)$$

subject to

$$0 < C_{ev} \leq C_{ev0} \quad (19)$$

where  $i$  is the cost of capital,  $a_{C_{ev}}(C_{ev})$  is a convex and strictly decreasing function of  $C_{ev}$  representing the cost of changing the vendor variable environmental cost to the level  $C_{ev}$ ,  $JTRC_E(Q)$  is the joint total relevant cost with sustainability considerations given by equation (6), and  $C_{ev0}$  is the original vendor variable environmental cost before the investment is made.

To obtain the JELS<sub>E</sub> including investment in vendor variable environmental cost reduction, we minimize (18) over  $Q$  and  $C_{ev}$  by classical optimization techniques. Of course, if the optimal

vendor variable environmental cost does not satisfy the restriction (19) we should not make any investment, and Eqn. (7) holds.

Once again we use the logarithmic investment function. Here we assume that the vendor's variable environmental cost  $C_{ev}$  declines exponentially as the investment amount  $a_{C_{ev}}$  increases. This results in the following relationship C

$$C_{ev} = C_{ev_0} e^{-\tau a_{C_{ev}}} \quad \text{for } 0 \leq C_{ev} < \infty \quad (20)$$

where  $C_{ev_0}$  is the original vendor variable environmental cost and  $\tau$  is the percentage decrease in  $C_{ev}$  per dollar increase in  $a_{C_{ev}}$ . Taking the natural logarithm of both sides of equation (20) gives

$$a_{C_{ev}}(C_{ev}) = g - h \cdot \ln(C_{ev}) \quad \text{for } 0 < C_{ev} \leq C_{ev_0} \quad (21)$$

where

$$g = \frac{\ln(C_{ev_0})}{\tau} \quad \text{and} \quad h = 1/\tau .$$

We are now ready to prove the following theorem when  $a_{C_{ev}}(C_{ev})$  as represented in equation (21) is used in equation (18).

### Theorem 2

If  $C_{ev_0}$  and  $\tau$  are strictly positive, then the following hold:

(i)  $f(Q, C_{ev})$  is strictly convex iff

$$Q < [8ihR^2(S+A+f_v+f_p)/r^2DC_{ev}^2]^{1/3}$$

(ii) The optimal vendor's variable environmental cost and the optimal joint economic lot size are given by

$$C_{ev}^{**} = \min(C_{ev_0}, C_{jEC_{ev}}^*)$$

$$Q^{**} = \min(Q_{jE}^*, Q_{jEC_{ev}}^*)$$

where

$C_{ev0}$  = original vendor variable environmental cost before investment

$$C_{jEC_{ev}}^* = \frac{2Rih[(D/R)C_v + C_p + C_{ep}]}{D \left[ \frac{-Rih}{D} + \sqrt{\frac{R^2i^2h^2}{D^2} + 2r\Gamma_v[(D/R)C_v + C_p + C_{ep}]} \right]} \quad (22)$$

$$Q_{jE}^* = \sqrt{\frac{2D(S + A + f_v + f_p)}{r\Gamma_E}} \quad (23)$$

$$Q_{jEC_{ev}}^* = \frac{\frac{-Rih}{D} + \sqrt{\frac{R^2i^2h^2}{D^2} + 2r\Gamma_v[(D/R)C_v + C_p + C_{ep}]}}{r[(D/R)C_v + C_p + C_{ep}]} \quad (24)$$

and

$$\Gamma_v = D(S + A + f_v + f_p).$$

(iii) The resulting optimal total cost per unit time is given by

$$f(Q^{**}, C_{ev}^{**}) = \min (JTRC_E(Q_{jE}^*), JTRC_{EC_{ev}}(Q_{jEC_{ev}}^*, C_{jEC_{ev}}^*))$$

where

$$JTRC_E(Q_{jE}^*) = \sqrt{2r\Gamma_E\Gamma_v}$$

and

$$JTRCI_{EC_{ev}}(Q_{jEC_{ev}}^*, C_{jEC_{ev}}^*) = ih \cdot \ln \frac{C_{ev0}}{C_{ev}^*} + \frac{Q_{jEC_{ev}}^*}{2} r\Gamma_E + \frac{\Gamma_V}{Q_{jEC_{ev}}^*}$$

and

$Q_{jEC_{ev}}^*$  is given by equation (24)

$C_{jEC_{ev}}^*$  is given by equation (22).

### Proof of Theorem 2

(i) Let

$$f(Q, C_{ev}) = ia_{C_{ev}}(C_{ev}) + JTRC_E(Q) \quad \text{for } 0 < C_{ev} \leq C_{ev0}$$

where

$JTRC_E(Q)$  is given by equation (6).  $f(Q, C_{ev})$  is strictly convex if the minors of its Hessian determinant are strictly positive.

The first principal minor of the Hessian determinant is

$$|H_{11}| = \frac{2D(S + A + f_v + f_p)}{Q^3}$$

which, of course, is strictly positive. The second principal minor is

$$|H_{22}| = \frac{2\Gamma_V ih}{Q^3 C_{ev}^2} - \frac{r^2 D^2}{4R^2}$$

It can be easily shown that  $|H_{22}| > 0$ , iff

$$Q < 2 \left[ \frac{ihR^2(S + A + f_v + f_p)}{r^2 D C_{ev}^2} \right]^{1/3}.$$



Hence, part (i) holds.

(ii) The optimal values of the decision variables may be found by solving the two simultaneous equations given by

$$\frac{\partial f}{\partial Q} = \frac{-D(S + A + f_v + f_p)}{Q^2} + \frac{r}{2} \Gamma_E \quad (25)$$

$$\frac{\partial f}{\partial C_{ev}} = \frac{QDr}{2R} - \frac{ih}{C_{ev}} \quad (26)$$

The solution to these equations results in equations (24) and (22) respectively. The stationary point  $(Q_{jEfv}^*, C_{jECev}^*)$  is a relative minimum if it satisfies the convexity condition of part (i). We may restate the convexity condition as

$$Q < [8ihR^2(S+A+f_v+f_p)/r^2DC_{ev}^2]^{1/3} \quad (27)$$

further, we may solve (26) for  $C_{ev}$  and substitute in (27).

After some algebraic manipulation we find that the convexity condition will be satisfied if and only if

$$Q < \left[ \frac{2\Gamma_v}{ih} \right]^{1/3}.$$

If this condition is satisfied and we have a local minimum at  $(Q_{jEfv}^*, C_{jECev}^*)$ , and part (ii) holds.

(iii) The proof of this part results from substituting the optimal values of  $Q$  and  $C_{ev}$  into the appropriate joint relevant total cost formulas.

## 8. JELSI<sub>ECev</sub> NUMERICAL EXAMPLES

Assume all the parameter values presented in Section 4 remain in place. In addition, the vendor may invest in reducing vendor variable environmental cost according to a logarithmic investment function with parameters  $i = 0.10$  and  $\tau = 0.0005$ . Table 3 presents the results of

calculations for the JELS with sustainability considerations (JELS<sub>E</sub>) and environmental JELS with investment in vendor variable environmental cost reduction (JELSI<sub>ECev</sub>). The results show the expected reduction in vendor variable environmental cost and accompanying smaller lot for all three scenarios originally presented in Section 4.

Table 3  
Comparison of JELS<sub>E</sub> and JELSI<sub>ECev</sub>

Traditional Ratio	Environmental Ratio	Sustainability JELS (JELS <sub>E</sub> )		Investment JELS JELSI <sub>ECev</sub>			Percent Decrease in		
		Q <sub>J<sub>E</sub></sub> *	Joint Optimal Cost (\$)	Q <sub>J<sub>ECev</sub></sub> *	C <sub>ev</sub> *	Joint Optimal Cost(\$)	Lot Size	Vendor Var Env Cost	Joint Optimal Cost (\$)
16	10.71	362.00	5,000.06	335.68	19.07	5,006.26	7.01	23.72	- 0.12
16	16	400.00	5,000.00	326.25	17.36	5,014.66	7.86	13.20	-0.29
16	26.67	445.79	4,374.29	408.29	15.68	4,390.50	8.41	7.76	-0.38

A closer look at Table 3 reveals that investment in vendor variable environmental cost reduction results in the greatest percentage decrease in vendor variable environmental cost when the environmental ratio is smaller than the traditional ratio, and lot size decrease by the greatest percentage when the environmental ratio is greater than the traditional ratio. In all three cases the joint optimal cost essentially remains the same after investment.

### 9. COMPARISON OF FIXED AND VARIABLE ENVIRONMENTAL COST REDUCTION

Table 4 presents a comparison of the numerical results presented in Sections 4 and 6. First, percent decrease in lot size over the JELSE model is compared for the cases of investment in vendor fixed environmental cost reduction (Model I) and vendor variable environmental cost reduction (Model II); second, percent reduction in optimal vendor fixed environmental costs for Model I is compared to optimal vendor variable environmental costs for Model II; and third, joint optimal costs are also compared for both these cases.

For the same value of the technology parameters,  $\rho$  and  $\tau$ , a much larger decrease in lot size is apparent in Model I. Further, the larger percent reduction for Model I is experienced when the initial environmental ratio is less than the initial traditional ratio, while for Model II the largest percent reduction is experienced when the initial environmental ratio is greater than the initial traditional ratio. Turning to costs, the largest percent reduction in vendor fixed environmental costs in Model I and variable environmental costs in Model II both occur when the initial environmental ratio is smaller than the initial traditional ratio. For Model I, the largest percent decrease in joint optimal cost occurs when the environmental ratio less than the traditional ratio. For Model II in all three scenarios joint optimal cost increases, but by a negligible amount of a maximum of less than four tenths of a percent. Finally as expect from the model structure, a decrease in vendor fixed environmental cost, all other things remaining constant, results in a decrease in the environmental ratio. The opposite effect, an increase in environmental ratio, is

experienced when vendor variable costs are decreased.

Table 4

Comparison of Fixed and Variable Environmental Cost Reduction Results

Traditional Ratio	Environmental Ratio	Percent Decrease in Lot Size		Percent Decrease in Costs				Post Reduction Environmental Ratio	
		Fixed	Var.	Optimal Fixed	Optimal Var.	Joint Optimal Fixed	Joint Optimal Var.	Fixed	Var.
16	10.71	21.19	7.01	85.74	23.72	13.40	-0.12	1.64	11.26
16	16.00	18.44	7.86	83.69	13.20	11.18	-0.29	5.29	16.43
16	26.67	18.50	8.41	81.83	7.76	10.70	-0.39	8.29	27.30

Let's look a little more closely at these results beginning with Model II. Here the optimal reduction of vendor variable costs results in a relatively small decrease in the joint economic lot size. In turn the number of lots required to satisfy demand essentially remain the same. Hence the total vendor setup cost does not change much. There is some decrease in the variable environmental contribution to holding costs, but this is apparently not enough to compensate for the added investment cost. Perhaps if a more cost efficient technique for reducing vendor variable cost is available performance would improve. This suggests that the sensitivity of the model to values for the technology coefficient  $\tau$  should be investigated.

For Model I the optimal reduction of vendor fixed costs results in a significant decrease in joint economic lot size. This results in a increase in the number of lots required to satisfy demand. Normally, this would lead to an increase in the total setup cost over the planning horizon. However, the vendor fixed environmental cost, which is a major component of the setup cost per cycle, is decreased by more than eighty percent in all three scenarios. Beyond this the decreased lot size results in lower holding costs. This combination is more than enough to cover the added investment cost, resulting in a significant decrease in joint optimal cost.

## 10. CONCLUSION

This paper presented the development and evaluation of two models of environmental cost reduction in the joint economic lot size model including sustainability (JELSE). The first model considers the option of reducing vendor fixed environmental cost in JELSE and the second involves vendor variable environmental cost reduction in the JELSE. Numerical examples for each model are presented. One result is that the largest impact of vendor fixed environmental cost reduction (Model I) is achieved when the initial environmental ratio is less than the initial

traditional ratio. Further, one result of investment in vendor fixed environmental cost reduction is a significant decrease in the environmental ratio. This suggests that a decreased value of the traditional ratio can be supported and it is likely that there will be a synergistic impact of the reduction of this ratio on joint lot size fixed vendor environmental cost, and joint optimal cost. One way to accomplish this reduction in the traditional ratio is to reduce the vendor's setup cost. Hence, the development of a model which would include simultaneous reduction of vendor fixed environmental cost and vendor setup cost model is indicated and could show some promise. The results for Model II are less definitive. Here sensitivity analysis of the results with respect to the technology parameter should be conducted. The results of this sensitivity analysis should give a good idea of what path to follow in future research efforts.

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***This research has been supported by a Frank G. Zarb School of Business Summer Research Grant.***

## **Does Inventory Reduction Really Matter to Firm Performance?**

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Since the adoption of just-in-time (JIT) innovation in the early 1980s, U.S. manufacturing companies have achieved significant reduction in inventory. The inventory reduction was one of the measurable benefits of JIT implementation, and it has been considered as a prominent indicator of firm performance. As a result, academicians and practitioners studied the effects of inventory reduction on firm performance as well as the trend of inventory reduction.

Using inventory holdings for two-digit SIC-code industries over the period of 1961 to 1980, the data published by the U.S. Census Bureau, Rajagopalan and Malhotra (2001) investigated the relationship between inventory reduction and firm performance at the industry level rather than the firm level. Their findings indicated that overall inventory declined when they compared the post-1980 period with the pre-1980 period. However, they cautioned that their results provided an encouraging but somewhat mixed picture about the results of U.S. manufacturing inventory reduction efforts. On the other hand, Chen, Frank, and Wu (2005) examined the inventory reduction of publicly traded U.S. manufacturing companies between 1981 and 2000 at the firm level. They reported that the average rate of inventory reduction over the sample period was about 2% per year. Work-in-process inventory declined most at approximately 6% per year, while finished-goods inventories did not decline. In fact, their findings showed that finished-goods inventories increased in some industries.

As reported by the above studies, it is well known that the U.S. manufacturing industry has achieved significant inventory reduction over the last three decades. On the other hand, the extant research on the relationship between inventory reduction and firm performance has not been able to produce any statistically significant results. The early studies, based on the questionnaire studies of small number of firms, reported somewhat mixed results on the negative relationship (for example, Huson and

Nanda (1995), and Balakrishnan, Linsmeier, and Venkatachalam (1996), and . Fullerton, McWatters, and Fawson (2003), among others).

Chen, Frank, and Wu (2005) examined whether individual firm's abnormal inventory relative to the industry average inventory could have an impact on firm performance measured by Tobin's Q, but failed to provide any significant result. Recently, using the manufacturing data from the COMPUSTAT database over the period between 1981 and 1998, Swamidass (2007) reported that overall inventory measured as the ratio TI/S (total inventory to sales) generally decreased throughout the most part of the 1980s. He also observed an anomaly: When the sample firms were ranked based on their performance measured by their Altman Z scores, the ratio of total inventory to sales declined significantly in the top and middle 10% performer groups, while the lowest 10% performer group actually showed an increase in inventory. Cannon (2008) also examined the relationship between inventory turnover and firm performance measures (return on asset (ROA) and return on investment (ROI)), using a sample of 244 firms drawn from the COMPUSTAT database. No significant supporting results were found.

More recently, Capkun, Hameri and Weiss (2009) also used the firm level data selected from the Compustat database over the period of 1980 to 2005 and examined the relationship between inventory performance and measures of financial performance at both the gross and operating levels. They reported a significant correlation between inventory and financial performance, but the correlation varies significantly across inventory types. It is important however, that Capkun, Hameri and Weiss (2009) was the first study that reported such strong estimation results on the relationship.

In this study, we examined the testing models and estimation methods employed by Capkun, Hameri and Weiss (2009) using a longer period data over the period of 1980 – 2012. Our findings indicate that the estimation results of Capkun, Hameri and Weiss (2009) was inconsistent. The study also provides the corrected estimation results on the relationship between inventory reduction and firm financial performance.

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# MINIMIZING THE SUM OF ERRORS RAISED TO THE POWER OF FOUR: A NEW APPROACH TO CONDUCTING REGRESSION ANALYSIS

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## ABSTRACT

This study employs sum of the errors raised mainly to the power of four and in general to the power of  $2n$  where  $n$  is an integer equal to or greater than two to conduct regression analysis. It is shown that this approach will produce better results in cases where there is a significant number of outliers in the data under investigation.

**Keywords:** Least Square Method, Regression, Forecasting, Deviation.

## INTRODUCTION AND OVERVIEW

One of the most popular and widely used forecasting techniques in Statistics is regression analysis. Almost all Fortune 500 companies use a variety of regression models to predict the value of the variables of interest. The idea behind regression analysis is to predict the value of a response or dependent variable based on the behavior of a group of explanatory or independent variables. The most common method used to conduct a regression analysis is called “Least Square Method (LSM).” This standard approach to regression analysis attempts to minimize the sum of squares of all errors made as a result of different regression equations.

Statisticians have been trying to employ different approaches to LSM in an attempt to create more accurate and reliable predictions. This research paper attempts to develop a new regression analysis model based on minimizing the sum of the errors raised to the different power values as opposed to the conventional least “square” method. In other words, instead of using the conventional “ $\text{Min } \sum (Y-\hat{Y})^2$ ”, this study will explore the use of “ $\text{Min } \sum (Y-\hat{Y})^4$ ”, “ $\text{Min } \sum (Y-\hat{Y})^6$ ”, “ $\text{Min } \sum (Y-\hat{Y})^{2m}$ ”, where  $n$  is an integer greater than or equal to two.

While this method is not exclusive to simple linear regression and can be applied to multiple as well as non-linear regression, the focus of attention in this study will solely be on simple linear regression.

## RELATED LITERATURE

The term “regression” in the context of statistical decision making was first used by famous British genetic scientist, Sir Francis Galton. In a paper published in 1884 [3], Galton proposed his genetics proposition that the height of the children of unusually short or tall parents have a tendency to “regress” towards the average population height. Although Galton used this term to outline the “regression towards the mean” feature of his genetics proposition, regression analysis nowadays, refers to a very popular statistical analysis that its main purpose is to predict the value of a dependent variable based on one or more independent variables. The most popular method to conduct a regression analysis is Least Square Method, developed by Gauss or Legendre. In

fact, one the most controversial arguments in Statistics is between Legendre and Gauss over the discovery of Least Square Method [5]. While the Least Square method is widely used technique to conduct a regression analysis, other methods are also proposed to accomplish this task. Branham [1] provide an excellent overview of advantages and disadvantages of Least Square method as well as Minimum Absolute Deviation.

## RESEARCH METHODOLOGY

To begin the study, deterministic function in the form of  $Y = b_0 + b_1 X$  was selected. Arbitrarily, the y-intercept and the slope were assumed to be 5, and 2 respectively. By assigning 30 values to variable X, and using “norminv” function of Microsoft Excel to add a random noise, data for the study was generated. Data for study appears in the following table (Table 1).

**Table 1. Data used for the Regression Analysis with and without random noise**

Observation	X	Deterministic Y	Random	Random Noise	Y
1	382	769	0.188969	-4.40850126	764.5915
2	354	713	0.428771	-0.89751654	712.10248
3	491	987	0.904734	6.545023572	993.54502
4	500	1005	0.930245	7.388086756	1012.3881
5	433	871	0.174783	-4.677150991	866.32285
6	302	609	0.832067	4.811832744	613.81183
7	246	497	0.033711	-9.144248277	487.85575
8	455	915	0.309181	-2.490866538	912.50913
9	368	741	0.000971	-15.49458431	725.50542
10	275	555	0.074007	-7.232924095	547.76708
11	445	895	0.430487	-0.875678312	894.12432
12	296	597	0.103797	-6.301046386	590.69895
13	208	421	0.743842	3.276185964	424.27619
14	416	837	0.307576	-2.51365998	834.48634
15	422	849	0.93454	7.552416321	856.55242
16	497	999	0.211104	-4.012974366	994.98703
17	227	459	0.357772	-1.822106648	457.17789
18	306	617	0.348225	-1.95058451	615.04942
19	466	937	0.697356	2.584060374	939.58406
20	415	835	0.235219	-3.608828762	831.39117
21	396	797	0.725709	2.999431696	799.99943
22	422	849	0.766417	3.635484126	852.63548
23	306	617	0.961845	8.862546959	625.86255
24	299	603	0.991627	11.96108392	614.96108
25	253	511	0.047661	-8.339817881	502.66018
26	233	471	0.16781	-4.814271472	466.18573
27	203	411	0.07562	-7.175834303	403.82417
28	332	669	0.538361	0.481524398	669.48152
29	433	871	0.739775	3.213263503	874.21326
30	266	537	0.758748	3.511410785	540.51141

The following Excel output (Table 2) indicates the regression analysis output based on Least Square Method.

**Table 2. Regression Analysis Excel output based on Least Square Method**

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.999488104
R Square	0.998976471
Adjusted R Square	0.998939916
Standard Error	6.080165733
Observations	30

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1010284.683	1010285	27328.32	2.0706E-43
Residual	28	1035.115629	36.96842		
Total	29	1011319.799			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	1.426725344	4.468807023	-0.31926	0.751897	10.5806616	7.7272109
X	2.016329813	0.012197058	165.3128	2.07E-43	1.99134527	2.0413144

Worthy of note is the fact that under ideal circumstances the computed regression equation should have been  $\hat{Y} = 5 + 2X$ .

Using solver option of Microsoft excel, regression equations using Minimum Absolute Deviation, conventional method (LSM), as well as minimizing the errors raised to power of 4, 6, 8 were computed. Results indicated that the new approach to regression is as good and in some cases superior to conventional models.

**EMPIRICAL FINDINGS AND DISCUSSION**

While it is recognized that we are dealing with only one sample and an inadequate sample of size 30, the results reveal that using the sum of the errors raised to the power of 4 and 6 produces y-intercepts and slopes much closer to the ideal values of 5, and 2 than the conventional method and Minimum Absolute Deviation. It can also be observed from Table 3 that as the power of the sum of the error terms increases, y-intercepts also increase, while the slope of the regression equations decline.

**Table 3. Y-intercept and Slope of Regression Equations using different methods**

<b>Coefficients</b>	<b>Min <math>\sum Y-\hat{Y} </math></b>	<b>LSM</b>	<b>Min <math>\sum (Y-\hat{Y})^4</math></b>	<b>Min <math>\sum (Y-\hat{Y})^6</math></b>	<b>Min <math>\sum (Y-\hat{Y})^8</math></b>
$b_0$	-6.779034106	-1.42672536	2.064205259	5.62198078	7.356660164
$b_1$	2.030822017	2.016329813	2.006215052	1.994632259	1.988949695

### FUTURE RESEARCH

Future research should include more than one sample as well as larger sample sizes. It could also include the use of more than one explanatory or independent variable, non-linear regression as well as other forms of regression analyses when there are outliers and/or influential observations. Submitting queries to Wolfram alpha (Mathematica) in addition to solver option of Microsoft may also be considered.

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# Online Programming Tutorials and a Recommender System

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## Abstract

Code.org has created an enormous interest in its hour-of-code initiative. The authors wanted to be part of that initiative and made the following simple hypothesis: an hour of code tutorial from code.org can be successfully identified and delivered to students. The claim has not proven true because the authors were not able to adequately determine what tutorials to use. An analysis of the literature identifies code.org as an advocacy organization. An analysis of the existing offering of tutorials highlights their reliance on visual programming in stylized languages with continual feedback in gaming contexts. However, the organization of the tutorials is too haphazard and evolving for the professors to conveniently identify a useful tutorial. A Recommender System should be implemented to help students get matched to the right tutorial. Characteristics of this Recommender System are discussed.

Keywords: recommender system, online programming tutorials

## 1 Introduction

One of the first published books on computer programming appeared in 1965 and began with this sentence (Brader & Perlis, 1965): "In order to understand computer programming one must understand clearly the basic organization and nature of a computer." Guzdial and Solloway (2003) advocate making computer education widely available, refer to the author of the aforementioned book, and say " we need to re-think our introductory computer science content in order to remove the old and broken and replace it with the new and relevant." Many papers have been written about the desirable characteristics of a 21st century introductory computer science course. Not surprisingly, one common conclusion is that the course should be specific to the needs of the students (Forte & Guzdial, 2005).

A popular movement began in early 2013 to spread the teaching of computer programming to children. The initiative began with a video released in February 2013 entitled "What Schools Don't Teach" (Code.org, 2013). By July 2013 the video had earned 20,000,000 views and led to the collection of 700,000 signatures on a petition to support computer programming education for children (Wilson, 2013).

In October 2013, one author received an email (Partovi, 2013) of which part is duplicated here

From: Hadi Partovi <hadi\_partovi@code.org>

Date: Thu, Oct 24, 2013 at 5:39 PM

Subject: An Hour of Code for every student

To: Roy Rada <rada@umbc.edu>

Last week, we announced the Hour of Code to the world. Now backed by Microsoft, Google, Apple, Amazon, LinkedIn, Mark Zuckerberg, the College Board, Boys & Girls Clubs, and over 100 other partners, we're getting closer to 10 million students trying one Hour of Code during Dec. 9-15. We still need your help. *Every* student should have the opportunity to learn computer science. Please join us at <http://hourofcode.com>.

The code.org web site (<http://www.code.org>) begins with this quote from Steve Jobs (Sen, 2012):

"Everybody in this country should learn how to program a computer because it teaches you how to think". The 6-minute video on the home page has multiple short interviews where people discuss the role of computers in their life and how important they believe it would be that everyone learn to code for, at least, an hour. The interviewees cover a broad spectrum of people well known to Americans and include Bill Gates, the founder of Microsoft, Mark Zuckerberg, the founder of Facebook, and Chris Bosh, a famous American basketball player. The video is intended to be inspirational and succeeds. Anyone watching that video might be tempted to offer a hypothesis like this: "The hour of code initiative will successfully enroll many students."

## 2 Method and Results

The code.org web site was studied at two different times in November 2013 (Nov 1 and Nov 14) in an effort to identify the appropriate tutorials to use in the high schools. For each date, the method and results are described. For Nov 1 essentially no tutorials were available from which to choose and a

## *Hour of Code*

search of the literature suggested that code.org was basically an advocacy initiative. In the Nov 14 study, tutorials were indicated but choosing the appropriate one proved overwhelmingly difficult.

A study of the code.org web site by one of the authors on Nov 1, 2013 revealed only announcements that tutorials would soon be available but none were actually available at that time. The author systematically searched the literature about code.org and can demonstrate systematically that very little other than marketing-type material had been published about code.org as of Nov 1, 2013.

The absence of tutorials would clearly be a deterrent to teachers planning to introduce their students to tutorials on code.org. The code.org web site was analyzed again on November 14, 2013 and at that time pointers to one-hour tutorials for coding were indicated. The list of tutorials suggested a tight organization. It offered top-level categories titled:

- Internet Explorer 8
- Tutorials for Beginners
- Tutorials that Teach JavaScript
- No Device? Try 'unplugged computer science'
- MIT App Developer
- Other Learning Options

On entering anyone of those seeming categories, one was presented a kind of revolving kiosk and one could click on the images in the kiosk. Clicking on an image led to unpredictable responses that varied from:

- no response,
- return of a pdf file that described a tutorial option, or
- being taken to another web site where a tutorial existed or information about a possible tutorial existed.

Additionally, many of the links in one category appeared in multiple categories. While a tutorial that worked on Internet Explorer 8 might also be for beginners or about Javascript, the taxonomy is poorly defined and presented. Next several of the links that led to tutorials were studied.

One clickable image led to a 15-page pdf file titled 'Traveling Circuitry Lesson 1 Binary Baubles'. That file explained the importance of students understanding that computers speak in binary. The file suggests an algorithm for what to teach to what students based on their age and suggests teaching about computer hardware for older ages. The argument is made that students would do better to spend an hour learning such underpinnings of computers than to learn to code.

Another link is called 'Create Stories' and takes the user to an interactive educational system called Scratch. In particular, one is directed to create an animated postcard that one could give to a friend. A video is provided to guide and motivate the student. The tutorial is intended to take one hour to complete.

A tutorial for beginners uses a simple drag-and-drop programming language and invites the student to progress through 20 progressively more complex programs to get an angry bird to reach a pig in a maze (see <http://learn.code.org/hoc/1>). The student can cause the bird to take one step forward, left, or right. Further instructions only include the ability to repeat some number of times the one step instruction or to make an if-then decision. The student begins with the simple problem of a maze in

which the pig is 2 steps in front of the bird (see Figure 1 "Angry Birds"). If the student gets that program correct, then the student is given positive feedback and presented a more challenging problem. For instance, the 8th maze involves 'Do Loops' (see Figure 2 "Do Loops"). As always the student is given feedback after each attempt (see Figure 3 "Feedback"). After a few successful mazes have been solved, a video automatically appears to introduce the next sequence of mazes. The videos are presented by famous people, including one by Bill Gates and another by Mark Zuckerberg.

The last tutorial that the authors tried involved something the authors had not previously mastered, namely how to develop an Android app. The code.org site advertises an MIT App Inventor with multiple subparts. However, all the subparts say 'will be coming' and lead to no actual tutorial. Anyhow, in anticipation of the MIT site getting properly connected to code.org, the authors left code.org and eventually found the appropriate place on the MIT web site (<http://dev-explore.appinventor.mit.edu/ai2/tutorials>). The web site introduces various App challenges, but the most basic app is called 'Hello Purr' and is what was attempted. Although the authors are professors of information systems, the professor, who did this tutorial, needed four full hours to master this supposedly one-hour tutorial.

### **3 Discussion**

The discussion section first looks at what did and did not work from the code.org hour-of-code initiative. Then what might work is probed in terms of a recommender system. The timeline and the matching of students to tutorials did not work. Great enthusiasm was generated, and the tutorials that were provided were excellent and illustrate what would be needed more broadly (see Table 1 "What Did and Did Not Work?").

The absence of adequate tutorial material long enough in advance impedes the December 2013 roll-out of the initiative. Teachers are not able to adequately plan an initiative in their school to involve many students when the materials to be used for that initiative are not available a few weeks before the roll-out.

The code.org web site provides a page of guidance to the teacher to indicate the kind of decision making which is needed to allocate a class to a tutorial. That page briefly indicates the need to assess the resources and backgrounds of the students and the school and to choose the appropriate tutorial. However, the range of different resources and backgrounds and how they map to the tutorials available is only given in primitive form. Something more extensive would be appropriate. One can look at the tutorials and classify them further as regards the features that they have and how those might map to the needs of certain students and schools.

Many established sources exist for online courses and tutorials, such as Codecademy, Kahn Academy, Coursera, and CodeHS. All those sources are rich in material. Some of them are offering tutorials for code.org's hour-of-code. Much research is being done on how to create better online tutorials for teaching programming. For instance, one team is developing the system Gidget to teach programming online while also exploring the benefit of further using assessment to automatically guide teaching (Lee, Ko et al., 2013). Gidget is a prototype which its creators intend to make available to the general public. Broad research environments, such as Alice and Scratch, are being developed to support the teaching of



computing. From these many tutorial offerings, a student needs help in determining which tutorials are appropriate for him.

Code.org has successfully tapped a desire for change and created a movement of sorts. Many citizens of the world see the benefits that could accrue from a wider dissemination of computer knowledge in the populace. Code.org has garnered some of their support.

By pointing to tutorials that should be useful to a wide-range of novices, code.org has helped others to appreciate what tutorials are likely to be useful for this audience. The learning objective of the tutorials is to help students develop a model of programming. The multiple dimensions along which such modeling might be described include: the modeling language, objectives and assessments, and types of scaffolding (Lehn, 2013). In the code.org tutorials the modeling language is sometimes a stylized one that is designed to help the student visualize some problem-solving activity via an algorithm, such as traversing a maze. The objectives are finely decomposed into sub-objectives so that feedback can be automatically given for each sub-objective (as in learning about do-loops separately from learning about if-statements). This language choice and decomposition of objectives supports scaffolding, as does the addition of videos to provide guidance at key junctures.

In many of the code.org tutorials, the student makes something happen that is intuitive and appealing, while at the same time gaining insight into some fundamental mechanism or principle of computing. Games as a method of motivating students and as a tool for teaching computer science have been long appreciated (Malone, 1980) though that pedagogical method is still underutilized (Shute, 2011). The interactive character of the code.org tutorials is often of the gaming sort and occurs across, at least, two dimensions. In the first dimension, the student is writing code to take some steps in a game, such as the 'Angry Bird' maze game. In another dimension, the student goes through a series of mazes as a learner and earns points for successful completion of each maze as the student progresses to mastery of the overall learning game. This is a kind of educational simulation at two levels with careful attention to the learning objectives (Tsai, Kinzer et al., 2013).

In the highlighted tutorials, an audio-videotape with a catchy presentation (often with celebrities) and not simply a talking head begins the tutorial and walks the student through the process. This condition of multimedia and entertainment would seem to be generally useful. However, what works for one audience might not work for another audience. By illustration, a celebrity for one audience might not be recognized by another audience. Code.org has helped people appreciate some of these issues.

People have tried for decades to increase the teaching of computer science by exploiting online tutorials. Books have advocated online degree programs (Rada, 1997), and editorials have asked for a virtual IT college (Rada, 1996). Yet, much computer science education continues to be delivered in the traditional way. Code.org provides another example of an effort to support computer science education with online content. One of the challenges to the teacher is how to navigate through the many resources that are available (Luik, 2012),

What is prominently missing is a Recommender System. Recommender systems typically produce a list of recommendations either through collaborative or content-based filtering (Konstan & Riedl, 2012). Collaborative filtering builds a model from past behavior (as used by Amazon and Facebook).

Content-based filtering utilizes characteristics of an item to match to other items with similar properties (as used by Pandora).

One cannot effectively choose the best existing module to support 'an hour of code' unless one knows the attributes of the students and the module. Recommender systems to guide students to the correct courses have been developed in the past (Lu, 2004), but this would be a new application of such a system. One could build a recommender system which might collect attributes of students and attributes of tutorials and match the two. The attributes to be collected from students might involve branching logic themselves, such as a question about the computer available to the student (see Figure 4 "Computer Attribute").

Another attribute would be about background of the students and learning objectives of the course. For instance, how much math do the students know? Or does the objective include an ability to program do-loops?

Such a recommender system would not be static in that many attributes might themselves be evolving over time. For instance, smartphones would not have been important in such a recommender system in the 20th century but are crucial in the 21st century. Rather than attempting to have one central authority develop and maintain the recommender system and its associated ontologies and databases, one might want to create a self-organizing system, perhaps in the spirit of Wikipedia. In this self-organizing recommender system, students or teachers might interactively enter information about their particular situation as they get guided to the available tutorials that might help them. They might find that guidance given to them seems inappropriate or outdated and might update the recommender system for the benefit of others. Simultaneously, developers of tutorials should have an interface to a system that helps the tutorial developer characterize the tutorial and integrate the tutorial into the recommender system for students so that students might get pointed to the new tutorial when appropriate.

## **4 Conclusion**

The code.org video in February 2013 went viral. Yet, the initiative to provide an hour of code for December 2013 shows inadequate coordination between the Advocacy arm and the Tutorial Delivery arm. The authors attempted to work with others to institute an 'hour of code'. However, they got stuck in identifying the appropriate tutorials to use with their students. Prominently missing has been an adequate catalogue of tutorials and semi-automated aids to match a student to the appropriate tutorials. Code.org has provided momentum for further programming education. Next steps might include developing a self-organizing recommender system to which students identify themselves and by which they are guided to the appropriate tutorial.

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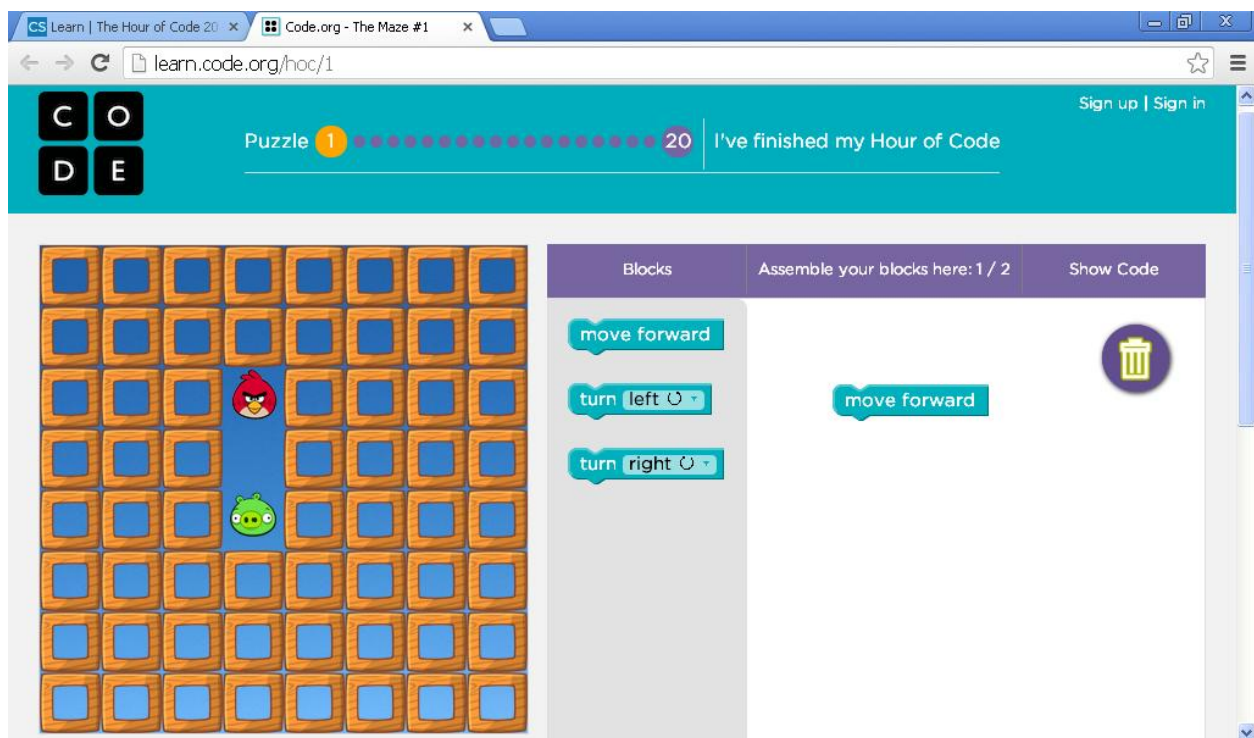
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## 6 Figures

### 6.1 Figure "Angry Birds"

Figure "Angry Birds". This screen shot of the so-called "Tutorial for Beginners" is the premier tutorial of code.org. It features video guides from Bill Gates, Mark Zuckerberg, and others. The programming tasks are simple, as illustrated in this first assignment which requires the student to move two "Move Forward" instructions from the palette on the left into the 'program' on the right and then select 'run'. The bird then moves two steps forward and captures the pig. The student is then given credit for a success and is introduced to the next maze which is slightly more complicated.



## 6.2 Figure "Do Loops"

Figure "Do Loops". In this screen shot, the 8th maze or puzzle of the tutorial is shown in 3 columns. On the far left column is the maze with the angry bird in one corner and the pig in another corner. The middle column shows the blocks or instructions from which the student can pick. The rightmost column shows the two 'do loops' which successfully traverse the maze.

The screenshot shows a web browser window at <http://learn.code.org/hoc/8>. The interface features a teal header with the 'CODE' logo, a progress indicator for 'Puzzle 8' out of 20, and a 'Sign in' button. The main area is divided into three columns:

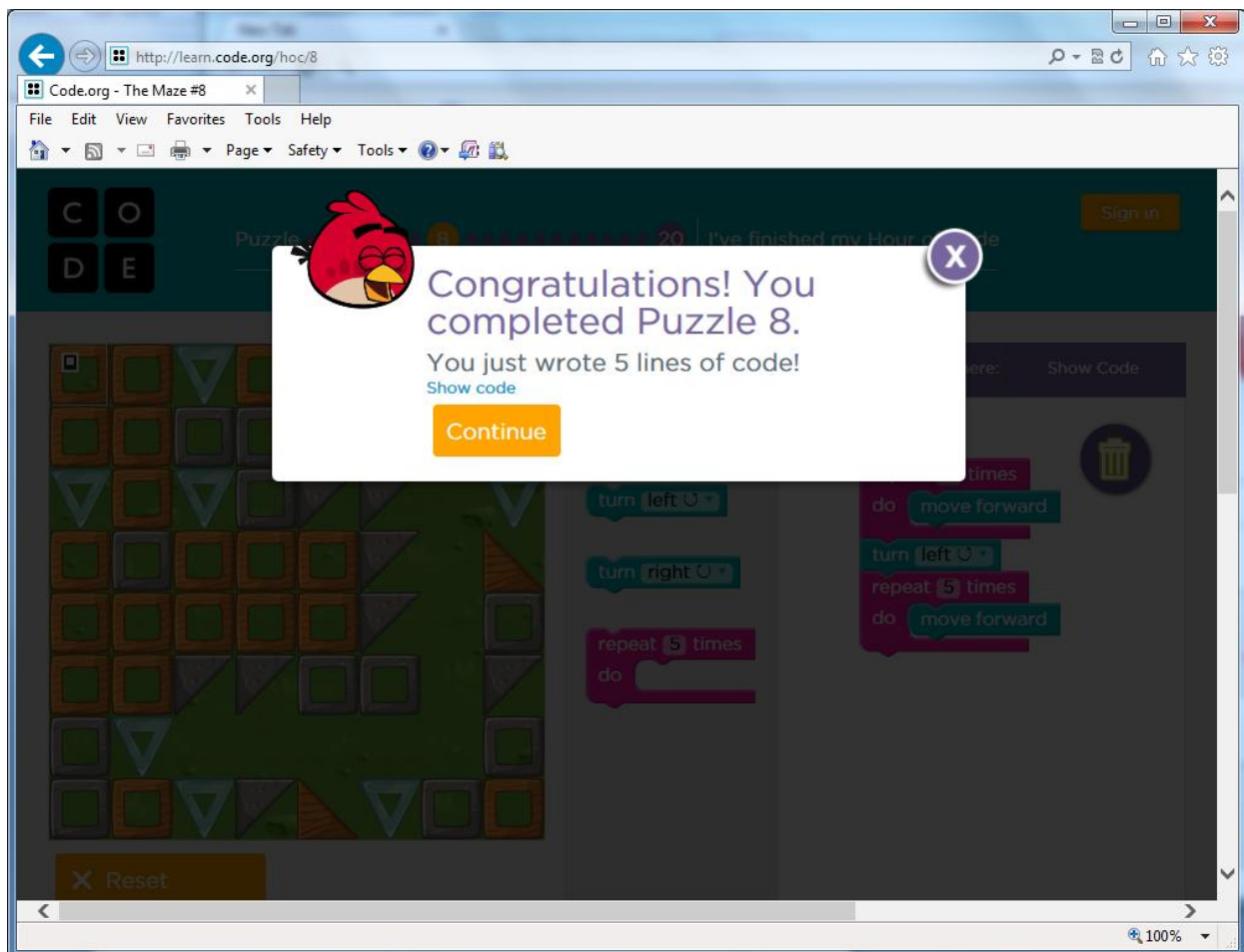
- Left Column:** A 10x10 maze with a red angry bird at the bottom-left and a green pig at the top-right. A 'Run Program' button is located below the maze.
- Middle Column:** A 'Blocks' panel containing:
  - move forward
  - turn left
  - turn right
  - repeat 5 times (with a 'do' block attached)
- Right Column:** An 'Assemble your blocks here: 5 / 5' panel showing a completed script:

```
repeat 4 times
do
  move forward
turn left
repeat 5 times
do
  move forward
```

At the bottom left, a prompt reads: "Write me a program so I can get to the green pig using the fewest number of blocks. Try using more than one 'repeat times' block."

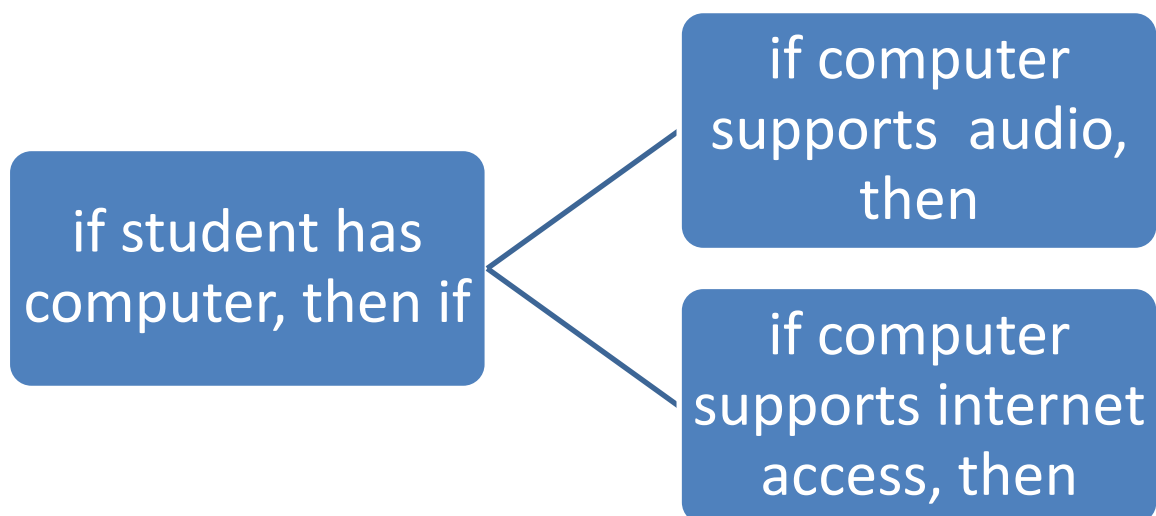
### 6.3 Figure "Feedback"

Figure "Feedback". After the student submits the program shown in the previous figure, the maze is solved, and the student is congratulated with feedback that is specific to what the student did. Similarly, if the student had made a mistake, the student would be directed to try again with constructive feedback.



#### 6.4 Figure "Computer Attribute"

Figure "Computer Attribute": This multi-valued attribute of the computer available to the student is one of many examples of attributes that need to be known before an appropriate tutorial can be selected.



## 7 Tables

### 7.1 Table "What Worked and Did Not"

Table "What did and did not work"	
What Did Not Work	Tutorials not available long enough in advance for teachers to prepare
	Guidance on how to map existing tutorials to appropriate student groups not extensive enough
What Did Work	Enormous enthusiasm generated
	Some excellent tutorials identified which show the kind of tutorials that are needed -- ones that are interactive and media rich.



## Teaching Secure Software Assurance to Undergraduates

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### ABSTRACT

Comprehensive security closes all routes of attack found in the network, hosts, access points, application code, and user procedures. Regardless of their technology infrastructure, organizations and government agencies support the security plan by acquiring and maintaining secure software that functions correctly even when confronted with unauthorized, malicious events. Recognizing that poor quality software is a serious and growing problem contributing to security breaches, this research addresses the secure software process. Secured software architecture, security analysis tools, and Java programming language vulnerabilities are discussed. A vulnerability assignment is described and demonstrated. This assignment provides an Information Technology Management, Computer Information Systems, or Computer Science student an opportunity to evaluate program code for possible security issues.

**Information Technology, Secure coding practices, Security vulnerabilities, Static-analysis tools, STEM education.**

### INTRODUCTION

Application technology architectures vary greatly and include locally and centrally stored application executable code that is developed in-house or acquired through a vendor. Within an architecture, there may or may not be access to the source code for the various applications. Regardless of the architecture, poor quality software is a serious and growing problem [3] [4] [5] [7] [16] [19] [24]. Comprehensive security focuses upon closing all routes of attack through the network, hosts, application access, application code, and user procedures. Organizations and government agencies contribute to the confidentiality, integrity, and availability of applications through migrating risks and minimizing vulnerabilities by assuring secure software that functions correctly even when under attack by malicious parties.

Reports of security breaches show that most attacks do not result from clever attackers discovering new kinds of flaws, but rather from repeated tries of well-known exploits [7]. Software errors and poor software quality contribute to 80% of successful attacks on federal computers [7]. Any organization's technology infrastructure can be vulnerable through their applications including those who purchase all solutions from vendors. Regardless of who manages the software acquisition function, it should be designed to minimize vulnerabilities and mitigate risks. The industry is in need of stronger software assurance practices in order to lessen the impact of attacks on the data, which is often the real target [7] [19] [24].

## Secure Software Architecture

Software assurance may be described as “a systematic process aimed at achieving confidentiality, integrity, and availability in designing and implementing an application that mitigates risk, is free of flaws and defects, minimizes vulnerabilities, and functions in the most secure manner [7].” The requirements for software implementation into the production environment should consider all possible technology architectures. Analysis must be completed when the source code is available and assurance should be required by the vendor in cases where the code is not available at the installation site.

Unfortunately, there is no generally effective way to deploy secure software without considering security through the entire software development lifecycle [9] [24]. A major reason that software vulnerabilities are being exploited by hackers and malicious code is the failure to adopt and utilize secure coding practices [7]. Secure development practices from design to deployment is more effective and less costly than attempting to fix security errors in insecurely-built software [9] [24]. Security vulnerabilities discovered later in the development cycle are more expensive to fix than those discovered early. Many professional developers do not adopt formal secure development practices because they do not know of any methodologies, believe adopting one would be too expensive in time and resources, or feel that others (ex: network management) are responsible for security [24] [26].

Creating a software architecture is a critical task in the development of software systems [9] [19]. The design indicates whether the system will exhibit good modifiability, performance, and interoperability. Program developers translate the software architecture design diagrams into code. The code becomes the main artifact of a software project. Software projects of reasonable size usually include several geographically distributed programmers. Projects experience personnel turnover, time pressures, and communication issues. As a result, software development and maintenance involving several developers and spanning months or years can experience a common phenomenon: the *actual* architecture found in the source code diverges from the *intended* architecture [18][19][21]. This problem is often introduced unintentionally by developers who write code that does not conform to the architecture. The difference between the code and the intended architecture may also occur due to changes in the architecture itself [19]. Intended architecture may be a welcomed modification that addresses a new requirement or technology innovation. The architecture evolution requires the expensive process of refactoring code which may not be a priority due to project constraints. Regardless of the reason, program code that is not in alignment with the design architecture negatively effects maintainability, reliability, security, modifiability, performance, portability, and interoperability [18][19] [21].

Software defects, or bugs, can cost companies significant amounts of money, especially when they lead to software failure [15]. There are different ways to ensure quality in software including code reviews and rigorous testing. Organizations use a peer code review process, a manual inspection of source code by developers other than the author, as a valuable tool for identifying source code that deviates from the design architecture. Manual code review can be a very effective means of identifying issues but is human resource intensive. There is a clear trend

toward the use of tools to support the code review process and limit the inefficiencies of manual inspection [5] [18] [21]. The growth of empirical software engineering techniques has led to increased interest in bug prediction algorithms that identify areas of software projects that may be prone to a security vulnerability [17]. These algorithms predict areas of software projects that are vulnerable to mistakes or to intrusion. Analysis tools and review tools are more likely to be integrated into practice when they are fast and are seamlessly implemented into the development cycle, for example, during the nightly build process [18]. The use of secure software development tools during development and maintenance can assist developers to build more secure software [7].

## **Software Security Analysis Tools**

Tools are available that mechanize software development and review programming artifacts that would otherwise be performed manually or not at all. The tools communicate issues through notifications, which may be textual, visual, or a combination of both. Software (or program) security analysis tools are a particular subset of program analysis tools that promote efficiency, quality, defect reduction, and an improved understanding of the code [14]. Software analysis tools are always language-specific with separate tools for C, C++, Java, etc. There are dozens of software analysis tools available commercially, along with many academic research, and open source tools. The performance and usability of academic research and open source analysis tools is an active area of research but commercial tool licenses generally forbid the publication of any experimental or evaluative data [2] [3] [4] [6] [10] [14] [15] [17] [18] [23] [25].

Software security analysis tools can be categorized as either dynamic or static. Dynamic tools analyze program behavior at run time without accessing the source code. A dynamic analysis program detects vulnerabilities by actually performing attacks [24]. As a result, successful analysis is dependent upon sufficient testing scenarios that simulate the actions of an intruder. Dynamic analysis security tools (e.g. HP WebInspect [11] and IBM AppScan [13]) analyze program behavior at run time to find security faults, such as memory leaks, buffer overflows, and SQL injections. Both developers and application purchasers can use these security tools to locate and repair vulnerabilities that could otherwise lead to costly failures. The use of dynamic tools is the only viable option in cases where the vendor's executable code, not the source code, is available for analysis.

Static analysis tools scan software for issues that may cause defective behavior or vulnerability without executing the code. Program security defects are discovered at compile time without executing the code. The tools are based on compiler technology, because the initial stages of static-analysis are the same as those required for compiling code. The analysis can be performed multiple times during the life of the program from development to deployment. Static analysis tools perform an exhaustive search for various classes of problems and many minimize the number of spurious warnings through the use of heuristics and improved analysis techniques. The sophistication of the analysis varies greatly depended upon the tool employed. The simplest tools often only search source code for text pattern matches or calculate basic program metrics to determine the likelihood of problems arising from the code. Advanced tools act as an advanced compiler for the source code, deeply analyzing both execution and data flow for faults [7]. Static analysis security tools (e.g. Fortify SCA [10], Armorize CodeSecure [1], and

FindBugs [16]) analyze programs to find security defects, such as unsanitized inputs, null pointer references, concurrency violations, buffer overflows, and potential array-out-of-bounds errors. Since access to the source code is requirement, only software developers and application purchases that include the source code can implement the use of static analysis tools within a security assurance plan. In the numerous cases where an application purchase (license) does not includes access to the source code, the specific software security practices of the vendor should be investigated.

Although static analysis tools can be seamlessly implemented into the system build process, effectively interpreting and acting upon the results is challenging in practice. Research reports that, in general, they scale poorly, cannot find complex inter-procedural defects, and report false defects [2][3][7][18][21]. Tool reports may include warning messages that are difficult to interpret. For example, it is challenging to understand the context of a warning message that appears in the report of a program when the root cause lies within the code of another program. Some reported issues are false alarms that do not reflect a true vulnerability in the code which may lead to developers ignoring tool reports. [17] [24] [15]. Even when a warning identifies a real defect, it may not represent a quality dimension of interest to the organization or a developer may choose to ignore the issue. This may trigger skepticism in the reliability of the tool among developers [3][18][19].

Static analysis tools with certain characteristics are more effective in improving the development process. Software developers prefer prediction algorithms that identify code with a strong, visible and obvious reason for the flagging [17] [24]. It is important for the usability of tool reports that they provide actionable message that suggest solutions to problems or errors [17][18]. Prior research has also found that the description of a fault is important in deciding whether to fix the issue [17] [18]. Once a vulnerable area has been identified, the development team should be able to take clear steps that will result in the area no longer being flagged. For example, FindBugs is already in use at Google, and most categories of warnings cause over 90% of users to investigate high priority warnings [17].

FindBugs is a free and open source static analysis tool with a flexible architecture that can be executed in many modes: from the command line, as a stand-alone application, deployed over the web using Java Web Start, or as a plug-in incorporated into an integrated development environment. The tool performs intra-procedural analysis on Java class files and reports over 400 different patterns of defective code which are grouped into eight categories including *Correctness*, *Bad Practice*, *Security*, *Dodgy code*, *Multithreaded correctness*, *Performance*, *Malicious code vulnerability*, and *Internationalization* [22]. Each warning within the report is assigned a priority (high, medium, or low) based on the severity of the associated problem. Based on the priority, code developers may compare two issues of the same bug pattern, but should not compare issues across different bug patterns. To facilitate a prioritization of issues across different bug patterns, FindBugs also ranks warnings on a scale from 1 to 20, where 1 is assigned to the most severe issues. The ranking is a subjective assignment that signifies the severity and impact of the issue along with the speed and probability that the underlying mistake will be discovered when the code is executed. The manual recommends that problems identified as low priority be given little attention and efforts should focus on those problems identified with higher priority.

The Findbugs analysis engine includes numerous heuristics to filter and reprioritize warnings that may be inaccurate, or that may not represent serious problems in practice. Many simple detectors use a visitor pattern over the class and method files, often using a state machine with information about the types, constant values, special flags, and values stored on the stack or in local variables. Other detectors can traverse the control flow graph, using the results of data flow analysis such as type information, constant and null values [12] [22]. The data flow algorithms incorporate the information from conditional tests into the analysis results [12] [22]. FindBugs also has the ability to report several concurrent bug patterns and can detect defects related to interference.

## **Java Programming Language**

The programming code that drives an application can also provide a point of entry for an attacker to execute commands, access data, or pose as another. Software vulnerabilities are exploited by malicious code when there is a failure to adopt and utilize security coding practices [7]. The Java programming language has some unique security challenges. There is no secure coding standard for the Java programming language which may lead to the development of applications that are vulnerable to attack [23]. Although fundamental coding guidelines are available for the Java programming language, there is a variety of levels of understanding of how to develop secure systems among software developers [16] [23]. Many of the fundamental guidelines are simple to follow but often have associated subtleties that can undermine the security that the guideline was intended to provide [16]. In addition, Java has features and application programming interfaces that may be used in an insecure manner and make attacks possible.

While the Java security architecture, can protect users and systems from hostile programs downloaded over a network, it cannot defend against implementation issues that occur in trusted application code. These issues, or bugs, can inadvertently create vulnerabilities including access to files, printers, webcams, microphones, and the network from behind firewalls that the security architecture was designed to contain. In some circumstances, local programs may be executed or Java security disabled. These bugs can potentially be used to manipulate the client computer architecture to steal confidential data from machine or intranet, spy through attached devices, or further other malicious activities.

## **Secure Software Assurance Assignment**

The creation and evaluation of secure code is not commonly taught in university courses [7]. Educators should provide instruction to sensitize students to the challenges of vulnerable software while beginning the continual process of acquiring defensive tools to assure future software applications [7]. University courses should be designed to ensure a student's knowledge of basic software vulnerabilities while providing opportunities to apply sound techniques and tools to write secure code. With appropriate training in secure coding principles, students will be better prepared to guard against software vulnerabilities [7]. Integrating secure coding practices into STEM (Science, Technology, Engineering, and Mathematics) courses is necessary, not to

make every STEM student a security expert, but to make them aware of common vulnerabilities and ways to avoid them [7]. This project provides active learning instruction in secure coding practices for information technology and computer science students. The premise of this paper is that all technology students can and should learn the basics of secure programming and analysis.

## ASSIGNMENT DIRECTIONS

Purpose: Perform a security assessment of an application using a static security assessment tool.

Directions:

1. Install Eclipse Platform on computer.

Eclipse is a free and open source integrated development environment. It is one of the most robust and widely used tools for development in any language and can include a variety of tools and plug-ins, many of which can be used simultaneously [8]. Eclipse is a good candidate for observing both the expressiveness and scalability of any number of tools including FindBugs [14]. Netbeans, a free and open source integrated development environment can be used as an alternative to Eclipse [20].

2. After the installation of Eclipse, Install appropriate Java programming language plug-in (ex: JRE System Library).

3. Install FindBugs application plug-in into the IDE.

FindBugs, trademarked by the University of Maryland, is the static analysis tool that is recommended for this security analysis assignment. FindBugs is used extensively in application development in industry and academic research [4] [17]. Other freely available static analysis tools were evaluated such as Lint4j, a freely available Eclipse plug-in. FindBugs and Lint4j were used to evaluate at six applications and, in general, Lint4j found less than 20% of the number of problems found by FindBugs. And, the code problems discovered by Lint4j were similar to those reported by FindBugs.

4. Select an open source application available through Source Forge. Implement and verify the application source code within the IDE.

Source Forge and organization that maintains and makes available a large library of open source applications, indexed by category and programming language.

5. Perform security assessment using the FindBugs tool within the IDE.

6. (Optional Step that is dependent upon course objectives) Respond to security assessment report with resolution of high and medium priority issues. Repeat security assessment to verify issues have been resolved.

7. Summarize your perspective on comprehensive system security.

*Vulnerability Assessment Based on the Assignment*

The assignment was completed on a personal computer running with Windows 7 Professional 64-bit operating system and an Intel® Core™ i7 CPU, Q820, 1.73 GHz with 4 Gbytes of RAM. An integrated development environment was created with the installation of Eclipse Juno Software Development Kit, version 4.2.1, JRE System Library [JavaSE-1.7], and Findbugs, version 2.0.3.

After building a small local application to verify the IDE, the search began for an appropriate open source Java application. Table 1 shows the count of problems, by subcategory, found by FindBugs in a sample of open source Java applications downloaded from Source Forge. None of these applications included any low priority “bugs”. Table 2 shows the count of problems, by category and subcategory, for the same sample of applications depicted in Table 1.

The search focused on applications of a variety of size. The criteria for the selection was that once installed, the application “worked” from a user standpoint and the source code could be imported into the Eclipse IDE. There was also a desire to trigger a wide variety of FindBugs error codes to make the assessment process interesting. Many repeated experiments failed to trigger FindBugs category *malicious code vulnerability* or *security*. Both of these FindBugs errors could be created by fabricating code within the open source applications but neither appeared naturally.

Table 1: Count of problems, by priority, in open source Java applications found on Source Forge

<b>Application / Description</b>	<b>High</b>	<b>Normal</b>	<b>Low</b>
AI Genetic Algorithm	3	27	0
ISO-8583 Financial Transaction	27	242	0
Mathematics, Optimization	0	6	0
Board game	2	12	0
Accounting w/inventory mgt.	10	112	0

Table 2: Count of Problems, by Category and Priority, in Open Source Java Applications.

B =Bad Practice                      C=Correctness                      D=Dodgy  
M=Multithreaded Correctness    P =Performance

Priority:		HIGH					MEDUIUM				
Application / Description	All	B	C	D	M	P	B	C	D	M	P
AI Genetic Algorithm	30	0	2	1	0	0	1	1	4	1	20
ISO-8583 Financial Transaction Framework	269	7	13	5	0	2	36	4	23	79	100
Mathematics, Optimization	6	0	0	0	0	0	3	2	1	0	0
Board game	14	0	0	2	0	0	7	0	1	0	4
Accounting w/inventory mgt.	122	0	3	7	0	0	2	3	7	0	100

The remainder of the effort for the security assessment assignment focused on the Artificial Intelligence (AI) Generic Algorithm application. This is an open source application available through Source Forge under the Education/Java category. This application is a library of genetic algorithm variations and is shared under the GNU Library or Lesser General Public Licenses. Briefly, genetic algorithms are iterative processes that provide solution to complex functions.

Genic algorithm processing may be described with the following steps:

**[Start]** Create a random set of candidate solutions (chromosome/ binary representation) for a fitness function. Skip *Evaluate* step.

**[Evaluate]** After the first iteration [Start], compare the data value of the best solution set of the new generation with previous set of solutions.

**[New Generation]** Create a new generation of candidate solutions based on the previous set by applying roulette wheel selection, crossover and mutation.

**[Roulette Wheel]** Random selection where the probability is proportional to fitness

**[Crossover]** Random portion of digits in variables are exchanged between variables.

**[Mutation]** Random digits in variables are changed to avoid selection of a local optimum in the set of all possible solutions.

**[Return]** Return to the *Evaluate* step.



Review of the Javadoc report of the source code reveals that genetic application application is organized with 3 Packages: Org.jenetics which includes 7 interfaces and 46 classes; org.jenetics.examples which includes 8 classes; and, org.jenetics.utilities which includes 8 interfaces and 31 classes.

FindBugs identified 30 problems in the source code of this application; 3 *high*, 27 *medium*, and zero *low* priority issues. For brevity, table 3 lists the category, error description, and application resource where the problem code is found only for the issues identified with *High* rank.

Table 3: Result of Findbugs Analysis of Source Code.

Rank	Category	Problem Description	Resource	No.
High	Correctness	Apparent infinite recursive loop	NumberChromosome.java	1
High	Correctness	Extra arguments are passed in a string function	ExponentialRankSelector.java	2
High	Dodgy	Stores dead local variable	GenotypeTest.java	3

Evaluation of each problem appear below. The evaluation includes the name of the source code module, a description of the problem, an explanation, and recommended resolution. The lines in the source code that triggered the *FindBugs* problem are highlighted. Evaluation of the report is an optional step that is dependent upon course objectives.

### **Evaluation 1: Apparent infinite recursive loop**

**Source Code:** NumberChromosome.java

**Problem:** The private field *byteValue2* does not appear other places in the class NumberChromosome.

**Explanation:** The purpose of the code is not clear. It may be the remnants of testing.

**Resolution:** Removal of the code eliminates the problem without impacting the application.

**Lines of source code:**

```
/**
 * Return the byte value of this
<code>NumberChromosome</code> at the
 * <code>index</code> 0.
 *
 * @return the byte value of the {@link Gene} with
<code>index</code> 0.
 */
public byte byteValue() {
    return byteValue(0);
}
private byte byteValue2() {
    return byteValue2();
}
```

## Evaluation 2: Extra arguments are passed in a string function

**Source code:** ExponentialRankSelector.java

**Problem:** This class, ExponentialRankSelector, contains a format-string method that includes a call where more arguments are passed than are actually used by the format string.

**Explanation:** This situation does not cause a runtime exception, but the code may be omitting information that was intended to be included in the formatted string.

**Resolution:** Two possible changes resolve the issue: Modify the number of arguments to pass only those required class. Or, less likely, add missing functionality that was meant to use extraneous arguments.

**Lines of source code:**

```
/**
 * Create a new exponential rank selector.
 *
 * @param c the <i>c</i> value.
 * @throws IllegalArgumentException if {@code c} is not
within the range
 *         {@code [0..1)}.
 */
public ExponentialRankSelector(final double c) {
    if (c < 0.0 || c >= 1.0) {
        throw new IllegalArgumentException(String.format(
            "Value is out of range [0..1): ", c
        ));
    }
    _c = c;
}
```

## Evaluation 3: Stores dead local variable

**Source code:** GenotypeTest.java

**Problem:** *FindBugs* found an instance of dodgy code within a method in the class GenotypeTest.java. The instruction assigns a value to a local variable, but the value is not read or used in any subsequent instruction

**Explanation:** This situation does not cause a runtime exception but a value of an existing variable is assigned to the dead variable.

**Resolution:** Removal of the code eliminates the problem without impacting the application.

(Continued)

### Lines of source code:

```
public void testSetGetChromosome() {
    Integer64Chromosome c1 = new Integer64Chromosome(0, 100,
10);
    Integer64Chromosome c2 = new Integer64Chromosome(0, 100,
10);
    @SuppressWarnings("unused")
        Integer64Chromosome c3 = new Integer64Chromosome(0,
100, 10);
    @SuppressWarnings("unused")
        Genotype<Integer64Gene> g = Genotype.valueOf(c1, c2);
}
```

### CONCLUSION

With the rise of security breaches originating in program code, a comprehensive security plan should include analysis of the applications included in an organization technology architecture. Software assurance practices should be completed whether or not the code is available within an organization's technology libraries. Use of analysis tools in addition to code inspections and vendor verification can be a cost-effective means of supporting a security plan when they are included early in the development process. This research addresses an awareness of software security assurance with a discussion of secured software architecture, security analysis tools, and the Java programming language strengths and vulnerabilities A vulnerability assignment based on a static assessment tool is described and demonstrated. The assignment could provide an Information Technology Management, Computer Information Systems, or Computer Science student an opportunity to evaluate program code for possible security issues.

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## **SUPPLY CHAIN MANAGEMENT AND INVESTORS' RISK-RETURN CHOICE**

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### **ABSTRACT**

We use a behaviorally motivated risk-return optimization framework to shed light on the important link between global supply chain management, investors' risk-return choice and the need for a risk free asset. By improving the transparency and sustainability of the global supply chain, firms can reduce the probability of extreme losses, thus increasing investors' expected utility and asset valuations. When monetary and fiscal policy tools have been employed beyond established precedents, and market participants begin to question the continued ability of governments to stabilize markets, firms have an opportunity to partially fill this void by reducing costly environmental and social risks in their supply chains. Increasing the availability of low asset return volatilities in an interconnected world, that faces environmental, social and financial challenges on an unprecedented scale, requires systemic change. This change appears to be already underway.

Keywords: Supply chain, ESG factors, risk, return

### **INTRODUCTION**

The importance of supply chain management (SCM) in affecting a firm's operating and financial performance and creating economic value for its shareholders has long been recognized (Hendricks and Singhal [11, 12], Hertz et al. [13], Altay and Ramirez [1], Ou et al. [23], Swink et al. [30], Ellinger et al. [9], Johnson and Templar [17], and Mefford [20]). We contribute to this literature by highlighting the role of sustainable and transparent SCM in reducing the volatility of expected asset returns as it is perceived by individual investors. When investors perceive lower asset risk, trade-offs between investor-specific behavioral volatility and expected asset returns improve thus increasing investors' expected utility and firms' valuations. Firms with the most sustainable and most transparent supply chains are likely perceived as least risky and most valuable with the potential to replace the government as the safe haven in times of crisis.

Instead of using the variance of the return distribution, we focus on investor-specific behavioral volatility as developed by Davies and de Servigny [6], henceforth DdS. A behavioral approach improves upon traditional financial models in that it offers a more realistic measure of asset volatility, taking into account non-normality of asset return distributions as well as important differences in how individual investors perceive asset risk. We use this approach to suggest that the risk-reducing effects of SCM on asset return distributions may help address concerns regarding the common assumption that the sovereign debt of developed countries will always be risk free. Specifically, we suggest that, when the existence of a sovereign risk free asset cannot

be taken for granted, firms may reduce investor-specific behavioral return volatilities and improve investors' risk-return trade-offs by moving towards more sustainable and transparent global supply chains. Instead of looking for alternative safe havens in gold or other commodities, investors might look to safer firms for a refuge from risk. Disclosing and improving firm risk profiles to make them observable and valued by investors may also improve the signaling function of asset prices and returns. The resulting fund allocations are likely to not only increase investors' expected utility, but also improve the economy's ability to prosper.

The paper is organized as follows. The next section outlines the behaviorally motivated utility optimization framework developed in detail by DdS. The section after that identifies the macroeconomic and political trends that lead observers to question the assumption that sovereign debt will always be risk free, and suggests the possibility that alternatives may be found. Then, we describe the need for a systemic (or universal) shift towards sustainable and transparent SCM and point out developments indicating that change has already begun. The final section concludes.

## **THE BEHAVIORALLY MOTIVATED MODEL**

The recent financial crises in the U.S. and in Europe have renewed concerns about some of the assumptions built into generally accepted models of traditional finance theory, such as modern portfolio theory (MPT), the capital asset pricing model (CAPM), and the efficient markets hypothesis (EMH). In their search for better investment management practices, DdS identify three problems associated with the traditional MPT that need to be addressed. First, due to the great diversity of investors' attitudes towards risk, the risk-return framework needs to be completely subjective. Not only do investors differ with respect to their predictions of future return distributions, but they also differ with respect to their perceptions of the same future return distribution prediction. Second, the quadratic utility function employed by the traditional MPT displays increasing absolute risk aversion and increasing relative risk aversion, with especially the former being contrary to observed investor behavior. And, finally, the quadratic utility function implies that investors care only about the mean and variance of a given return distribution while ignoring all other moments. This assumption would make sense if all return distributions were Gaussian (normal), but most empirical tests conducted by DdS and others suggest this is not the case (see, for instance, Chapter 4 in DdS, and MSCI, Inc. [21]). Without abandoning MPT altogether, DdS suggest changes to the framework so that individual preferences are recognized, while behavioral biases and errors are understood yet excluded from the optimization process. In other words, the framework is built to optimize the rational long-term preferences of *individual* investors, and it allows for the fact that most asset returns are not normally distributed by recognizing asymmetries and fat tails.

To improve upon the quadratic utility function used by the traditional MPT, DdS define utility as a function of log returns on initial wealth, and identify the exponential function as more suitable. A rational long-term utility function must be smoothly increasing in wealth (return) and exhibit concavity, because more is preferred to less and investors are averse to risk. The exponential function, beyond fulfilling all the requirements for a rational long-term utility function, is the



only utility function that exhibits constant relative risk aversion (CRRA) and, therefore, decreasing absolute risk aversion (DARA) when log returns are used, which is more plausible given observed investor behavior. Utility, for the exponential function, is zero for zero returns, exponentially decreasing for negative returns, and increasing at a decreasing rate for positive returns. Thus the exponential utility function is consistent with an aversion to both negative skewness and fat tails in the return distribution. The risk aversion built into this utility function increases with lower degrees of the investor-specific risk tolerance.

The analysis of DdS then follows the traditional MPT in that the maximization of expected utility is replaced with a search for the optimal risk-return choice. This requires the decomposition of expected utility into two metrics, expected return and a risk measure that is independent of expected return. However, in the behaviorally motivated model of DdS, which abandons the unrealistic assumption of normally distributed asset returns, risk is no longer equal to the return variance. The higher distribution moments now matter. Furthermore, the behavioral risk measure, while consistent with rational long-term decision-making, is now subjective. In the traditional MPT, investor-specific subjectivity is limited to the individual investor's preferences regarding the trade-off between objective measures of expected return and variance. In contrast to the assumed "representative investor" of traditional finance theory, actual investors differ greatly with respect to their risk tolerance, which influences their perceptions of how risky a particular asset is. They may perceive different amounts of risk being associated with a given return variance, or with a given non-normal return distribution. Addressing these shortcomings of the traditional MPT, DdS add a behavioral component to the rational utility maximization framework and allow for non-normal return distributions with higher distribution moments. In their behaviorally motivated model, risk is defined as the investor-specific behavioral variance,  $\sigma_B^2$ , using the following approximation:

$$\sigma_B^2 \approx \sigma^2 \left( 1 - \frac{2\sigma}{3T} \text{skew} + \frac{\sigma^2}{3T^2} \text{kurtosis} \right) \quad (1)$$

where  $\sigma^2$  is the return variance and T is the individual investor's degree of risk tolerance. Kurtosis, in this equation, is normalized by subtracting 3 so that skewness and kurtosis are zero when the return distribution is normal. In this special case, the behavioral risk measure equals the return variance, and the behaviorally motivated model converges to the traditional MPT.

The behavioral risk measure thus generalizes the optimization of the trade-off between expected return and risk, while retaining a focus on rational long-run investor preferences. This more general risk measure allows for differences among individual investors precisely where these differences arise. The variable T is inversely associated with both skewness and kurtosis, indicating that investors with high risk tolerance perceive little risk arising from the characteristics of return distributions that are represented by these two moments. Investors with low risk tolerance, on the other hand, exhibit a great deal of loss aversion, and tend to be very sensitive to relatively high probabilities that are attached to extreme losses or gains when return distributions are negatively skewed and leptokurtic. The degree to which risk perceptions are influenced by individuals' fears and hopes varies greatly across investors, and this variety is incorporated in the behavioral variance measure.

## IS ANYTHING RISK FREE?

In the MPT, the assumed existence of a risk free asset allows investors to construct a portfolio with less risk than the efficient portfolio of risky assets offers. While this, in theory, is appealing, the MPT critically depends on the availability of a proxy for the risk free asset. Recent research has raised questions regarding the continued suitability of sovereign debt securities to serve in that role. Xiang and Qian [36] and Damodaran [4, 5], for instance, discuss the causes and effects of a market perception that default by governments in the U.S. and Europe is no longer impossible. This perception may be explained with market participants' realization that advanced economies have experienced record increases in "fiscal stress" in recent years as documented by Baldacci et. al. [2]. Rising sovereign debt levels combined with the sense that austerity measures are needed to contain them, have raised deflationary risks. The loss of credibility by the credit rating agencies in the wake of the 2007-2009 crisis has highlighted the difficulty of tracking these risks. While gold has, at times, been suggested as a substitute for sovereign debt, recent evidence does not support gold's use as a safe haven asset in the past, casting doubt on the metal's future ability to serve in that role (Joy [18]). With a new proxy for the risk free asset not readily identifiable, a sense that nothing is risk free seems to be spreading (Sommer [27]).

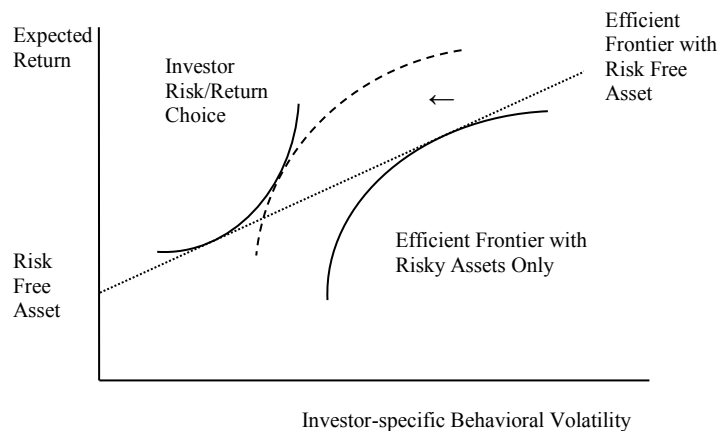
Damodaran [4] predicts some possible consequences if investors are unable to identify an asset with a certain return: A reduced investor willingness to take risks would likely lead to lower asset prices. As a result, firms would borrow less and pay lower dividends. Inevitably, this would lower economic growth, which may be exactly what advanced economies need to help them stay within the nonnegotiable limits imposed by a finite planet (Jackson [15]). Thus, the outcome would not necessarily be all negative. In fact, increased competition for reduced funding may improve the quality and lower the risk of the projects that are ultimately financed.

Some of the observed long-term trends suggest at least the possibility that this may be the direction in which we are heading (see, for instance, Table 1.10 on p. 27 and Table 6.1 on p. 186 in DdS). As the populations of the Western economies are aging, the demand for safe assets will increase even as the supply of safe assets appears to be shrinking. This creates an opportunity for borrowing entities (municipal governments and businesses) that, through "real economy" as opposed to "financial" innovation, are able to reduce the risk associated with a given expected rate of return (Doheny et. al. [7]). Selected companies with the highest credit ratings have already benefitted from lower financing costs than the U.S. Treasury. Examples are the short-term yields of Exxon and Johnson and Johnson, which recently dipped below the yields of comparable U. S. Treasury securities (McGee and Burne [19]).

An important area in which innovation can lower risk, as measured by the behavioral volatility, is management of the global supply chain. SCM has been shown to affect firms' risk, financial performance, and financing costs. Perceived reductions of firm risk would make corporate securities more attractive and lead to higher asset valuations (Ellinger et. al. [9], IBM Global Business Services [14], PricewaterhouseCoopers [24], and Hendricks and Singhal [11, 12]). Firms that improve their disclosure of relevant information and implement practices that lower

the frequency and severity of losses associated with SCM, likely shift investors' efficient frontier to the left and allow investors to achieve risk-return combinations similar to those that would exist, if a truly risk free asset were available (see Figure 1).

**Figure 1: SCM may improve investors' risk/return choice without a risk free asset**



To support the risk-reducing effects of “real economy” innovation, it may be necessary for firms, investors and consumers to make significant changes in long-established patterns of behavior, and for governments to facilitate these changes by creating the appropriate legal and regulatory infrastructure. The next section outlines the need for systemic change, and the steps that have already been taken in this direction with the universal adoption of a new focus on ESG (environment, social and governance) factors.

## THE NEED FOR SYSTEMIC CHANGE

The importance of identifying and managing risks in the supply chain - both the upside as well as the downside of uncertainty - has been widely recognized in the academic and professional literature (Doheny et. al. [7], Mefford [20], Rao and Goldsby [25], IBM Global Business Services [14], PricewaterhouseCoopers [24], and Stauffer [28]). Recent events, such as the earthquake and tsunami in Japan and Hurricane Sandy in the U.S. have heightened the sensitivities of investors to downside risk in the environment. Fires in Bangladeshi factories are examples of extreme social risks. Transparency enhances awareness and facilitates accountability. For firms, the United Nations Global Impact and Business for Social Responsibility [34] offer some practical suggestions to help improve supply chain sustainability. More recently, researchers at the Massachusetts Institute for Technology have developed a “social network for supply chains” termed *Sourcemap* that allows firms to connect with their suppliers and coordinate action in the event of crisis.

In order for global SCM to significantly reduce asset return volatilities - however measured - it is not enough for firms and investors to focus on supply chain sustainability and transparency. The behavior of all agents in the global economy will have to change simultaneously. Firms that disclose and reduce risk exposures in their global supply chains need investors to reward them with fund allocations, and they need consumers to make informed and responsible choices. To help investors and consumers identify responsible firms, government policy must formulate appropriate disclosure requirements that enhance transparency. Recent efforts by governments and economic agents all over the world reflect a growing awareness that ESG (environment, social and governance) factors are critical drivers of our progress as a civilization. However, it is difficult to identify a set of practical recommendations for firms, investors, consumers and governments along these dimensions, because of the great variety of approaches and the lack of generally accepted standards.

While standardized measures for ESG factors have yet to be developed, international organizations have launched initiatives to lay the foundation for global standards of operation and governance. In 1997, the Global Reporting Initiative (GRI) was created by the Coalition for Environmentally Responsible Economies (CERES) in conjunction with the United Nations Environment Programme (UNEP). GRI represents the first attempt at establishing a global framework for comprehensive reporting of the “triple bottom line,” i.e. business results from a financial, environmental, and social perspective. Other prominent standards include the Caux Roundtable Principles, the Global Sullivan Principles, the OECD Guidelines for Multinational Enterprises, and the Bench Marks (Principles for Global Corporate Responsibility). The rising number of ESG initiatives worldwide reflects a growing global concern with these issues. Even greater awareness and more widespread action are needed.

In connection with the Carbon Disclosure Project, for instance, Topping [33] and Jira and Toffel [16] outline ways in which the disclosure of environmental information encourages changes in the practices and behavior of corporations, investors, regulators and other stakeholders. The *Natural Capital Declaration* [22], The Cambridge Natural Capital Programme reports [31, 32] and *The 2050 Criteria* published by the World Wildlife Fund [35] all are manifestations of increasing levels of awareness among business leaders and investors regarding the immense sources of value associated with our ecosystems that, in the past, have been largely ignored. Emerging efforts aim to recognize and measure the value that the atmosphere, natural capital and biodiversity contribute to the sustainability of human life and health. This trend promises to reduce the environmental degradation and the destruction of natural habitats that, in the face of increasing population growth worldwide, threaten to result in resource shortages, price volatility, as well as elevated levels of climate and political risks.

Addressing social risks in the global supply chain is consistent not only with protecting and enhancing a firm’s reputation and intangible asset value but, more broadly, is a requirement for sound labor relations and stable societies. Efforts to build a sound social infrastructure include, for instance, the California Transparency in Supply Chains Act of 2010 (SB 657), which aims to combat slavery and human trafficking. Doorey [8] documents individual companies’ assessments of the risks and benefits associated with factory disclosures that address the use of sweatshops, child labor and other types of forced labor in their supply chains. Emerging and

unresolved issues surrounding farm animal welfare are raised in Sullivan et. al. [29]. These and similar efforts to broadly address social issues in firm decision-making share a concern that the goal of shareholder wealth maximization is often allowed to supersede the goal of preserving human life and health, which depend critically on the health of animals and our natural environment. In 2000, the *United Nations Global Compact* spelled out ten principles covering critical issues in the areas of human rights, labor, the environment and anti-corruption that, by now, have been signed and agreed upon by more than 10,000 participants from around the world.

As global population growth and increasing world consumption are expected to apply unrelenting pressures on societies and the planet, a realization is growing that we need a new social contract and a sincere concern for the common good (Ferenbach and Pinney [10], Reeves et. al. [26], and Bekefi et. al. [3]). If a more inclusive approach with a view towards optimization for all is adopted, then disclosure and transparency of global supply chains become necessities. With supply chain dependencies no longer hidden from public view, financial gains for shareholders at the expense of other stakeholders will become increasingly difficult to achieve and justify.

## SUMMARY AND CONCLUSION

A rapidly growing global population and rising levels of consumption are posing unprecedented threats to the atmosphere, the environment, communities, and governments. Successfully managing scarce resources, in the face of these ongoing challenges, requires major adjustments to traditional paradigms, concepts and tools. Better information disclosure about ESG risks in business supply chains, and an increased awareness on the part of CEOs and Boards of Directors regarding their roles in protecting human rights and valuing ecosystems are important starting points. When progress along ESG dimensions is driven simultaneously by firms, investors, consumers and governments, better supply chains are likely to reduce behavioral volatilities and improve investors' risk-return choices, asset valuations and resource allocations. This kind of success is critical in an increasingly complex and interconnected world, in which every asset is risky and safe havens are temporary at best.

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# **HAPPINESS AND PRODUCTIVITY: A CROSS-CULTURAL REVIEW OF THE USA AND FRANCE**

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## **ABSTRACT**

This discussion concurs with the extant literature regarding the impact of happiness on productivity while extending the debate to the quandary in which employees usually find themselves: Being paid to happily perform, regardless of the authenticity of this sentiment. In today's global organization, the question still remains whether happy employees are indeed productive employees. In this proposal the review is using the example of the US and France to help answer this very question drawing on a theoretical model of equitable employer, happy employees, and productivity.

Keywords: Happiness, Productivity, Equitable Environment, US, France.

## INTRODUCTION

Forget you were a university professor and imagine you were rather a waitress or a waiter, if you were a male university professor. Furthermore, you woke up this morning on the wrong side of your bed, as the saying goes. Everything seemed to be at odds with you: Your baby spilled coffee over the white shirt you had on, as you were stepping out of the house to go to work. It almost got you late for work, because that was your uniform, and it was the only white shirt you had ironed. Still, you made it just on time to work, and you found your supervisor waiting for you with masked irritation, wondering why you were not coming to start the day as you usually did, that is, at least 20 minutes ahead of time. You had to smile, open the cash registrar's, and greet your first customer with another 'genuine' smile, welcoming this customer to your place of business, and offering this patron the usual enticements you have been trained to offer customers, just as you would any other "normal day."

Though started on a shaky foot, your day will continue seemingly flawless and seamless to the eyes of the beholders, your customers and your supervisor, as though everything was just perfect. You alone will know you are having a terrible day! Regardless of that reality, you will go on from one table to another, greeting customers, offering menus, suggesting drinks and deserts, and asking with "keen" interest if everything was going well with your patrons. You would behave in this manner because of two assumed and understandable reasons: The first is your supervisor is observing you, and the second is your tip depends on your acting in a way to deserve this gratuity. You are also aware of a reality of critical importance in today's slow economy [2]: If you lost this job, you may have a hard time finding another place of employment, and your employer may be cognizant of this parameter as well. For this reason, it is cautious to offer your supervisor, whom it is pertinent to mention did not enquire about the reason of your near tardiness, will never know of your true state of mind of that day [11]. As it turns out, one might say, "Well, good!" Your supervisor did not notice you were having a bad day, and your customers continued tipping you because your performance was excellent throughout the day, and you remained productive just as you usually are. Business was great, and all was just perfect.

An example of this nature is not so far-fetched if one thinks of it. Happiness, fake or real, [11], especially as it relates to productivity, remains a topic of interest in the workplace [8] today, just as it was when the Hawthorne studies were conducted in Illinois in the early 1920s [14]. This was especially the case, in the US [15] where Americans were recognized as the smiley nation, notably from the 18<sup>th</sup> Century onward, with the Enlightenment movement and the advent of the happy, and healthy employee, who as a quintessential achievement, was going to find meaning and fulfillment in the workplace [5][16]; and subsequently, realize increased productivity.

If this was contrasted with the view prevalent in other nations, one would notice in France, for instance, employees' rights have predominantly been put at the forefront, regardless of any other cosmetic issue [17]. To rephrase, on average, the American employee is one who happily delivers between 49 to 60 hours of work per week, more than all other employees in the developed world [5]. In contrast, his counterpart, the French employee, since these are the two nations this discussion is comparing, delivers 30-35 hours of paid labor per week, almost less

than all employees in other developed nations, and finds ways to protest every time he or she finds an opportunity to do so [17]. It still is true in today's global world, events in the US will no longer stay isolated [13] and individuals around the world are slowly but surely catching up to the US way of doing things.

### **RESEARCH QUESTION**

If, then, happiness increases productivity, a desired outcome in the workplace, why do organizations in today's global environment still lag in fostering welcoming environments, of the kinds that will make employees happy, and thus highly productive? If one was to rephrase this question, one would ask it in the following different terms: Do today's organizations so despise increased performance that they would act in a way not to achieve such desirable high levels of productivity? Regardless of the manner in which one may view this issue, a number of organizations operate in a manner that makes one wonder whether employers are concerned with their employees' well-being [14]. These organizations may miss out on drawing from the best of their human resources, unbeknownst to them.

### **RATIONALE FOR STUDY**

Previous studies indicated the critical importance of happiness, satisfaction, and well-being not only for job performance, but also for the employee's benefit, the employee's co-workers [4] [19], and by inference, the employer. Even as this makes intuitive sense based on Gouldner's norm of reciprocity [6], only few companies around the world seem particularly inclined to act in a way that will produce work conditions fostering an environment conducive to creating happiness and thus increased productivity at work.

The tenet of Gouldner's norm of reciprocity underscores the willingness of one, even of a so called primitive nature, to feel the urge to reciprocate towards an individual who acts kindly towards another person. Based on this principle, if organizations treated their employees fairly and equitably, the latter would act in kind towards these organizations and would in turn feel more obliged towards their employers. This would prompt employees to work harder, resulting in better performance, less recalls, and ultimately, increased performance [14] [18] [20].

### **PURPOSE OF THE STUDY**

Thus, the purpose of this study is to offer a theoretical model of employer's equitable treatment of employees, happy employees, and increased productivity. This model will need to be tested and validated, even as this discussion will already concur with the extant literature that happy employees are productive, so long as these employees are indeed happy. This review also extends the current literature by adding a precondition to happy employees: Fair treatment and equitable treatment from employers. The nature of a happy employee is such that this employee can only be productive, and one may add even highly productive [1] [14] [15]. The objective of a discussion of this nature is to add to the debate, by showing the only way a happy employee may not be productive would be if this employee was not genuinely happy [20] [21]. Naturally, the primary beneficiaries of such a discussion would be employers in profit and non-

profit organizations, while others who would also benefit from this review are researchers, and also policy makers.

### **HAPPINESS DEFINED**

Indeed, the employee at the outset of this discussion may or may not have been genuinely happy. It is accurate to advance that despite all of his or her demonstrations of the obvious external manifestations of the quality of happiness, this employee may only have been faking happiness. The employee's supervisor could have noticed the employee in question barely made it to work. A simple, "*Certainly, something happened today... It is not like you to come just on time... Are you Ok?*" would have made this employee "whole," or made him or her feel appreciated. Employees are happy when they feel appreciated, in control [21], when they are paid well [5], meaning when they have decent compensation, and when they are treated fairly [14] [19].

More clearly, following Epictetus and the Aristotelian conception of happiness, the literature [14] [9] [16] [18] defined happiness in terms of an individual's possession of three important characteristics which are the following: (1) Freedom, or the latitude to think independently; (2) knowledge, or the faculty to have access to information within the organization; and (3) virtue, or moral character, and ethical compass. It follows from the literature that for employees to be happy, they need to contribute to decision-making in their organization, work in a positive environment, feel respected and appreciated, and receive constructive feedback when evaluated, besides having the feeling they are contributing to something of import [9].

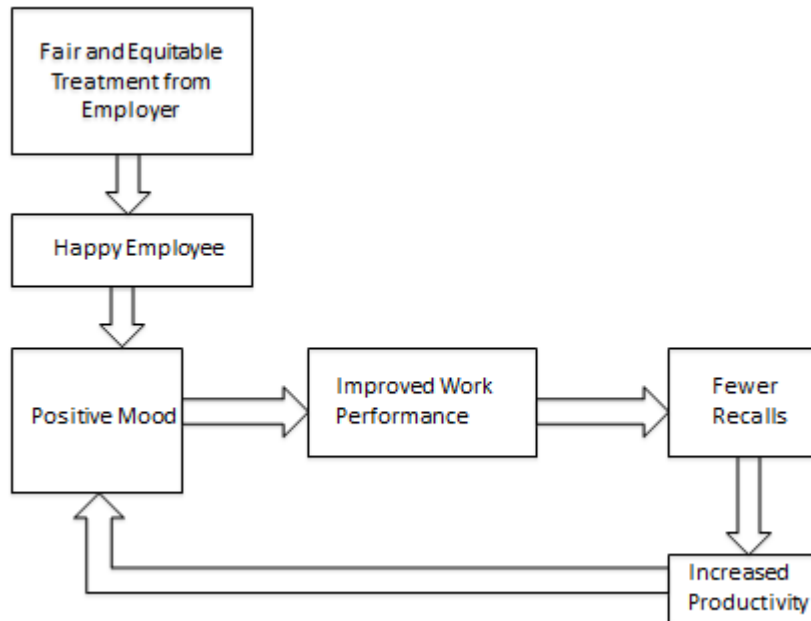
The employee in this example does not seem to fall in either of these categories. This employee may have masked the mood felt; however, there was nothing genuine about the way he or she went about the business of that day. Unlike moods, transient in nature, happiness is deeper, and more ingrained. Aligned with Gouldner's norm of reciprocity [6] as previously mentioned and Aristotle's teachings, most individuals aspire to live well, and to do good things [5] in return. This may explain the quintessential belief often validated by research, which suggests that happy employees tend to be productive employees. The employee in this example continued to work that day, albeit not to the best of his or her abilities. From this, one could only infer that the resulting productivity could not possibly be the best that employee could deliver.

### **MODEL**

The model resulting from such a dynamic would look like the following one.

--Insert Figure 1 about here--

Figure 1  
Model of Fair Treatment, Happiness, and Productivity



In this Model we notice the following six steps. (1) When employers treat employees fairly and equitably, this leads to happy employees. (2) Happy employees are generally in a positive mood. (3) When employees are in a positive mood their work performance improves. (4) Improved work performance is often of better quality, which generally results in fewer recalls. (5) In turn, fewer recalls, it is recognized, result in increased productivity. (6) And when employees are aware their productivity is above average, it usually contributes in maintaining them in a positive mood, keeping these employees happy. This cycle tends to be self-sustaining often resulting to ever-increased productivity [4] [8] [16] [20].

### **HAPPINESS, AN INTERESTING CONCEPT**

This is a proposal, and the discussion intends to offer hypotheses, collect data, test these hypotheses, analyze data, and report on the results obtained. Furthermore, the review proposes to discuss the cases of the US and France, two countries different on several dimensions of national culture [7]. A brief look at the US and France shows differences that are noteworthy. Some of these go back to history and the US Declaration of Independence in which all men were created equal, and had the right to “the pursuit of happiness.” In contrast, this was never the case in France, where only inalienable rights of the individual were always put at the forefront, and a long list of rights, at that. From these two historical perspectives, one already may notice two marked differences [15] on which the full version of this review will expound.

Furthermore, in the US, Americans redefined the notion of happiness and took it as far as in cemeteries by creating garden cemeteries [15]. In France, the most famous cemetery, the *Père Lachaise*, is a cold place, where the most famous individuals have requested to be laid to rest [12]. For individuals educated in France probably visited that cemetery more times than they cared to remember. Still, their sentiment probably, remained the same, “What a cold and inhumane place!” To be honest, that is the way most cemeteries might have looked like, until one came to the US, and discovered garden cemeteries!

## CONCLUSION

The preceding opens the way to a discussion of employer fairness, happiness and productivity, comparing the US and France. In the full version of this work, the discussion anticipates to draw implications from the results of the analysis conducted, based on data that will be collected in the US and France. The US is known as a happy people, albeit one that will even fake happiness, because happiness is seen as a business imperative, in a country where everything tends to be “good for business.” As it is, the slogan is that happiness pays and will make the business’ bottom line black. The question one may ask is the following: How black is one’s bottom line in an economy that is so slow, the bottom does not seem to see a way out, while the top does not seem to stop soaring. The most recent years did not prove to be so rosy for the US economy and by inference, for the economies of many other countries around the world [3], following the old adage, “When the US stumbles, the world crumbles.” Yet, wherever one goes, employees continue faking happiness that one has trouble fathoming employees can be experiencing, considering the prevailing economic conditions. In the rest of the world, as in France, for instance, employees do not try very hard to exhibit happiness they are far from experiencing. In fact sometimes, one wonders whether the French are even willing to cater to their clientele, especially in particular regions of France, such as Paris. No wonder then, many continue to question the correlation, intuitive as it may be, between employee happiness and productivity. A good place to start working towards making sure such a relationship would exist for a certainty would be making sure today’s global workplace helps the employee feel as if he or she was wanted. This would go a long way in ensuring the organization would reap impressive dividends for its emotional and spiritual investment in its employees, who, really feeling happy, might just become highly productive to the benefit of the organization, and society as a whole.

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**THE IMPACT OF SOCIAL MEDIA ON 21ST CENTURY ADVERTISING: A CROSS  
CULTURAL REVIEW OF THE US AND FRANCE**

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**ABSTRACT**

In this proposal, we offered that social media introduced a new era in marketing practices; nothing has been available to change how marketing for businesses is done, until now. Social media has indeed given new options to companies and has allowed companies to reach the consumer on a more personal level. Thus, we suggested social media advertising was a game changer: This simple evolution in Technology will have changed how businesses conduct their marketing practices; it will no longer be Word-Of-Mouth, simple commercials, or flyers in the Sunday paper. Also, we defined the concept of social media, and, lastly, compared the US and France in the adoption of this new avenue in business practices.

Keywords: Social Media, Global Market, Internet, Marketing, Business, US & France

## INTRODUCTION

"Did you hear about it?" is a question, which remains relevant even in today's wired world. Word-of-Mouth (WOM) advertising is still used by individuals in social media, who in turn, influence other individuals. In this forum, the number of individuals impacted increases exponentially, due to the sheer volume of one's fans, followers, and/or online friends. Even today, 90% of individuals surveyed indicate they will trust advice from those whom they know [7]. However, in a globalized world made smaller thanks to Technology [5], those whom we know are not necessarily those whom we see or have met. In a wired world, those whom we know may be individuals we met online only, or whom we befriended on social media. In fact it may be individuals whom we follow or who follow us, or who are our fans [2].

These followers or fans of ours have their followers or fans as well; one can see how this cycle has the potential to increase exponentially indefinitely. Once a message starts to circulate in this forum, there is a strong possibility this message will spread like a wild fire and if it is a product a marketer was trying to advertise, this product will be bound to receive an impressively large coverage. Little surprise, then, marketers today are heavily investing in social media advertising [5]. Indeed, Marketers are cognizant of the revolution social media, as a medium, is bound to introduce in advertising. If one person could impact a couple of other individuals by simple WOM advertising, there is no saying the number of individuals one person could impact, by using social media advertising [4].

### SOCIAL MEDIA ADVERTISING: A GAME CHANGER

Why would social media have such a great impact on advertising? Because of their powerful clustering effect, and the ability these media have, in bringing together, individuals who share common attributes and common "likes" [9]. Since these individuals share many characteristics already, it is not difficult to get them to like a product, and to get others in their midst to like the same product, and to recruit others like them to like the same product [10]. The reason for this is individuals will act upon the advice of others like them, who tell them, "Why go check it out: I did; it's great!" In a world in which Technology brings together countless numbers of individuals, one can see the exponential power of multiplication by which such an enticement would be played; a real game changer, indeed, for the world of marketers, and for the world of business as a whole [5] [10] [12]. Marketers see the potential in these social media and are delving into these in order to be the first to sow and reap the benefits of their investment, regardless of the potential, real or imagined, or at least not yet entirely ascertained pitfalls of this still nascent media. What are these media about? The next point will introduce a definition of social media as follows [6].

### A DEFINITION OF SOCIAL MEDIA

Social media consist in the use of websites and applications for social networking. There are six main types of social media: (1) social networks, (2) bookmarking sites, (3) social news, (4) media sharing, (5) micro blogging, (6) blog comments, and forums. Each of these individual application serve a different yet common ground to let the user connect or share their different ideas, thoughts, pictures, and views on different material depending on the type of site on which

the user is. Even though there are six different types of social media the most that is used is social networks. The first ever-social media site is "Friendster" which was created in 2002; it was a social gaming site, created by the Canadian computer programmer Jonathan Abrams, [3]. At that time it was one of the first sites to attain over 1 million members. Since this first social media site, others were create.

Next was MySpace, which was created in 2003; its site had more of a music emphasis. At its peak it had over 25 million users; it allowed users to share music, create different backgrounds and post pictures and message different users all over the world. Within a year of the launch of MySpace came Facebook, which was along the same premise; yet it allowed users to message in the native language, have family and friends and even give very detailed information about themselves. Facebook is one of the most unique social media because it allows users to join common interest user groups, workplace, school, college or even business [3].

In effect, as it stands at this very day and time Facebook is the most used social medium site next to Twitter and LinkedIn [1] [3]. Yet when it comes to business, many companies have a Facebook and Twitter and use YouTube to capture videos. This makes it possible for the consumer to review these at their leisure. Still: Why are social media important in the global market? Because when businesses use social media, these businesses can connect with the consumer on several levels. For instance, Facebook allows the company to create a simple page; this is known as a "become a fan page;" the company can display store locations, hours of operations, sales and specials deals. Once the consumer "likes" the page he or she can be entitled to coupons and other specials. Twitter for a business allows the customer to be entitled to special news feeds and can allow the consumer to tweet comments about the store. YouTube allows the consumer to look at commercials that were created for a particular store or even upload their own personal views about the experience they have had. Now that the definition of social media has been provided, this discussion will proceed with a comparison of the US and France on the adoption of social media in marketing advertising.

#### SOCIAL MEDIA ADVERTISING: COMPARING THE US AND FRANCE

[1] reported between 2008 and 2009, 300 million Facebook fans spent over 13.9 billion minutes online, making Facebook the most visited social medium in the US. The second most used social medium was MySpace, with individuals spending about 7.3 billion minutes during the same period, still, in the US. In France, the numbers are nowhere near those recorded in the US, because the French are only starting to catch up to the use of the Internet and social media for advertising purposes [1] [11] [9] both on the political and commercial levels. For instance, political advertising on the Internet using social media has been steadily gaining ground because candidates hope the more than 28.3 million French Internet users will see these political candidates as "cool" [11]. This was found to be true especially for those 50 years and older, than it was for those of the younger generation for whom the use of social media is nothing of a novelty and all about business as usual. All the same, French businesses embraced social media more as a reaction to international competition than as being a rational imperative, yet doing so in an effective and adequate manner [1].

This is understandable if one is familiar with the French who like to centralize power and decision-making [1]. Social media advertising, however, leaves power in the hands of the consumer, a practice not aligned with the national culture of France, a country which, by its very nature, is slow to adapt to new ways of conducting business [8], contrary to the US. Hofstede in his seminal work on national culture contrasted the US and France and identified differences distinguishing these two countries. Where the US believes in decentralization, France adheres to centralization of power. Also, the French tend to be more conservative and less outgoing than are the Americans. These characteristics may come from the US individualistic nature and French collectivistic nature. According to the scores Hofstede recorded from the survey he took of IBM employees across many nations, the US came out as significantly more individualistic (91) than the French [8] did (71). Granted, there is controversy over the use of Hofstede's work; many, indeed, find his work biased because it is based on his having surveyed individuals in a single company and it involved a sample which was predominantly composed of white males. However, his work is also considered seminal in the field of national culture, and this proposal will not delve into the above mentioned controversy, especially given that later works by the author and other experts confirmed Hofstede's previous findings [8].

At this stage of this proposal, the question one may ask is the following: Can a media created to connect individuals on a social level be used effectively for marketing purposes? In other words, can marketers use social media effectively for purposes other than social, for instance, to capitalize on people's connections on these media to promote, advertise, and sell goods and services? And if companies were successful at such an endeavor, how will these companies measure the success of their efforts, especially compared to how successful they are when using other advertising avenues? In order for social media to be an effective and efficient business tool, there has to be a measurable aspect to the way these are used. In the full version of this work, this discussion will expound on the very aspects introduced in this last paragraph. Problems and Implications of the use of social media for marketing purposes will conclude this discussion.

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# SIMULATING RANDOM LINES

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Key Words: Probability theory, Bertrand paradox, Random lines

## ABSTRACT

We simulated seven methods of generating random chords, and tested the homogeneity of the chords. The results show that randomly generated chords, unlike randomly generated points, are not necessarily uniformly distributed. The distribution of a set of random lines varies with the method of generating the lines. While terms “random points” and “uniformly distributed points” are synonymous and interchangeable, “randomly lines” does not amount to “uniformly distributed lines” at all.

## 1. INTRODUCTION

Let us start with two questions:

“Are randomly generated points between 0 and 1 uniformly distributed (0, 1)?” The answer is obviously: “Yes”.

“Are randomly generated straight lines on a circle uniformly distributed on the circle?” The correct answer is: “Not necessary. It depends on the method generating the lines.”

It is true that “random points” amount to “uniformly distributed points”. But this truth cannot be extended from “points” to “lines”. This is the topic that we are going to discuss in this article.

Random points are homogeneously distributed or uniformly distributed. In Probability Theory, random variable  $X$  is uniformly distributed on an interval, if and only if the density function of  $X$  shows a constant at any point of the interval.

What are uniformly distributed lines? They must homogeneously cover different directions and be homogeneous in terms of “density” of lines. Wang and Jackson defined uniformly distributed lines  $C$  in an area  $A$  as follows, where  $\phi(t, r)$  denotes a circle with central point  $t$  and radius  $r$  [4]:

*Let  $\Delta r$  denote an arbitrarily small but fixed amount. Lines in  $C$  on an area  $A$  are homogeneously distributed if and only if the line-directions are uniformly distributed over range*

$[0^\circ, 180^\circ)$ , and for any two points  $P$  and  $Q$  in  $A$ , probability that a line in  $C$  passes through circle  $\phi(P, \Delta r)$  is same as probability that a line in  $C$  passes through circle  $\phi(Q, \Delta r)$ .

Bertrand paradox [1] challenged the misconceptions among people about random lines: *Drawing a chord at random in a circle, what is the probability that the chord is longer than a side of the inscribed equilateral triangle of the circle?* For this problem that looked to have just one solution, Bertrand provided three different but equally plausible solutions. For convenience, we will use term *Bertrand's paradox* to refer to this paradox, *Bertrand-chords* to represent the chords referred to in Bertrand's paradox, *equil-tri-side* to represent 'a side of the inscribed equilateral triangle of a circle', and *Bertrand's probability* to represent the 'probability a Bertrand-chord is longer than equil-tri-side.' The three solutions and their supporting arguments are as follows:

*Solution-1.* A Bertrand-chord is longer than an equil-tri-side if its midpoint lies within the concentric circle with half the original radius. Since the area of this inner circle is a quarter of that of the original circle, Bertrand-probability is 1/4.

*Solution-2.* A Bertrand-chord is longer than an equil-tri-side if the chord-angle is between  $0^\circ \sim 30^\circ$ , where *chord-angle* refers to the angle between a chord and the radius passing through one endpoint of the chord. Since the range of a possible chord-angle is  $0^\circ \sim 90^\circ$ , Bertrand-probability is 1/3.

*Solution-3.* A Bertrand-chord is longer than equil-tri-side if its midpoint lies on the inner half of the radius bisecting the chord. Hence, Bertrand-probability is 1/2.

Random chords in Bertrand's paradox are random lines in a circle. There are many methods of generating random chords or lines in addition to the three cited in Bertrand's paradox. In this paper, we test homogeneities of sets of "random" lines generated with different methods by simulating those lines in MS Excel, so as to have a better understanding on distributions of random lines related to the methods of generating them.

## 2. A NECESSARY CONDITION FOR HOMOGENEOUS RANDOM CHORDS

Distributions of lines in a two dimensional space have been less explored, and less understood, than the distributions of points. Misconceptions on the distributions of random lines, for example, have caused perplex of Bertrand's paradox for 125 years. Random lines are more complicated than random points. Characteristics of random lines are not simply the extrapolations of random points. Random points are generated on an interval. Random lines are generated in an area. If we choose a circle as the area, as in Bertrand's paradox, then random chords are random lines in a circle.

To tell homogeneity of the distribution of a set of chords, we can use the Bertrand's ratio,  $\frac{1}{2}$ . It has been proved in [4] that random lines generated by the method in Solution-3 for Bertrand's paradox are homogeneously distributed on a circle, and the *Bertrand's probability*, the probability that the chords are longer than a side of the inscribed equilateral triangle of the circle, is  $\frac{1}{2}$  in this circumstance. That is, Bertrand's probability being  $\frac{1}{2}$  is the *necessary* condition for a set of random chords to be homogeneous. But it is *not a sufficient* condition. Thus, we have the following thesis:

**Thesis 1.** If randomly generated chords on a circle are homogeneously distributed, then Bertrand's probability is  $\frac{1}{2}$ .

The following corollary is the contraposition of Thesis 1, which are logically equivalent.

**Corollary 1.** If Bertrand's probability is not  $\frac{1}{2}$  for a set of randomly generated chords on a circle, then those chords are not homogeneously distributed.

By Corollary 1, we can tell whether a set of randomly generated chords are homogeneous by using "Bertrand's probability =  $\frac{1}{2}$ " as the criterion. That is, if Bertrand's probability is not  $\frac{1}{2}$ , then the chords are not homogeneously distributed; if Bertrand's probability is  $\frac{1}{2}$ , then the chords may be, or may not be, homogeneous, since "Bertrand's probability =  $\frac{1}{2}$ " is not the sufficient condition for homogeneously distributed random chords.

### 3. SIMULATING SEVEN METHODS OF GENERATING CHORDS AT RANDOM

We have simulated with MS Excel seven methods of randomly generating chords in a circle and tested their homogeneity by using Bertrand's probability as addressed in Corollary 1. For each method, hundreds of thousands of chords in circle  $\phi((0,0), 1)$ , the circle with center at (0,0) and radius 1, were generated, and their lengths were compared to the side of the inscribed equilateral triangle of the circle. The simulated Bertrand's probability was then approximated by the frequency that chords were longer than a side of the inscribed equilateral triangle (*Bertrand-frequency*). The simulation results are as follows.

#### *Simulation #1.*

Randomly select a point inside the circle, and generate the chord whose middle point is the randomly selected point.

The result of our simulations:

Number of random chords simulated:	204,000
Number of chords > a side of the circle's inscribed equilateral triangle:	51,218
Bertrand-frequency as the approximated Bertrand's probability:	25.107%

This method is one of the three methods in the original Bertrand Paradox. Its Bertrand's probability is reasoned to be  $\frac{1}{4}$ .



*Simulation #2.*

Randomly select a point P on circumference of the circle, and randomly select a number between 0 and 180 as the angle between the chord and the tangent line passing through P.

The result of our simulations:

Number of random chords simulated:	208,000
Number of chords > a side of the circle's inscribed equilateral triangle:	69,726
Bertrand-frequency as the approximated Bertrand's probability:	33.522%

This method is one of the three methods in the original Bertrand Paradox. Its Bertrand probability is reasoned to be 1/3.

*Simulation #3.*

Draw a diameter with a random direction, pick a point randomly on the diameter as the middle point of the chord.

The result of our simulations:

Number of random chords simulated:	205,000
Number of chords > a side of the circle's inscribed equilateral triangle:	102,443
Bertrand-frequency as the approximated Bertrand's probability:	49.972%

This method is one of the three methods in the original Bertrand Paradox. Its Bertrand probability is reasoned to be 1/2. And Wang and Jackson proved that such lines are indeed homogeneous [4].

*Simulation #4.*

Randomly select two points inside the circle, which determine a chord of the circle.

The result of our simulations:

Number of random chords simulated:	210,576
Number of chords > a side of the circle's inscribed equilateral triangle:	157,215
Bertrand-frequency as the approximated Bertrand's probability:	74.6595%

*Simulation #5.*

Randomly select two points on the circumference of the circle, which determine a chord. The method selecting a point  $(x_1, y_1)$  on the circumference is: Select a point randomly between  $-r$  and  $+r$  as the value of  $x_1$ , where  $r$  is the radius of the circle; calculate value of  $y_1$  such as  $y_1 =$  square root of  $(r^2 - x_1^2)$  with randomly selected  $+$  or  $-$  sign. The second point  $(x_2, y_2)$  is selected similarly.

The result of our simulations:

Number of random chords simulated:	215,000
Number of chords > a side of the circle's inscribed equilateral triangle:	78,329
Bertrand-frequency as the approximated Bertrand's probability:	36.43%

*Simulation #6.*

Randomly select two points anywhere in the plane, which determine a straight line passing through the selected two points. If the straight line passes through the pre-located circle, a chord is formed.

The result of our simulations:

Number of random chords simulated:	104,919
Number of chords > a side of the circle's inscribed equilateral triangle:	53,170
Bertrand-frequency as the approximated Bertrand's probability:	50.6772%

#### *Simulation #7.*

Pick a point randomly inside the circle, and pick a number randomly between 0 and 180 as the angle between the chord and a prefixed vertical line.

The result of our simulations:

Number of random chords simulated:	216,779
Number of chords > a side of the circle's inscribed equilateral triangle:	132,245
Bertrand-frequency as the approximated Bertrand's probability:	61.005%

## 4. DISCUSSION AND CONCLUSION

Based on the simulation results and Corollary 1, the following methods do not generate uniformly distributed chords because the simulated Bertrand's probabilities are far away from 0.5:

- Randomly select a point inside the circle, and generate the chord whose middle point is the randomly selected point (Simulation #1, simulated Bertrand's probability = 0.25107);
- Randomly select a point P on circumference of the circle, and randomly select a number between 0 and 180 as the angle between the chord and the tangent line passing through P (Simulation #2, simulated Bertrand's probability = 0.33522 );
- Randomly select two points inside the circle, which determine a chord of the circle (Simulation #4, simulated Bertrand's probability = 0.74660 );
- Randomly select two points on the circumference of the circle, which determine a chord (Simulation #5, simulated Bertrand's probability = 0.36430 );
- Pick a point randomly inside the circle, and pick a number randomly between 0 and 180 as the angle between the chord and a prefixed vertical line (Simulation #7, simulated Bertrand's probability = 0.61005 );

Our simulations did not reject the other two, Simulation #3 and #6, as the methods of generating homogeneous chords, because their Bertrand's probabilities were close to 0.5 in the simulations:

- Draw a diameter with a random direction, and pick a point randomly on the diameter as the middle point of the chord (Simulation #3, simulated Bertrand's probability = 0.49972);
- Randomly select two points anywhere in the plane to determine a straight line; If the line passes through the pre-located circle, a chord is formed (Simulation #6, simulated Bertrand's probability = 0.50677).

Evidences and proofs in addition to simulation results have been developed showing that the above two methods generate homogeneous chords. Wang and Jackson reasoned that the method in Simulation #3 did generate homogeneous chords [4]. Method in Simulation #6 is actually mimicking so-called “tossing broom straws”, which is a hypothetical “natural” way to create true random chords by throwing broom straws to a circle on the floor [2].

Why methods in Simulation #1, #2, #4, #5, and #7 do not generate true homogeneous random chords although they all generate chords “randomly”? In a one dimensional space, if  $X$  represents a random variable whose value is randomly picked between 0 and 1, then  $X$  has the uniform distribution. But a function of  $X$  is not necessarily uniform distributed. For example,  $X^2$  and  $\log X$  is not uniformly distributed [3]. Further operations in a “function” may change the density of random points, therefore distort the pure randomness of  $X$ . Random chords are in a two dimensional space. If a method has restrictions on randomness of point-selection or contains some operations on top of randomly selected points, the method may lose validity of true randomness.

By using Bertrand’s probability, we can tell not only homogeneity of a set of random chords, but also the “density” of the distribution of chords in a circle. If Bertrand-frequency is greater than 0.5, then the density of the chords in the central area of the circle is larger than the area close to the circumference; If Bertrand-frequency is smaller than 0.5, then the density of the chords in the area close to the circumference is higher than that in the central area. So, methods in simulation #4 and #7 generate more chords in the central area of the circle than the area close to the circumference since their Bertrand-frequencies are 74.660% and 61.005% respectively. On the other hand, chords in simulation #1, #2, and #5 have lower density in the central area than the area close to the circumference, since the Bertrand-frequencies are 25.107%, 33.522%, and 36.43% respectively.

It is true to say that randomly generated points are homogeneously distributed in the one dimensional space. But it is false to say that randomly generated lines are homogeneously distributed in the two dimensional space, as shown in our simulations.

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## **Decision Theoretical Analysis of a Sequential Maximal Covering Location Problem**

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### **ABSTRACT**

In this study, we consider a maximal covering location problem where a facility is located to serve some demand points that originate at random locations. We argue that locating this new facility may result in creating additional demand, which will give opportunity for expansion through opening additional facilities in the area. We formulate the problem as a stochastic optimization problem and suggest possible solution strategies. Finally, we discuss possible practical applications of the problem.

# **HUMAN CAPITAL: DOES IT MEDIATE THE RELATIONSHIP BETWEEN ERP BENEFITS AND FIRM PERFORMANCE?**

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## **ABSTRACT**

This study develops and tests a research model that examines the influence of human capital on the relationship between enterprise resource planning (ERP) system benefits and firm performance. The research model developed in this study is tested using survey data drawn from a sample of 44 firms in Mexico. The results indicate that human capital positively influences the relationship between ERP system benefits and firm performance. The findings overall suggest that firms need to first develop their human capital in order to leverage the benefits flowing from an ERP system deployment, rather than just focusing on technical implementation issues.

**Keywords: ERP, Human Capital, Performance**

## **INTRODUCTION**

Firms around the world implement ERP systems to improve their organizational effectiveness. Most firms report that their ERP implementations improved their performance along a series of key indicators such as customer satisfaction and overall competitiveness. However, there are many suboptimal implementations wherein firms did not experience any significant improvement on such indicators. In fact, there have near failures of firms reporting negative performance from their ERP deployments [9] [3]. Examples of such success and near failure implementations are common in Latin America. The Mexican company, Grupo Posadas ® is a

success story, as nine years after the implementation of an ERP system the firms' managers reported improvements in key business figures [15]. The, Argentinean firm: Banco Columbia ®, in contrast had a suboptimal implementation. This firm deployed an ERP system in order to improve business flexibility and reduce costs, but its performance dipped and the firm ended up firing the executives who were in charge of the implementation [10].

In the above discussion, a conventional academic and practitioner view is that the relationship between ERP system benefits and firm performance is a direct one. That is, as ERP benefits increase so does performance. Despite the apparent soundness of this logic, a closer examination of this relationship reveals that such might not actually be the case, as a variety of factors could mediate the translation of ERP benefits into improvements in organizational performance. In this study, we suggest that human capital could potentially be one such mediating factor.

Human capital is defined as the tacit knowledge embedded in the minds of a firm's employees [1]. The individual expertise associated with human capital may or may not stay within organizations because it is a property of the individual and thus it depends on the hiring, mobility, and turnover of employees [20]. Human capital could mediate the effects of ERP benefits on organizational performance, as the employees first benefit from the ERP system in the form of better information accessibility and usability, and then they leverage such benefits and translate them into actions that improve an organization's performance (e.g. using real-time quality information to deliver a high quality customer service). As Cohen and Levinthal [4] argue: employees need to understand new information before they can use it for commercially viable purposes.

In this study, we examine the relationship between the benefits brought about by the implementation of an ERP system and organizational performance. Current research tends to focus more on the benefits that firms derive from deploying an ERP system and does not move beyond that to tie such benefits to organizational performance; i.e. such benefits are taken for granted as resulting in organizational performance. In this study, we intend to move this research stream forward and try to open the benefits to performance "black box" and show that human capital plays a significant role in this relationship. In other words, we suggest that the benefits from an ERP system have a positive influence on specific human factors that, in turn, translate such benefits into organizational performance.

The layout of the rest of the paper is as follows. First, we present the study's background and hypotheses. Next, we describe the research methods and results. Lastly, we discuss our findings and draw conclusions.

## **BACKGROUND AND HYPOTHESIS**

ERPs are integrated systems that link intra and inter-firm functions to provide seamless information flows across the supply chain [5]. An ERP system integrates a firm's databases into

a unified platform that employees across different functional areas and supply chain partners can access. Key features of the ERP system include sharing of the same data definition across modules through the use of a data dictionary, maintenance of a single set of data across business processes, and quick information retrieval, accessibility, and availability. The leveraging of these has the potential to help a firm improve its level of effectiveness in key performance areas. Additionally, deployment of an ERP system infuses a firm's employees with a new sense of organizational integration thus enabling them to adopt an enterprise-wide perspective [5] [18]. Among the operational and organizational areas that benefit the most from the implementation of an ERP one can count inventory management, on-time delivery, customer satisfaction, information quality and availability, user satisfaction, and market share [13] [22].

In turn, the improvements brought about by an ERP can positively affect a firm's overall performance. Organizational performance is a multi-dimensional construct comprising such areas as return on investment, profitability, sales growth and customer loyalty [2]. Performance indicators such as profitability and return on investment depend on a firm's cost control effectiveness. If an ERP system helps a firm improve its inventory management and on-time delivery, it can help the firm improve its return on assets (ROA), return on investment (ROI), and return on equity (ROE), which are profitability and return on investment indicators that reflect a firm's costs reductions efforts. Moreover, the improved customer satisfaction and on-time delivery brought about by an ERP system deployment may boost a firm's sales growth and customer loyalty, hence boosting its overall performance. A synthesis of the above discussion suggests that:

*Hypothesis 1. There is a positive association between an ERP benefits and firm performance.*

ERP system benefits could have a direct impact on a firm's human capital. ERP benefits such as increased information quality and information availability have the potential to improve employee skills and motivate them to do a better job. When employees have real-time access to high quality information, they can make sense and understand the information that they handle in a more appropriate and timely way [13] [14]. Under such user and system friendly circumstances, employees become more precise and knowledgeable in their work, and hence become more skillful, thereby raising their level of human capital. Also, as an ERP system improves user (or employee) satisfaction, it can boost a firm's human capital level by exerting a positive influence on people's motivation to perform a high quality job [19] [21]. After all, past research [e.g. 12] suggests that satisfied employees are also likely to be productive ones. A synthesis of the above discussion suggests that:

*Hypothesis 2. There is a positive association between an ERP benefits and a firm's level of human capital.*

In addition to the discussion that precedes Hypothesis 1 on direct effects, we believe that ERP system benefits may translate into organizational performance improvements indirectly through their effects on a firms' human capital level. As stated earlier, the improved information quality

and availability resulting from the implementation of an ERP can make individuals more skilful at their jobs. Employees, therefore, can perform activities such as better management of inventory, ensuring on-time delivery, and so on with more precision and effectiveness than before the ERP system implementation. The above activities have the potential to reduce costs and hence improve such performance indicators as profitability and return on investment; i.e. we suggest that human capital bridges the potential benefits of an ERP to a firms' overall performance indicators. A synthesis of the above discussion suggests that:

*Hypothesis 3. A firm's level of human capital mediates the association between an ERP benefits and firm performance in such a way that when human capital is accounted for a positive relationship between ERP benefits and firm performance becomes weaker and non-significant.*

## **RESEARCH METHODS**

### **Data and Sample**

The data collection instrument was primarily developed from a synthesis of ERP system as well as other relevant research considered pertinent to this study's objectives. The questionnaire development involved a two-step process. First, the questionnaire was submitted to a focus group consisting of academicians acknowledged as experts in the areas of survey methodologies and ERP system research. The inputs from the focus group of academicians led to the addition and deletion as well as the restructuring of certain items in the questionnaire. The questionnaire was then submitted for review to a focus group of practitioners. Modifications and changes were made to specific questionnaire items as a result of inputs from this focus group. The questionnaire was translated from English to Mexican Spanish and back (to make sure that nothing has gotten lost in the translation process) using expert translators. Dillman's [7] [8] time design method (TDM) and tailored design methods for constructing the questionnaire were followed to the extent possible.

Data were obtained using mail survey procedures. In general, Dillman's [7] [8] time design method (TDM) and tailored design methods for mail surveys were followed to the text possible. We mailed the surveys to a sample of 350 companies in Mexico that belong to an industry-wide organization of manufacturing companies. The survey is still in progress but to date we have received 44 responses back. We are still in the first wave of our survey procedure, so we have a preliminary response rate of approximately 13%. We believe the response rate would improve after we send out the second wave of surveys. The responses we have obtained so far have predominantly come in from large firms (using sales figures as criteria).

At each company, the survey respondents were, for the most part, middle and high level managers who supervised their company's information systems, and hence can be considered knowledgeable about their firm's ERP system implementation besides having a broad perspective on overall firm activities. Respondents had an average of 11.4 years of general



working experience, and an average of 5.8 years of working experience in their respective organizations. The respondents belonged, mostly, to the Information Systems (IS) department.

### Operationalization of Variables

*ERP Benefits.* A synthesis of different types of methodological studies – descriptive, case, survey – yielded ten benefit measures commonly cited by researchers as used to evaluate the performance benefits of ERP systems [16] [14] [11]. The ten changes in performance measures identified are: information availability, information quality, inventory management, standardization, on-time delivery, profitability, return on investment, user satisfaction, customer satisfaction, and competitive advantage. Each of the ten performance measures in this study formed an item to collect information on the changes in benefits attributed to ERP system implementations. The data for each of the ten performance measures were obtained using a 7-point Likert type scale ranging from 1 (disagree) to 7 (agree).

*Human capital.* We measured this variable using Subramaniam and Youndt [20] 7-point Likert type scale ranging from 1 (disagree) to 7 (agree). The scale comprises five items. The sentence “Our employees are widely considered the best in our industry” is an example of one of this scale’s items.

*Firm performance.* We measured this variable using Schreiner, Kale and Corsten’s [17] four-item perceived firm performance scale. The scale items ask respondents to rate how their companies performed relative to their direct competitors during the last three years in terms of four key indicators: sales growth, profitability, return on investment, and customer loyalty. This is a 7-point Likert type scale ranging from 1 (much worse than the competition) to 7 (much better than the competition).

## ANALYSIS AND RESULTS

Table 1 shows the measuring scales’ reliability estimates. As observed, all the alpha coefficients are above the 0.80 threshold, indicating an appropriate degree of internal consistency.

**TABLE 1**

### Descriptive Statistics and Bivariate Correlations

Variables	Mean	St. Dev.	$\alpha$	1	2
1 Firm performance	5.865	0.885	0.950		
2 ERP benefits	5.793	1.102	0.848	0.322 *	
3 Human capital	5.879	0.831	0.888	0.539 ***	0.324 *

\*\*\* =  $p < 0.001$ ; \*\* =  $p < 0.01$ ; \* =  $p < 0.05$ ; † =  $p < 0.10$

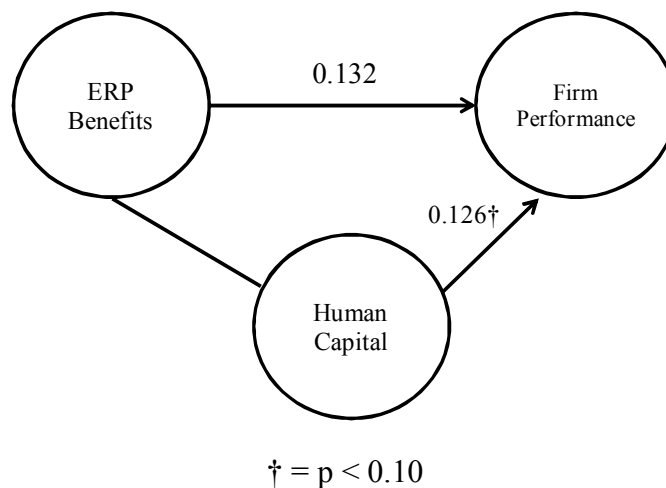
Table 1 also shows descriptive statistics and bivariate correlations. In this table, we observe that firm performance and ERP benefits have a positive and significant association. This evidence supports Hypothesis 1, which indicates that there is a positive relationship between both variables. A simple regression analysis supports this finding ( $\beta = 0.259, p < 0.05$ ).

Hypothesis 2 suggests that an ERP system's benefits and a firm's level of human capital have a positive association. Table 1 indicates that there is a significant correlation between both variables, hence providing support for this hypothesis. A simple regression analysis also supports this finding ( $\beta = 0.574, p < 0.001$ ).

In order to dig deeper into the observed relationships and to test Hypothesis 3 we performed a Sobel test of statistical mediation. Congruent with the simple regression analysis performed to test Hypothesis 1, the test indicates that the total effect of ERP benefits on firm performance is positive and significant ( $\beta = 0.259, p < 0.05$ ). It also indicates that when the total effect is decomposed, the indirect effect is marginally significant ( $\beta = 0.126, p < 0.10$ ) and the direct effect is non-significant ( $\beta = 0.132, p > 0.10$ ). Notably, the indirect effect coefficient is almost as large as the direct effect one, as the ratio of indirect to direct effect is 95%. Because the proportion of the total effect that is mediated is 48%, almost half of the total effect detected in the relationship between ERP benefits and firm performance is mediated by human capital. However, because the Sobel test itself is marginally significant ( $z = 1.858, p < 0.10$ ), this evidence provides only partial support for Hypothesis 3. Figure 1 shows pictorially the result of the mediation analysis.

**FIGURE 1**

**Mediated Relationship between ERP Benefits and Firm Performance**



## DISCUSSION AND CONCLUSION

The implementation of an ERP system results in several operational and organizational benefits to a firm. In the past two decades or so, more and more firms around the world have implemented these systems in order to improve their efficiency, effectiveness, and ultimately their competitiveness. Inherent in this thinking is a common belief that the benefits of an ERP translate directly into improvements in firm performance. In this study, we investigated these benefits to performance relationship and tried to find evidence that such an association may be mediated by human capital. We chose to specifically examine human capital as a mediating factor as the information benefits from an ERP system have to be first understood and absorbed by a firm's employees before they are reflected in overall performance improvements.

In general, our findings confirm as well as expand current knowledge on this topic area. We found evidence that the benefits of an ERP have a positive impact on firm performance. However, we also found that about half of this effect is due to the influence of ERP benefits on human capital, which in turn influences positively firm performance. These findings are revealing, as they are at odds with the current thinking suggesting that an ERP implementation by itself has a bearing on a firm's effectiveness. Because we found that only the indirect effect was marginally significant, we have evidence to suggest that if an ERP system's benefits are to influence a variety of key performance indicators, firms have to first increase their level of human capital. Once a firm's employees augment their knowledge and capabilities based on the benefits brought by an ERP system deployment, they will leverage these to carry out value adding activities that have the potential to improve firm performance.

This study has some limitations. On the theory side, although the effect of an ERP system benefits on firm performance could be mediated by several factors, we only explored one of the factors in depth, namely: human capital. We believe that theoretically there might be several knowledge-related variables such as absorptive capacity, dominant logic, and intellectual capital that could also mediate such effects. For instance, it may be that when a firm's absorptive capacity (i.e. the ability to see the value, assimilate, and use a certain knowledge for commercially viable purposes) is low, a firm's human capital might underutilize the benefits of an ERP system. Pursuing such a line of thinking, then absorptive capacity, or other factors, could be tested as better mediators of the association between an ERP benefits and firm performance. Another limitation of this study is the small sample size that limits the statistical power of the tests. Remarkably, these limitations provide opportunities for future research in this area, with larger sample sizes and with more powerful statistical tests.

In the end, an ERP system is an expensive but promising investment for firms that could help them to improve their performance. However, given that this effect is likely to be mediated by a variety of factors, firms should pay attention to factors such as human capital that are first influenced by the benefits flowing from an ERP system deployment, and in turn is leveraged and translated as improvements in a variety of key performance indicators. We believe that this study helps us better understand the potential performance improvements of an ERP implementation and provides opportunities to stimulate future research in exploring this topic area.

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**Exploring the Leadership Continuum: The Relevance of Transformational Leadership  
on Organizational Performance**

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## **ABSTRACT**

The world is changing, and at an unprecedented pace. Due in large part to the globalization of markets and production, the complexities of managing and leading in a world economy has precipitated changes to the way strategies are developed and the way leaders lead. Customers expect more, shareholders demand more and employees want more. The nature of leadership is evolving to be able to respond to such expectations and manage to the greatest good of all key stakeholders. Never has there been more research and analysis on effective leadership attributes with a focus on managing through change, creating competitive advantage in a global marketplace and winning on the world stage. Adaptation is the key to success in the global context. Being able to anticipate change, demonstrate flexibility in strategic positioning and develop resiliency to manage through such change is cornerstone to a successful global presence. Transformational leadership is a model of change that has the potential to benefit all key stakeholders of an organization.

## SECTION 1: INTRODUCTION

### **Purpose of the Paper**

The purpose of this paper is to investigate leadership strategy from a continuum perspective with a focus on transformational leadership and the influence it can have on organizational performance and decision-making. This paper examines the body of research on leadership theory with a specific focus on transformational leadership and the opportunity it presents to positively impact all key stakeholders in an organization. It provides a broad overview of leadership theory evolution and investigates the leadership continuum with an analysis of controversies surrounding transformational leadership. After validating the opportunities presented through transformational leadership, the paper will conclude with implications of leadership choice and decision-making on organizational performance.

Largely based on primary research, available targeted survey data and other meta-analysis of secondary data, this paper will demonstrate that transformational leadership does in fact create opportunity to benefit customers, employees and shareholders. And thus it is a viable strategy to sustain competitive advantage in a global marketplace.

### **Context of the Topic**

Scholars and researchers have amassed volumes of information on management and leadership, but have yet to formulate a unified theory that integrates both the technical and human aspects of leadership. What has evolved are a multitude of scientific and behavioral theoretical approaches that attempt to provide a framework for understanding and evaluating leadership and assessing effectiveness in the context of overall organizational performance.

In a chronicle of the evolution of leadership by Daryl Green (2007), the correlation of leadership adaptation to economic factors and changing needs of followers is pronounced. The classical school of management was born out of the Industrial Revolution, and the shifting of jobs from rural to urban. The need to systematically manage, administer and formalize work structures provided the basis for modern leadership thought.

A global depression, coupled with technology advances and a pressing need to integrate a human element in leadership thinking helped fuel the development of the behavioral school of management in the 1930s. In the ongoing quest for refinement, a more qualitative approach was advanced in the 1940s that focused on a more methodical and scientific approach to decision-making. From there a systems approach emerged (1950s) that looked at the interconnectedness of inputs and outputs on organizational



effectiveness and the impact of the environment on management decision-making. The 1960s was a time of social change and human rights movements which required a unique approach to management – from which the contingency school evolved. According to Burns (1978),

Leadership over human beings is exercised when persons with certain motives and purposes mobilize, in competition or conflict with others, institutional, political, psychological, and other resources so as to arouse, engage, and satisfy the motives of followers...in order to realize goals mutually held by both leaders and followers (p.18).

Leadership theories have rapidly advanced since the early part of the 20th century.

Transformational leadership and the continuum of leadership theories are a blend of the schools that took root and over the years have flourished, and build upon the need to compel the follower to a greater cause to elevate personal and thus organizational performance.

## **SECTION 2: WHAT IS TRANSFORMATIONAL LEADERSHIP AND HOW DOES IT FIT IN MODERN LEADERSHIP THEORY?**

Transformational leadership is a model of change. Leadership can make a difference in motivation, in performance and in results. And thus understanding the effectiveness of different leadership styles can create opportunity in a global marketplace.

**Clearly the leader who commands compelling causes  
has an extraordinary potential influence over followers.**

James Burns

Transformational leadership theory gained global attention through the 1980s and 1990s with more research focus than any of the other leadership theories combined (Judge and Bono, 2000). The evolution of Transformational Leadership dates back to James McGregor Burns' and his Pulitzer Prize winning book *Leadership* (1978), where he conceptualized leadership as either transactional or transformational (Bass, 2006, p.3). He defines leadership as 'leaders inducing followers to act for certain goals that represent the values and the motivations – the wants and needs, the aspirations and expectations – of both leaders and followers.'

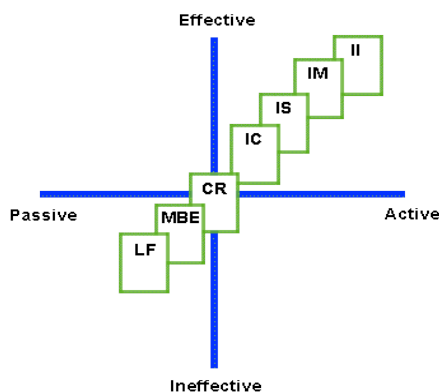
According to Burns (1978), transactional leadership occurs ‘when one person takes the initiative in making contact with others for the purpose of exchange of value’ (p. 19). ‘Whereas transformational leadership occurs when one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality’ (p.20). He saw the leadership styles as mutually exclusive. Transactional leaders appeal to the personal interests of followers (directly through contingent reward), whereas transformational leadership appeals to both leaders and followers at a higher level of consciousness. Bernard Bass, a disciple of Burns and a Distinguished Professor Emeritus of Management and Director of the Center for Leadership Studies at SUNY Binghamton (Bass & Avolio, 1994) further developed Burns’ transformational leadership theory, and countered that transformational and transactional leadership are not on opposite ends of the leadership continuum. Rather, transformational is an expansion of transactional and that good leaders exhibit both components of leadership. Effective leadership implies the flexibility to manage to the situation as both approaches are relevant in certain circumstances.

Transactional leadership relies on contingent rewards to motivate behaviors with an emphasis on compliance, end result accomplishment and a level of centralized control (Bass, 1997). Followers are told what, when, how and where to do activities. Essentially if you do what is requested, you will get something – an exchange of value between parties. This exchange of value can take many forms - from financial, to political to social. And there is a clear understanding of who has the power and where the relationship starts and stops. Transactional leadership is necessary at times to accomplish organizational goals. However, when used exclusively, it can have negative repercussions on organizational performance.

Transformational leadership adds more to the transactional exchange by way of commitment, motivation and involvement. It reaches beyond the mere transaction between a follower and leader, and thus elevates leadership to a different level. It involves inspiration, vision, challenge, innovation, mentoring and support and has many common elements with charismatic leadership. Bass suggests that charisma is only part of transformational leadership (2006, p. 5) and clearly differentiates between authentic transformational leadership. Burns indicates that transformational leadership occurs when the individuals involved “raise one another to higher levels of motivation and morality” (1978, p. 20).

### **How Does Transformational Leadership Fit in Modern Leadership Theory?**

The Full Range Leadership Model (FRL model) is a compelling visual of over 100 years of leadership research (Barbuto, 1997). It provides an illustration of the full leadership continuum moving from sub-models within transactional leadership to the four components that have come to define transformational leadership. To understand the FRL model is to understand how transformational leadership fits in modern leadership theory. Quadrants are defined along a continuum of active and passive, and effective and ineffective and are based on years of research in the management and leadership arena. And Bass contends that every leader exhibits each spectrum of behavior at some point and time. However, frequency of behavior is the leading indicator of effectiveness and performance excellence (Bass & Riggio, 2006).



### **The model of the Full Range of Leadership**

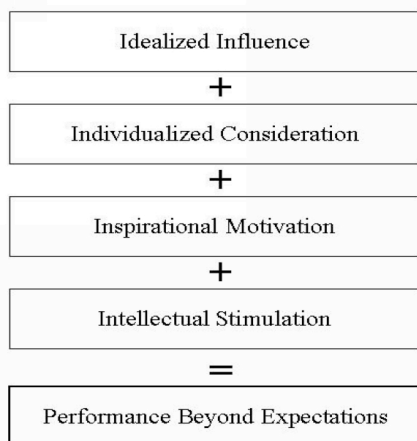
In looking at the lower left quadrant, laissez-faire (LF) behavior is defined by Bass (2006) as non leadership – both passive and ineffective. It is non-transactional and can involve avoidance and procrastination. Management-by-Exception (MBE) is a transactional form of leadership and has been studied from both an active and passive perspective. It entails taking corrective action when standards are not met and focuses on negative outcomes. Active means the leader is looking for mistakes or errors while passive infers corrective action is taken when issues are brought forward. Although more effective than non management, this leadership approach is deemed ineffective in virtually all studies reviewed. The exception might be where safety is a concern. Contingent rewards (CR) is essentially outlining what needs to be done and what the reward is at the end. It is proven to enhance performance and results when the follower sees the reward worth the effort to obtain.

Moving up the continuum into the upper right quadrant where leadership is assessed as active and effective are the four components of transformational leadership. Individualized Consideration (IC)

focuses on coaching and mentorship with the employees’ best interest at heart. Compassion, genuine caring, valuing individuality, personalizing the working relationship, delegation and active listening would be characteristics exemplified. Intellectual Stimulation (IS) describes managers who spark innovation, creativity and encourage the questioning of status quo. New perspectives and thinking outside the box are valued. Inspirational Motivation (IM) involves providing a compelling vision (which can include revenue and profit goals) that engages the masses to perform and aspire to excellence. And lastly, idealized influence (IF) exemplifies leadership that walks the talk, role models and is trusted and respected by followers (Steidlmeir & Bass, 1998).

Transformational leadership at its core then is a combination of each of the four components in the upper right quadrant, used regularly to build on contingent rewards. Leaders are charismatic and followers respect them to the point of trying to emulate their behavior. Followers understand and believe in the vision and are compelled to do ‘more’ to because they are getting the support, direction and mentorship to succeed. They are offered challenge, encouraged to be imaginative and empowered to make a difference – which is then rewarded. From an organizational perspective, research suggests that under these conditions followers are more satisfied, more productive and willing to do more towards the success of the organization (Bass & Avolio, 1994).

‘Performance beyond expectations’ can be achieved with effective transformational leadership. It requires active utilization of the four components of the transformational process and is described by Northouse (2007) as the ‘additive’ effect of transformational leadership. He completed research on 39 studies of transformational literature, and validated that leaders who exhibit transformational leadership behaviors delivered differentiated work outcomes (2007).



**Additive effect of transformational leadership**

### **Assessing Leadership Competency**

Based on extensive research, Tichy and Devana (1986) describe the qualities of transformational leadership as the following:

- i) ability to act as an agent of change
- ii) having the courage to assume calculated risk
- iii) transparency and sincerity with followers
- iv) values driven approach to decision making
- v) commitment to lifelong learning
- vi) adaptability to manage the change necessary to deliver on a vision for the future.

Although there is general concurrence with these qualities, measurement and assessment is a source of continued research and debate. And it is only with effective assessment tools that active development plans can be supported.

The Multifactor Leadership Questionnaire (MFQ), developed by Bernard Bass in 1985, is one of the most widely used and recognized leadership assessment tools. Aligned to the Full Range of Leadership Model (FLM), the MFQ has evolved to factor in 36 standardized items, 4 assessing each of the 9 leadership dimensions with a more detailed leadership development format also available (Bass & Riggio, 2006, p. 21). It has been tested for reliability and meta-analysis has validated the correlation between transformational leadership (as measured by MFQ) and leadership effectiveness.

### **Strategic Management and the Psychology of Strategic Management**

Strategic management, the discipline of providing organizational direction through strategy formulation and strategy implementation, is rooted in early work of pioneers such as Alfred Chandler and Peter Drucker and date back to the middle of the 20<sup>th</sup> century. Chandler postulated on organizational integration and long-term strategy focus with his legacy being 'structure follows strategy' (Chandler, 1962). Drucker was influential in advancing thinking on intellectual capital, knowledge workers and management by objectives (Drucker, 1974). This early work, coupled with many other strategists and theorists, formed the basis for understanding and formalizing strategic planning and created the foundation of modern leadership theory.

A few key consistent themes continue to resonate through the decades and through the research which include:

- 1) the importance of adaptation skills

- 2) the dynamics of the global landscape requires flexibility to remain competitive
- 3) strategic management provides organizational direction
- 4) strategic management involves both an economic and a sociological application thus requires a multi-pronged planning approach.

The need for a multi-pronged approach lends itself to the seminal management work of Tom Peters and Robert H. Waterman Jr. In *In Search of Excellence* (1982), which is still one of the most widely read business books ever. With a focus on people, customers, and action, they posited 8 themes that have come to be understood as differentiators of excellence in the corporate world. Their work was instrumental in proving how critical people are to business success. And it came at a time when the Western world was trying to figure out how to compete globally, especially against the fiercely competitive Japanese enterprises.

With the linkage of people to organizational success there came a heightened need to understand both intrinsic and extrinsic motivators of work performance. Significant research has been conducted on the psychological aspects of strategic management in an attempt to better understand, and thus be able to impact the quality of decision-making and ultimately the outcomes that are tied to executing with excellence.

Chester Barnard, through his work on *Functions of the Executive* (1934), is credited with developing the 'systems' approach to organizational structure and aligning a clear focus on both the efficiency and effectiveness of individuals. He is known for masterminding the acceptance theory of management which essentially says that management authority is limited to what employees allow them to have. It was also through his work that context was put to the executive decision-making process and that 'situational' factors came into play (Barnard, 1938). The theory of the 'art' of management (versus the science of management) made way for more research and analysis.

Henry Mintzberg, in the late 1980s, felt compelled to critique current thinking on strategic leadership based on the dynamics of the process. He reengineered traditional thought from a singular strategic plan to 5 broad types of strategic plans (Mintzberg, 1996) and later evolved that to 10 'schools of thought' on management strategy. From a decision-making perspective, Mintzberg observed that the ad hoc nature of this managerial duty is precipitated by the uncertainty of their environment. Thus there is more complexity to the decision-making process than original research would suggest.

The implications of this early strategic management thinking are far reaching. Principles that help put meaning to management are timeless, while the models that examine those principles continue to evolve. As measurement tools become more streamlined and qualities attributed to effectiveness better understood, increasingly more models are put forward in an attempt to explain and rationalize the characteristics of success.

Moving from strategic management and towards leadership effectiveness, attempts to understand and capture the essence of leadership date back to the early work of Max Weber (1947) and his description of leadership along three lines: bureaucratic, traditional and charismatic. The ability to charm, develop, and influence commitment defines a charismatic leader. Weber viewed transformational leaders as charismatic and postulated that charisma was best described by personal qualities and attributes. ‘Idealized influence,’ a component of transformational leadership, has come to represent charisma. Weber proved that leadership is more than a simple social exchange between two individuals. But his philosophy has since been deemed to be limiting (Bass & Riggio, 2006, p. 5). And it is this ‘dark’ side of charisma that has ethicists questioning the moral integrity of an ‘impression’ approach to leadership.

As can be expected, every theory has its proponents and advocates. Clearly the evolution of thought on strategic management through to leadership effectiveness involves many disciplines, much research, differing perspectives and much academic debate. Transformational leadership brings together psychological elements of management with behavioral components of leadership to deliver an approach that focuses on inspiring action for the greater good of all stakeholders. But does it deliver?

## **THE CONTROVERSIES OF TRANSFORMATIONAL LEADERSHIP**

### **Organizational Effectiveness**

Organizations are diverse. From the industries they represent, to the demands of sometimes conflicting stakeholders, to the imbedded culture that underpins the day-to-day operations, developing the skill to effectively navigate the changing landscape while keeping employees motivated to continue to deliver more is the challenge of our time. The linkage of leadership effectiveness to organizational effectiveness has been well documented. ‘Transformational leadership is expected to contribute to an organization’s efforts to improve its operations and the best use of its human resources’ (Bass & Avolio, 1994, p. 6).

Northouse (2007) defined leadership as a process whereby one individual influences a group of individuals to achieve a common goal. This influence, to be effective, needs to be initiated in a positive

way that instils trust, confidence and respect in order to truly transform the organizational and contribute to increased effectiveness.

One of the prevailing criticisms of transformational leadership is that it may be ‘antithetical to the philosophy and principles of the Organizational Development Movement which espouses shared values, equality, power sharing, consensus and participative decision-making’ (Bass, 1997, p. 7).

The criticism builds on the contention that by the very nature of transformational leadership, organizational goals and values become indoctrinated as the individual goals and values of followers. Values centered on productivity and organizational success replace core humanistic values and could entice followers to be more concerned about the organization than their own needs. Bass counters that true transformational leadership, is about balancing the interests of all stakeholders, not taking from one to deliver to another.

Along the leadership continuum, transactional leadership, and contingent rewards, without the vision, inspiration, motivation, challenge and role modeling can be a source of stress, conflicting priorities and even burnout. Autocratic leadership, governed by repercussions for non-performance, in the absence of any other offsetting morally uplifting leadership, poses significant threat to organisational performance in the long-term.

Transformational leadership and organizational performance have been researched in a number of industries, environments and settings over the course of the past 20 years and the conclusion of this encompassing work is that there is a positive correlation between leadership effectiveness and organizational success. An organizational vision from a transformational leader can elevate team performance and team cohesiveness while building upon individual capability. It can help followers contribute more actively to group outcomes by fostering sharing, creativity and challenge. ‘Building on follower trust and promoting follower self-esteem and self-efficacy creates more satisfied followers, generally’ (Bass, 2006, p. 46). Employee commitment, loyalty and satisfaction are foundational to strong organizational performance. And a measure of organizational performance is long term market share and customer retention and satisfaction. So in understanding the implications of transformational leadership on organizational effectiveness one must understand what it does to add value to the key stakeholders. And when authentic the results are far superior than under any other leadership style.

Leveraging Royal Bank of Canada’s enterprise wide Employee Opinion Survey, (recapped in Appendix 1), and specifically themes considered correlated with transformational leadership (bolded and



italicized) validates the contention that employee satisfaction is a leading indicator of customer satisfaction which is a leading indicator of organizational performance. There is compelling evidence that understanding the organizational vision, being able to find congruence with personal values, and fostering an environment where employees feel significant, confident, connected and supported drives organizational performance. RBC is truly a transforming organization. And they continue to raise the bar in terms of financial performance. It is only through transformational leadership they are able to rally 60,000 employees to make a difference to clients and deliver on the vision of ‘always earning the right to be our customers’ first choice.’ In year over year comparisons, even the verbiage being used to appeal to the ‘masses’ is evolving. As an example, RBC speaks to ‘enabling’ performance as opposed to ‘managing’ performance.

According to Bass and Riggio (2006) transformational leadership results in increased trust, higher levels of performance towards organizational goals and follower motivation to perform at a higher level.

### **Decision-Making**

Bass and Avolio (1994) capture a compelling illustration of the considerations that encompass organizational decision-making from a transactional and transformational perspective. A recap is provided.

#### **Bass and Avolio Decision-Making Considerations – Transactional and Transformational**

<b>Decision-Making Considerations</b>	<b>Transactional</b>	<b>Transformational</b>
<b>Behavioral Tendancy</b>	Responsive – manage issues as brought forward or from a needs based perspective	Proactive – anticipate problems with time to formulate action and response.
<b>Adaptability</b>	More rigid – one dimensional approach to managing problems	More flexible – can multi-task
<b>Reaction Time</b>	Slower	Quicker
<b>Risk Orientation</b>	More Conservative	More Aggressive in Approach
<b>Time Horizon Orientation</b>	More present day and short term focus	More futuristic and longer-term focus
<b>Innovation</b>	In the box thinking	Out of the box thinking
<b>Strategic view</b>	Narrow focus	Looks beyond the confines of

		the organization overall and considers external variables
<b>Support in decision making</b>	Follows the book	Reaches beyond the 'books' to make informed decisions
<b>Communciation</b>	Downward flow of information	'walk around management' – lead by example
<b>Risk Tolerance</b>	Conservative – low risk low reward	Moderate – higher reward for higher risk

The divergence of thinking and actions on the leadership continuum fundamentally changes the nature of decision-making. Transactional leaders manage to contingent rewards and are generally satisfied with status quo. They are not encouraged to challenge current state and thus can get caught in the traditional way of doing things. This can hamper calculated entrepreneurial risk. A purely transactional approach to processing decisions does result in different outcomes. Leadership style has an impact on decision-making.

An organization that asks followers to think outside the box, requires innovation to foster creativity and that pushes status quo creates a different decision-making environment. The four components of transformational leadership, as defined by Bass – idealized influence, inspirational motivation, intellectual stimulation and individualized consideration – have impact on the culture of the organization and the behaviour of followers (Bass & Avolio, 1994).

Transformational leadership builds upon trust, commitment and loyalty and thus is self-fulfilling, self-propelling and highly intuitive. Through delegation, empowerment and trust is transfused from leader to follower and allows for both individual and organizational development. Transformational leadership can be top-down, bottom-up, direct, indirect and horizontal. The point is, transformational leaders transform the organization at all levels and in all directions.

Decision making is important for team building and development. This level of involvement can be empowering for team members and can encourage greater participation, involvement and engagement which translate into improved productivity.

## The Ethical Debate

Transformational leadership has been criticized for its reliance on impression management, its lack of checks and balances of countervailing interests, influences and power to avoid dictatorship and oppression of a minority by a majority and as being antithetical to teamwork, collaboration and shared leadership (Bass, 1997).

According to Bass,

Leaders are truly transformational when they increase awareness of what is right, good, important and beautiful, when they help to elevate followers' needs for achievement and self-actualization, when they foster in followers higher moral maturity, and then they move followers to go beyond their self interest for the good of their group, organization, or society (p.3).

There is concern by critics that transformational leadership, by the nature of it being behavioural, appeals to rhetoric instead of reason and because of that has the power to negatively influence thinking and ultimately actions. There is a distinction between authentic transformational leadership and pseudotransformational that needs to be drawn (Bass, 1997). One is ethical and the other is not. Pseudotransformational leadership is personified by the abuse of power that comes with having influence over the actions of followers that might be in conflict with collective interests. Power can be a source of good or a source of evil – depending on how it is leveraged. When in the hands of a leader with narcissistic tendencies, with a singular vision, or a willingness to put organizational goals ahead of individual then Bass would argue this is in fact not transformational leadership.

The transformational leadership component 'inspirational motivation' is the subject of criticism as it suggests followers are encouraged to set aside their own interests for the greater good of the group. There is the potential to give up more than they could possibly gain in the process. Truly transformational leaders inspire followers through a shared vision to achieve more than they thought possible by encouraging creativity and innovation and challenging followers through coaching and mentorship to be the best they can be. It is not about sacrificing self-interest for the common good.

Impression management deals with the ability to impact and influence based on sharing information. Knowledge is power and what is shared can have profound impact on how it is interpreted by followers. It is evidenced everyday in advertising and media releases. Bass argues that trust is at the heart of

transformational leadership. Leaders who succumb to ‘amoral puffery’ risk losing credibility with followers (Bass, 1997, p.5). And without credibility there can be no transformation.

Transformational leadership is conceivable because of the sharing of a common vision and sufficient empowerment and positive enforcement to encourage followers to be advocates. It is based on seeking out a win-win where possible, but resorting to transactional skills when required to break gridlock and maintain cohesion.

As outlined in Appendix 2, moral elements based on leadership characteristic have been studied at length to understand implications for authentic or inauthentic leadership (Bass & Avolio, 2006, p. 15). The critics of transformational leadership argue power is used against the collective good. Proponents argue that if that is the outcome, then it cannot be defined as transformational leadership.

### **SECTION 3: CONCLUSION**

#### **Summary**

Ongoing research continues to validate the effectiveness of transformational leadership over others on the Full Range of Leadership model. Leadership effectiveness is directly correlated to organizational performance. And the benefits of empowering employees to do more, be more and give more provide testament to the power of authentic transformational leadership. It focuses on behaviours that inspire and develop others and has stood the test of time in terms of a model that is adaptable to the rapidly changing global landscape, the changing needs of customers, and the ever evolving expectations of a dynamic and diverse workforce. Transformational leadership is about a range of behaviours that include: inspirational vision of the future for an organization and its followers; helping every follower to be the best they can be; a genuine interest and motivation to foster growth, innovation and development throughout the organization; adaptations skills to meet the needs of key stakeholders while also instilling a collaborative mindset with and between both followers and leaders; and lastly, understanding and demonstrating that transformational leadership is not dictated from the top but rather to be truly effective is practiced and developed at all levels of the organization.

Understanding this range of behaviours helps to correlate leadership effectiveness to organizational performance, helps to validate decision-making strategy and also counters the ethical debate sparked by a leadership style deemed to be ‘impressionist’ and amoral by critics.

## Opinion

In reflection, transformational leadership does present the promise of positively impacting all three stakeholders. Employees are empowered to do more and thus deliver more, which directly benefits shareholders. Employee satisfaction is a leading indicator of client satisfaction so a model that appeals to the employee will impact client loyalty and provide enhanced organizational performance. However, the reality is also that transformational leadership requires more energy, thought and deliberate actions on the part of the leader to be effective. It can drive followers to lose sight of important balance and can incite actions that are collectively not in the best interest of all stakeholders. This happens largely when leadership is inauthentic and what Bass coined as ‘pseudotransformational.’

Interest in transformational leadership has gained momentum over the past three decades due to the compelling need for organizations to keep pace with significant global economic changes and the needs of followers. Transformational leaders have the potential to deliver ‘performance beyond expectations’ by leveraging the four components ascribed to authentic transformational leadership. In an era of increased global competition, complexity and uncertainty leadership that can transform followers can provide competitive advantage. The risk of such idealized influence and inspirational motivation lies in the hands of the leader. When followers are compelled to adhere to a visionary leader, the likes of Jim Jones and Charles Manson to name a few, then clearly there is a moral hazard that comes into play. Transformational leadership, centered on moral grounds, raises the promise of liberating followers and taking organizational performance to new heights. But the power of influence is still more heavily weighed to the leader thus heightens concerns relative to abuse of power, oppression and conflict.

Transformational leadership is a journey not a destination. To begin the journey towards a transformed organizational approach, an awareness and fundamental belief that transformational leadership can propel an organization to new heights from a performance and engagement perspective is necessary. Leveraging different diagnostic tools to support in determining gaps will allow for personal development plans to be created and implemented that will help move the organization down the path. Sustainability of desired behaviours is achievable with support, modelling, mentorship, feedback, positive reinforcement, and accountability to the new paradigm of leadership. According to Kouzes and Posner’s seminal work, *The Leadership Challenge*, there are 5 basic practices that leaders can adopt from a strategy implementation perspective. They tie in closely to exemplary leadership and in fact, transformational leadership (2003) and are outlined in Appendix 3.

Transformational leadership may hold the key to improving teamwork, communication, and productivity. And thus refining measurement tools and ascribing developmental models to enable leadership growth towards transformational attributes will contribute to organizational performance.

Radical changes in the leadership arena relative to the role of leaders and followers are already being witnessed, and the 21<sup>st</sup> century is clearly going to continue to see more individual accountability and responsibility for performance and results.

There are some interesting dynamics at play relative to the new workforce that require innovative leadership to retain the best followers. With the growing boomer population the new reality is there could literally be 50-60 year age gaps on work teams and between leader and followers. This in itself requires a fundamental paradigm shift to ensure productivity is enhanced with this increasingly diverse workforce. The Generation X workforce are very independent, self-motivated and possess confidence in their ability which translates into a new approach to work. They demand more responsibility, want more control and thrive in an environment that allows them to get to the end state on their own terms. Telecommuting, the demands of balancing work and family, and the need to take greater control of working lives means the relationship between leader and follow will continue to evolve. The wave of the future will see more facilitative as opposed to directive leadership as the means to motivating a diverse workforce.

Multiple intelligence is beginning to gain prominence as a predictor of leadership and as a way of ensuring that transformational leaders are helping to create more transformational leaders. Effective leadership in the future will be heavily reliant on communication technology (eleadership). A clearer understanding of the distinction between management and leadership is required, to ensure full diversity is leveraged and optimum performance is achieved as each provides unique motivation. People follow managers because they have to, but follow leaders because they are inspired to do so.

Leadership is about influence and the ability to engage and motivate people to act in ways that will allow for achievement of a common goal. Managers are not automatically leaders, although often times the title is assumed to confer that expectation. The differentiator between leadership and transformational leadership can move organizational performance from mediocre to exceptional. How followers are influenced to act can be the fuel that fires excellence or the match that lights transactional performance. Research would suggest that transformational leadership actually transforms the follower

and thus improves organizational performance. To change a follower and inspire to want to do more is no small task and speaks to the power of transformational leadership.

In his book entitled 'The Loyalty Effect' Frederick Reichheld (1996) suggests 'simply getting your employees to stay with the company won't necessarily produce superior economics. A lot of firms are loaded with dead wood.' (p. 102). And that 'to magnify employee loyalty and increase productivity, companies must do all they can to promote individual learning and the alignment of employee and company interests' (p. 140). He also suggests that historically focus has been on delivering value to shareholders, which has not necessarily improved customer loyalty nor employee retention.

The implications for leadership development have yet to be fully understood, but adaptability cannot be understated and is the heart of transformational leadership. Thus, there will continue to be a place for transformational leadership on the shelves of all successful organizations for years to come.

Transformational leadership has emerged as one of the prominent leadership paradigms. However, on the Full Range of Leadership model there could soon be another component in the top right called 'transcendental leadership.' According to Fry (2003) Transcendental leadership focuses on the existence of four essences, three of which are addressed through transactional and transformational leadership – the body (physical), mind (rational), and heart (emotional). However, it is the fourth essence that differentiates transcendental from the others and that is spirit. It is the development of the leaders consciousness and moral dimensions that allows one to move from transformational to transcendental. Fry describes it as a 'sense of transcendence – of having a calling through one's work or being called (vocationally) – and a need for social connection or membership' (p. 703). Spiritual survival, altruistic love and fulfillment is the call to action and as a theory transcendental leadership continues to take shape as the psychological (and spiritual) needs of followers are further researched and better understood.

Transformational leadership is not just about a shift in follower and leader behaviours but rather a fundamental shift in the paradigm of the organization – structure, rewards mechanisms, policies and corporate culture. Transformational leadership generates new potential to achieve 'performance beyond expectations.' Given the uncertainty in global markets, the rapid pace of change and the evolving dynamics of an aging workforce, subscribing to a more enabling and empowering leadership philosophy more frequently appears to be a recipe for success. Authentic transformational leadership characterized

by a high moral standard, a liberating approach, a genuine concern for followers and an inspiring pure vision has the potential to change the world.

In the final analysis, transformational leadership is contingent on followers. Whether the vision is worthy of aspiring to, the challenge worthy of rising to and the goals worthy of accomplishing depends on how it is perceived by the follower – which is dependent on the leader's ability to impact and influence a change agenda that aligns organizational goals with that of individuals. And as eloquently articulated by Bass 'that rather than being unethical, true transformational leaders identify the core values and unifying purposes of its organization and its members, liberate their human potential, and foster plural leadership and effective, satisfied followers' (1997, p.18). Adaptability is a fundamental requisite in the dynamic global marketplace of the 21<sup>st</sup> century. And authentic transformational leadership is the necessary ingredient to engaging the hearts and minds of followers to aspire to a shared vision that will allow for performance beyond expectations. Leadership makes the difference and that will not change even though the world around us continues to.

Transformational leadership has great potential to positively impact all three stakeholders. Employees are empowered, engaged, motivated and challenged to assume more responsibility and deliver more than they thought possible. Shareholders reap the rewards of a more productive workforce who are continuously learning, challenging status quo and innovating to stretch the limits of the organization. And for customers, employee satisfaction translates into better service, and a more enriching experience. Transformational leadership has the potential to 'transform' the interaction at all levels of the organization and allow new levels of performance to be achievable. It 'transforms' the follower resulting in enhanced job performance which impacts productivity organizationally. When authentic it allows for organizational differentiation and creates a competitive advantage.



## Appendix 1:

### Employee Opinion ‘Pulse’ Survey Results – May 31, 2013



Messages from Gord Nixon, President & CEO

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#### Employee Opinion “Pulse” Survey Results May 31, 2007

Last week we announced strong [results for the second quarter](#) and today I am pleased to share with you results of the recently completed Employee Opinion Pulse Survey.

I believe to put our clients first we must ensure RBC provides *what employees need to be successful*. *Regular employee surveys* are important for *gathering your input* on what is working well and where further attention is needed.

We had very good participation in this follow-up to the action plans developed and implemented in response to the 2006 Employee Opinion Survey. More than 13,000 people, over 73% of those randomly invited, completed the survey. I thank all those who shared their opinions by participating.

I am pleased and encouraged with the overall results. The survey shows we are not resting on past achievements but are continuing to make progress on areas you told us in 2006 we needed to address.

Comparing to the 2006 Employee Opinion Survey results, some of the highlights include:

- **Employee engagement** has increased across the organization
- Very strong and increased support for our **Client First vision and RBC values**
- Employees have a much greater understanding of **what is required to individually contribute** to the Client First transformation
- Positive movement in the Competitiveness category with increases in several areas including ease of doing business, quality of products, and responsiveness to market changes
- Overall results were strong with increased ‘top box’ scores in 4 of 6 survey categories - **Engagement, Client First Vision & RBC Values**, Competitiveness, and Recognition & Rewards
- We remained at the same level in the Managing & Developing Talent category and had a slight decline in Performance Management
- We continue to exceed the benchmark scores of North American High Performing Companies provided by our survey supplier in 5 of 5 categories (comparison is not available for one category)

Clearly, the actions taken over the past year to continue to put our clients first, make it easier to do business with RBC, and improve the value of what we offer to clients are making a difference.

With this great progress, we still have opportunities in front of us in some of the areas targeted for improvement. You can expect career development and performance management to remain areas of focus. In fact I believe it’s particularly important to our future success that our approach to performance management become more about ‘enabling’ performance than simply ‘managing’ performance.

You will hear more details about the results and plans for your area directly from your leaders.

Our operating results so far in 2007 and these survey results are two more indications of what the RBC team can achieve by working together. I thank you for your personal commitment and contribution to RBC’s success.

**Gord Nixon**  
President & Chief Executive Officer

Retrieved from <http://www.rbcnet.fg.rbc.com> on July 11, 2013

## Appendix 2:

### Moral Elements of Transformational and Transactional Leadership

Leadership Dynamic	<i>Transactional Leadership Ethical Concern</i>
Task	Whether what is being done (the end) and the means employed to do it are morally legitimate
Reward system	Whether sanctions or incentives impair effective freedom and respect conscience
Intentions	Truth telling
Trust	Promise keeping
Consequence	Egotism versus altruism – whether the legitimate moral standing and interests of all those affected are respected
Due process	Impartial process of settling conflicts and claims
<i>Transformational Leadership</i>	
Idealized influence	Whether ‘puffery’ and egoism on the part of the leader predominate and whether the leader is manipulative or not
Inspirational motivation	Whether providing for true empowerment and self-actualization of followers or not
Intellectual stimulation	Whether the leader’s program is open to dynamic transcendence and spirituality or is closed propaganda and a line to follow
Individualized consideration	Whether followers are treated as ends or means, whether their unique dignity and interests are respected or not

Note: From “Transformational Leadership Second Edition” by B.M. Bass and Ronald Riggio, 2006, p. 15

## **Appendix 3:**

### **Kouzes & Posner's – The Leadership Challenge (2003)**

#### **A Recap of Best Practices in Exemplary Leadership (transformational) and Strategy Implementation**

1. A willingness to challenge the process and question status quo is a required skill set of dynamic leadership in the 21<sup>st</sup> century. It requires taking calculated risk and learning from mistakes as that is where innovation and creativity can blossom.
2. The second practise is focused on the mission and inspiring a shared vision that engages and commits team members. The vision and mission provides a frame of reference for long-term planning, strategy development and implementation – which at the end of the day is the goal of leadership. A fundamental belief that leadership can make the difference and passion for the vision differentiates inspirational leadership from the rest.
3. Enabling others to act is critically important to transformational leadership. Collaboration, empowerment through delegation and leveraging power as an expandable resource is foundational to truly making a difference in working relationships. For leaders, employees that feel significant, confident and connected also feel like they share power – which strengthens the working relationship and fosters engagement.
4. Role modelling is yet another basic practice demonstrated by transformational leaders. It is through this modelling that core values and beliefs are instilled organizationally and both confidence and capability are fostered.
5. And it is by 'encouraging the heart' that extraordinary results can be achieved. Reward and recognition of accomplishments are the ties that bind and the actions that instil inspiration and enhanced performance.

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## **DRAWING THE LINE WHEN WORKING FROM HOME: THE BENEFITS AND CHALLENGES OF TELECOMMUTERS**

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### **ABSTRACT**

Telecommuting has been researched over the years and has been shown to have both positive and negative outcomes. This research paper will focus on the longitudinal outcomes of telecommuting. Data was collected through in depth interviews with individuals who telecommute and blogs on telecommuting. Our findings indicate although there are challenges for employees in creating boundaries between work and home when telecommuting; there are still benefits to be gained from this practice.

### **INTRODUCTION**

The practice of ‘working from home’ is still on the rise in the workplace. One reason this practice is increasing in popularity is technological advances in both software and hardware. According to White, “a study in 2012 by Wrike, a software collaboration firm, revealed that many people are warming up to telecommuting. Eighty-three percent of the respondents said they were spending at least an hour or two working from home. Forty-three percent of the respondents also stated that they were working remotely more often, in comparison to two years earlier... several advantages and disadvantages are associated with telecommuting” [15].

Before discussing this practice in more detail, however, it is important to provide a clear definition of the term “telecommuting”. The definition of telecommuting is, “an alternative work arrangement in which employees perform tasks elsewhere that are normally done in a primary or central workplace, for at least some portion of their work schedule, using electronic media to interact with others inside and outside the organization,” [13]. This research will focus solely on the topic of working from home.

### **CONTROVERSY IN THE WORKPLACE**

Due to its popularity, many companies are facing the choice of whether to allow their employees to work from home. One major company that made headlines recently by banning this practice is Yahoo. In a statement to telecommuters from their Human Resources Manager, she stated that in order: “To become the absolute best place to work, communication and collaboration will be important so we need to be working side-by-side. That is why it is critical that we are all present

in our offices. Some of the best decisions and insights come from hallway and cafeteria discussions, meeting new people, and impromptu team meetings. Speed and quality are often sacrificed when we work from home. We need to be one Yahoo, and that starts with physically being together” [6].

This paper will provide an overview of employer benefits, employer challenges, employee benefits and employee challenges of working from home. This overview will be followed by empirical examination of the issues confronting telecommuters using analysis of qualitative data gathered from interviews. Conclusions and recommendations based on these data will be provided.

### **EMPLOYER BENEFITS**

One employer benefit includes the reduction of absenteeism. According to Global Workplace Analytics, “78% of employees who call in sick, really aren’t. They do so because of family issues, personal needs, and stress... Telecommuting programs reduce unscheduled absences by 63%” [11]. Therefore, telecommuting yields two benefits: Increased productivity from reduced absences and decreased stress from increased flexibility and autonomy [7].

The second benefit for the employer is primarily a financial benefit from expense reduction. Employers do not have to pay to relocate their employees. One example is Nortel which estimated that they save \$100,000 per employee they don’t have to relocate [11].

Another benefit is better performance [1]. According to a study by Cisco “work performance also improves in a telecommuting culture. 69 percent of employees cited higher productivity when working remotely, 75 percent said the timeliness of their work improved and 67 percent said their overall work quality improved when telecommuting [11].

### **EMPLOYER CHALLENGES**

On the other hand, there are also challenges for the employer. One challenge is the effect on the relationship between the employer and his/her manager. When the employee is at home more often than in the workplace, their relationship is weaker [12].

One of the major challenges for employees is that this practice infringes on confidentiality. Allowing employees to bring work home poses a risk of confidential work information being accessed via a home network or left behind in another location while being transported [11].

Another challenge is that it is not possible to directly supervise an employee who is working from home. Lack of accountability is one of the major reasons that supervisors oppose telecommuting [2][3].



## **EMPLOYEE BENEFITS**

Employees also benefit from this practice. Not having to commute significantly cuts down on fuel costs [12], and 60 percent of the time saved by avoiding a commute is spent working [8] [11].

Another employee benefit for this practice is that it is ecofriendly. Not only is it safer for the environment, it is also found to be safer for the worker as well. Companies that offer at least “half time telework for the 50 million Americans with compatible jobs and a desire to work from home at least part of the time would save 1,500 lives, prevent almost 95,000 traffic related injuries and deaths, and save over \$11 billion a year in related costs,” [11].

## **EMPLOYEE CHALLENGES**

One challenge that employees face with this practice is that it can cause both parties to be faced with an overwhelming schedule. These employees are usually stuck in the “always-on mentality, and there’s a possibility you’ll experience less freedom than if you were alone at the office, particularly if you are in a different time zone than your colleagues... it is ineffective and can quickly lead to burnout” [14]. If an employee feels overwhelmed and stressed by the need to be available constantly to answer emails or work to accommodate various time zones, then work is not going to be performed as efficiently and effectively.

## **RESEARCH QUESTIONS**

In order to better determine how the research relates to the actual experiences of telecommuters who work from home, we decided to use qualitative interviews of individuals engaging in this practice over a period of time. Questions included topics of: Setting boundaries, productivity, stress and communication (see Appendix A for a complete list of questions).

## **METHODOLOGY**

This first study used interview questions administered via email and phone (see Appendix A). The number of respondents was 20 [10]. In order to examine this topic using another method, the second study analyzed entries from 10 blogs that address the topic of telecommuting.

## **RESULTS OF STUDY ONE**

### **Financial Benefits**

Many respondents cited financial advantages. For one married couple, the husband is a full time “working from home” employee, and they save money due to reduced commuting expenses, especially on gas. Since children are part of their family, saving money on after school care is another benefit. The wife stated that last year when he did not work from home, it cost \$15 dollars each day for 20 minutes of care because neither of them could get home in time to pick up the children when they arrived home from school. Another financial benefit is derived from the availability of funds from the company for office setup and supplies. One of these expenditures was a laptop that provided up-to-date technology, helping the employee to be more efficient.

### **Negative Public Perception**

One of the challenges mentioned by one individual is, “convincing people who don't work from home that working from home is not as ‘easy’ as it looks and convincing managers that it is at least as productive as working in an office.” Convincing friends that working from home is actually working is extremely important and it is also hard to convince friends and family that this practice is much more difficult than it may appear on the surface. In fact, all of the interviewees mentioned this challenge.

One question asked whether the worker felt he/she is viewed as less competent by co-workers or bosses because of working from home at least once a week. One respondent was relatively shocked by this question. His response was, “incompetent? No. I've never known anyone who works at home to be labeled that way. Actually, it's usually the opposite. Once you can demonstrate you can work well remotely, usually you get labeled as productive or as very ‘self-motivated’”.

## **WORKPLACE COMMUNICATION**

Another question was whether telecommuters found it difficult to communicate with coworkers and supervisors by not being in the office. One individual responded, “No. The other week I was home working and was in contact multiple times that day with another developer who was working from home. This person, who also happens to be my boss, then commented on what a productive day we had that day. With email, phones, IM, and Skype, there is no reason to not communicate when needed.”

## **SETTING BOUNDARIES**

When asked about boundary setting while working from home, one individual responded that there are both family and personal boundaries. In terms of family boundaries, he felt that the most important aspect to maintaining these boundaries is communication. He stated that, “when I'm working from home I'm WORKING and the family knows I can't be interrupted for non-

important matters. That said, working from home still offers great schedule flexibility so I do often schedule my work time around tasks I do need to do when I'm home. I would gladly trade salary for a flex schedule, to a point.” In terms of personal boundaries he stated that, “working from home requires more personal discipline than most people realize. I try not to work by time, but by tasks. I set an amount of work I want to get done and try to reach that target. If I get done with work hours left in my day, I set a new target.” Another person finds that setting a time-based boundary is helpful. She treats each day she works from home like a 9 to 5 workday with only breaks and lunch. For another person, one challenge she finds when working from home is getting motivated. But if she makes plans for the afternoon, working in the morning is more productive, than trying to work at home for the entire day. Another respondent used physical space to create work/home boundaries. He leaves his house during the day, which ultimately allows for him to be productive because when he returns, he can work with more focus.

We did find that some of the results on this topic differed for males and females. Males did not seem to have much difficulty setting boundaries between work and personal life. For one, the internal drive of knowing what is expected from coworkers helped him to set a mental boundary. Another used the external factor of time to determine how to allocate his work day. Others stated that, their desk is surrounded by no distractions. The males who do not set boundaries seemed to experience increased challenges while working from home, such as staying focused. Although the results for females interviewed were similar in terms of setting boundaries, there were some noticeable differences. Setting boundaries for women who have children can be a difficult task according to the respondents. One mother stated that she set her own work schedule around when her kids needed care. She also needs to be flexible to accommodate unplanned events. The challenge she faces most when working from home, is distraction from her family. Although she does have a separate workplace within the house, it is common for her children to come in and distract her. This was a challenge often noted by mothers who telecommute at least some portion of the week. Another challenge that was more common among women was refraining from doing household chores during the workday. We found from our research that women seemed to have a drive to multitask, for example, doing laundry while working.

## **SUMMARY OF FINDINGS – INTERVIEWS**

As a result of the interview data, we concluded that working from home is not an optimal choice for every person. Despite the fact that there are benefits to be gained, every worker and organization does not consistently experience them. If employees cannot handle the isolation and reduced amount of communication with coworkers, then this practice will not be successful for them. If the worker has good self-discipline, then he/she will not be as distracted by other activities previously mentioned. Therefore, the success of this practice seems to be highly individualistic, rather than organizationally determined.

## RESULTS OF STUDY TWO

In this study, we examined blogs that dealt with the topic of telecommuting and working from home. We were interested in whether these entries coincided with the literature and our survey results.

### **Workplace Communication**

Comments on this topic included:

- Communication needs to happen regardless if there is a challenge with this practice
- Successful telecommuters are dedicated to their work and tend to seek out communication on their own terms
- Employee should come to the office at least two times a week
- Successful telecommuters tend to be organized "go getters" and seek out things like communication with friends, coworkers and supervisors.

### **Setting Boundaries**

Comments on this topic included:

- Set crystal clear rules for yourself
- I have an "After 5pm" list that I jot down things that may come to mind as I'm working. That way, I know I will remember to deal with them later. And I try not to answer any personal calls during workdays.
- Yes, you can empty the dishwasher on your lunch break, or throw the laundry in the dryer between calls, but be careful not to let distractions creep into time you planned to work.

### **General Advantages**

Comments on this topic included:

- Freedom, choices, and options
- Having a choice in where I work
- Reduce the amount of time in traffic jams

## CONCLUSIONS AND RECOMMENDATIONS

The findings from the blogs and interviews support those of the literature, but add the perspectives of individuals. Employees value the benefit of working from home. The financial savings and ability to manage one's schedule were most often noted as positive factors. The challenges of working effectively and efficiently from home, however, were also conveyed. First among these is having the self-discipline to be productive when working from home.

Maintaining open lines of communication also surfaced as a major topic of concern. Since face-to-face interactions are highly limited or nonexistent, communication must be sufficiently detailed and frequent to compensate for this challenge [4]. It appears that having some in office time is a more successful model. Respondents suggested one to two days per week as a minimum amount.

As our interview results indicate, the practice of telecommuting does not appear to be problematic for most companies and employees. It offers both advantages and disadvantages, but overall provides important benefits. For example, telecommuting provides financial benefits to both the employer and employee. In addition, as seen from the interviews, employees were motivated by having more control over their schedules and even were willing to sacrifice pay to have that control.

Concerns that were mentioned by employers in years past, such as lack of contact and connection to employees who telecommute, have subsided with the sophistication of today's technology. Employees interviewed had no difficulty staying connected with their co-workers and supervisors.

One challenge that remains for those who work from home is that of being able to set boundaries. The ability to separate work and home, when telecommuting, requires self-discipline. Those interviewed here use a variety of methods to create these boundaries, so this goal is certainly achievable.

In summary, many employees enjoy having telecommuting as an option in their workplace. Not one person we interviewed stated that they disliked this practice. The trend continues to increase and despite its challenges, when done right, it does provide a means for promoting productivity among employees as well as achieving cost savings [5][9].

### **FUTURE DIRECTIONS FOR RESEARCH**

In order to achieve the maximum benefit to telecommuting, specifically, working from home, for both the employee and the employer, further research is necessary. Now that telecommuting is occurring commonly due to access to necessary technology, determining how this can best be done needs to be studied further. Some areas for investigation include organizational structures that affect the success of working from home, such as policies, technology, and culture. Individual factors also determine success as we found in this study. These include personality characteristics, family situation, and home environment.

Telecommuting provides many benefits to both employers and employees; however, further research would help to reduce the obstacles that prevent their maximization.

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## APPENDIX A

### Interview Questions for Telecommuters

- How often do you work from home?
- How do you set boundaries for yourself when you work from home?
- Do you find it hard not to snack constantly while being at home?
- How often do you leave your house?
- If you do leave your house, do you think it affects your productivity and stress level?
- Do you ever not get dressed for work? (i.e. staying in your pajamas all day)
- What challenges do you face the most while working from home?
- Do you find it hard to communicate with your coworkers and employers by not being in the office?
- Do you think you are viewed as incompetent by others because you work from home?



## **Cabela's - World's Foremost Outfitter: A Case Study in Destination Retailing**

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A relatively new trend in retailing is to become a destination retailer – one which consumers will make a significant effort to patronize, and are willing to drive several hours to spend a substantial time in. How do “destination store” companies differ from traditional retailers, and what is unique about their strategic orientation? This study traces the strategy of a premier destination retailer – Cabela's - from its inception in 1961 to becoming one of the most well-known outdoors equipment brand in the world today. The case study examines how Cabela's dominates its segment through its physical locational strategies, its website presence, and its catalog strategies. The case study also overviews its financials, its competitors, and some critical issues it faces going forward. In addition, the case study offers students several unique issues to analyze and debate, including guns sales at Cabela's and its strategy to use heavy subsidies from local governments where it chooses to locate.

# Service Perception Differences among Opinion Leaders in the Art Industry

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## Abstract

Conventional opinion leadership theory has traditionally dealt with the characteristics of an opinion leader and the domains where this behavior appears. Art organizations agree about the importance of having influentials among their customer base to prescribe their services and to acquire and maintain their relationships with them. However, little attention has been received to explain determinant service perception constructs as antecedents of opinion leader's future intentions. This study empirically tests the moderation effect of opinion leadership on the perceived quality, overall satisfaction and the individual's future intentions (likelihood to be committed to the venue, to support the organization, to repeat his visit). A survey-based questionnaire in a non-mainstream venue located in London was conducted to test the relationships, using structural equation modeling analysis. Two segments were obtained to test the moderation effect: individuals with low and high opinion leadership scores. Results show that during the service experience each segment gave more importance to one construct (satisfaction or quality) over the other. Strong opinion leaders give more importance to their satisfaction level as an antecedent of their future intentions and weak opinion leaders give more attention to perceived quality as a precursor of their future intentions. These findings expand the "service-profit chain" theoretical framework and suggest that, emotional attachment act as a filter that influences the service attribute perception. The emotive nature of the arts, personal involvement with the arts show, and the collective perception of the service explain how a service is perceived by an opinion leader.

**Keywords:** *opinion leadership, perceived service, loyalty, satisfaction, quality, arts services, emotions*

# **The Antecedent of Social Identification and Its Effects on Behavioral Intention of Transaction Virtual Community Members**

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## **Abstract**

The emergence of e-commerce has motivated a rapid growth in online trading. How to convert members into customers is the major issue for transaction website. Social identity theory provides an essential theoretical background for questions of this community identification and member behavior. Once members become attached to their community, it is expected that they will more likely support the community by showing various types of positive member behaviors. This research integrated both of the TAM (technology acceptance model) and social identity theory to explain how web service quality influence members' attitude toward using the transaction website and the consequently behavioral intention. This study treated social identification as members' attitude which will influence members' intention to spread eWOM, to get information, and to purchase from the transaction website. After reviewing 225 valid respondents, this research found that web service quality will enhance members' social identification. Furthermore, social identification will positively influence members' behavior intention. Finally, social identification plays the full mediation role in the model. According to the research finding, we suggest that transaction website should provide high quality service at first, so that members will perceive the usefulness of the platform. To motivate members' positive behavioral intention, practitioners should enhance their social identification.

**Keywords: Social Identity Theory, TAM, Social Identification, Transaction Virtual Community, Web Service Quality, Behavioral Intention**

## 1. Introduction

As the development of the Internet, virtual communities (VCs) have become the most important medium for people to interact and to share the knowledge with others. VCs serve both social and business functions (Wu, Chen, & Chung, 2010). For the social functions, they provide a communication platform to foster interaction among members. The members of these communities come together to develop friendships, share common interests, and exchange information. On the other hand, VCs comprise a viable trading and marketing platform that enables commercial interaction between sellers, buyers, and intermediaries (Schubert & Ginsburg, 2000).

Online vendors always consider that VCs are potential channels to advertise brands and promotions, improve store image, develop and gauge demand, and increase barriers to entry for competitors (Preece & Maloney-Krichmar, 2003). However, many online vendors have sponsored VCs in the hope of reaping commercial benefits, but few have been successful in this effort (Gupta, Kim, & Shin, 2010). Many studies have found that the community group cannot thrive without members' psychological attachment to their community (Arnett, German, & Hunt, 2003; Bhattacharya, Rao, & Glynn, 1995; Gruen, Summers, & Acito, 2000). How to enhance members' social identification has become the key issue to reach success, because member's sense of identification with the community will lead to positive behaviors. Researchers also always want to figure out what factors attract people to the community (Zhao, Lu, Wang, Chau, & Zhang, 2012). The social identity theory (Tajfel, 1978; Tajfel & Tumer, 1985) provides an essential theoretical background for questions of this community identification and member behavior. Therefore, this research adopted the social identity theory to explore members' behavior intention.

The technology acceptance model (TAM), introduced by Davis (1986), was adapted from the theory of reasoned action (TRA) and theory of planned behavior (TPB) (Sentosa & Mat, 2012). The TAM provides an explanation of the determinants of computer acceptance and is widely used to explain IT consumer behavior (Davis, Bagozzi, & Warshaw, 1989). This model contains two core concepts: the "perceived usefulness" of an on-line information system and the "attitude" toward the use of information technology. Both concepts affect behavioral intention and actual behavior. Compared with the TPB, the TAM emphasizes the independence of a consumer in using information systems and recognizes the higher decision-making power of the consumer (Lin, 2008). To take information technology into consideration, this research will combine the TAM and social identity theory into

research model. This research treated member's social identification as attitude toward using the transaction VC and combined the TAM and TPB as the theoretical framework to explore antecedents and consequences of social identification. Finally, this research will propose suggestions for practitioners of transaction VC.

## 2. Literature Review

### 2.1 Virtual Communities

Many new business practices have emerged with the development of the Internet and Web 2.0. Among these, the ones related to VCs could be the most important for businesses to reach potential customers. VCs provide effective platforms for the development of e-commerce based on social networks (Lu, Zhao, & Wang, 2010). There are several definitions of VC. Rheingold (1993) focused on the technological aspect of VCs and defined them as "social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace." Fernback and Thompson (1995) recognized the importance of "social relationships" and defined VCs as "social relationships forged in cyberspace through repeated contact within a specified boundary of place (e.g., a conference or chat line) that is symbolically delineated by topic of interest." Hagel III and Armstrong (1997) defined VCs as computer-mediated space where there is an integration of content and communication with an emphasis on member-generated content. According to previous studies, VCs can generally be defined as aggregations of Internet users who form webs of personal relationships (Kannan, Chang, & Whinston, 2000; Rheingold, 1993; Spaulding, 2010). Besides that, VCs typically require members to register before allowing access to discussion forums, or conferences. Virtual community hosts mediate the postings within each conference, and monitor online behavior to make sure they are acceptable to the community (Farquhar & Rowley, 2006). Therefore, this research defines a VC as a group of registered members who use a platform or website to share information.

Researchers have developed different classification schemes for VCs. Armstrong and Hagel III (1996) identified four kinds of VCs: (1) *Transaction communities* focus on transactional needs and provide a platform where people can obtain relevant trading information; (2) *Fantasy communities* usually refer to online games and allow people to come together to have virtual fantasy experiences; (3) *Interest communities* provide a platform for people with common interests or expertise on a specific topic

to gather and interact with each other; and (4) *Relationship communities* allow people with similar experiences to come together and form meaningful personal relationships. Similarly, Kannan et al. (2000) divided the virtual community space into four categories: (1) The main function of *transaction-oriented communities* is to bring sellers and buyers together; (2) *Interest-oriented communities* gather users around a common theme such as Macintosh computers (www.macrumors.com), or product support (support.dell.com); (3) *Relationship-oriented communities* generally focus on real-life relationships, such as family (MyFamily.org) or business relationships (LinkedIn.com); and (4) Users of *fantasy-oriented communities*, such as Second Life, expect to participate in an interesting environment in exchange for their time (Spaulding, 2010). This research aims to explore how businesses reap commercial benefit from their members and try to find out how businesses encourage members having positive behaviors, thus, this research will focus on transaction communities.

## 2.2 Social Identity Theory and Social Identification

Tajfel (1972) firstly introduced the concept of social identity and defined it as the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of the group membership. Tajfel (1974) quickly developed the theory to specify how beliefs about the nature of relations between groups influence the way that individuals or groups pursue positive social identity. The basic premise of social identity theory (Tajfel, 1978; Tajfel & Turner, 1985) is that by categorizing themselves as members of a particular social relation group, group members establish their identity in the social universe to which they belong (Hogg & Terry, 2000; Mael & Ashforth, 1992; Qu & Lee, 2011; Stets & Burke, 2000). Furthermore, a strong sense of belonging prompts positive behavioral support in a community by empowering members to have a positive attitude and adjust their behaviors based on their group values (Dholakia, Bagozzi, & Pearo, 2004; Dutton, Dukerich, & Harquail, 1994; Qu & Lee, 2011).

A social identity is a person's knowledge that he or she belongs to a social category or group (Hogg & Abrams, 1988; Stets & Burke, 2000); social identification is also the perception of belonging to a group (Bhattacharya et al., 1995). Drawing from Tajfel (1978)'s definition, Ellemers, Kortekaas, and Ouwerkerk (1999) proposed three components of social identification: cognitive, evaluative, and emotional. A cognitive component is a cognitive awareness of one's membership in a social group; an evaluative component is a positive or negative value connotation attached to this group membership; finally, an emotional component is a sense of emotional

involvement with the group. Adopting Tajfel (1978) and Ellemers et al. (1999) 's definition, this research defined social identification as VC member's sense of belonging to the community.

### 2.3 Technology Acceptance Model (TAM)

The technology acceptance model (TAM) was adapted from the theory of reasoned action (TRA) and theory of planned behavior (TPB) (Sentosa & Mat, 2012). The TRA is a widely studied model from social psychology which is concerned with the determinants of consciously intended behavior (Ajzen & Fishbein, 1980). According to TRA (Davis et al., 1989), a person's actual behavior is determined by his or her behavioral intention to perform the behavior, and behavior intention is jointly determined by the person's attitude and subjective norm concerning the behavior in question (Figure 1).

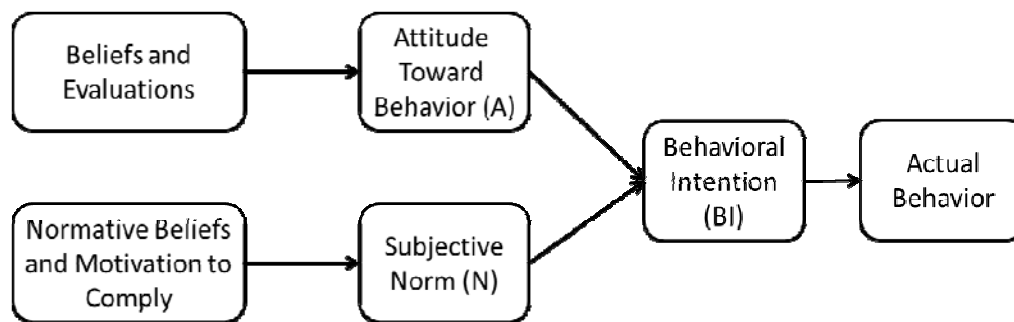


Figure 1. Theory of Reasoned Action (TRA)

Source: Davis et al. (1989), p.984

The TPB (Ajzen, 1985, 1991) is an extension of the TRA (Ajzen & Fishbein, 1980), made necessary by the latter model's inability to deal with behaviors over which individuals have incomplete volitional control (Figure 2). According to TPB, an individual's performance of a certain behavior is determined by his or her intent to perform that behavior. Both of the TRA and TPB have been the basis for several studies of Internet purchasing behavior (Sentosa & Mat, 2012).

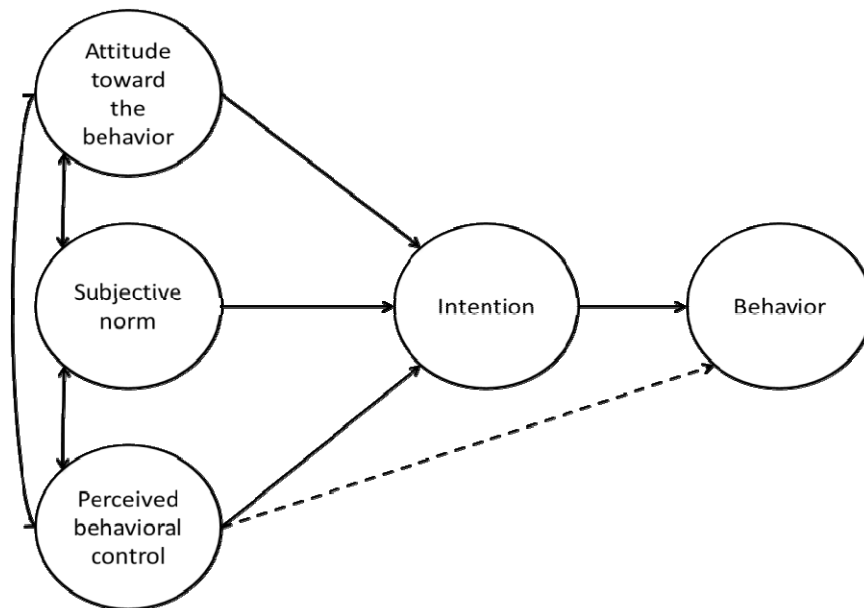


Figure 2. The Theory of Planned Behavior (TPB)

Source: Ajzen (1991), p.182

TAM uses TRA as a theoretical basis for specifying the causal linkages between two key beliefs: perceived usefulness and perceived ease of use, and users' attitudes, intentions and actual computer adoption behavior (Figure 3). In TAM, Davis (1989) proposes that the influence of external variables on intention is mediated by perceived ease of use and perceived usefulness. The TAM also suggests that intention is directly related to actual usage behavior (Davis et al., 1989). The TAM is considerably less general than the TRA, designed to apply to computer usage behavior or to explain end-user's behavior towards information technology (Davis et al., 1989; Saadé, Nebebe, & Tan, 2007). However, the TAM emphasizes the independence of a consumer in using information systems and recognizes the higher decision-making power of the consumer in comparison with the TPB. In addition, the TAM stresses more the influence of information systems on consumer behavior and ignores the effect of social and psychological factors; while TPB has insufficient explanations for the independence of consumers using information systems (Lin, 2008). This study combines these two theories to describe the factors affecting on-line consumer behavior intentions. This research will also integrate the social identity theory into research framework in order to emphasis the effect of social and psychological factors.



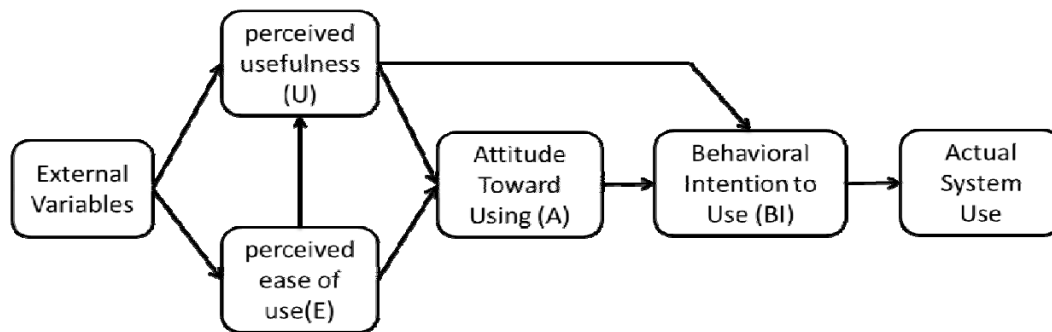


Figure 3. Technology Acceptance Model (TAM)

Source: Davis et al. (1989), p.985

## 2.4 Hypothesis Development

Sine computer-aided services have grown in number and significance in proportion to the rapid growth of Internet adoption, the quality of enterprise websites has become a key indicator of how well a company is likely to satisfy its customers (King & Liou, 2004; Udo, Bagchi, & Kirs, 2010). Web service quality is crucial because it shapes customers' initial impression of a website's value. According to the impression, customers determine whether they will continue using the website (Barnes & Vidgen, 2006). Mapping to the TAM, this research viewed web service quality as external variables which will further influence users' attitude toward the transaction VC.

From the perspective of the social identity theory, many researchers viewed members' strong identification with a particular online community as the core value that facilitates the effectiveness of the online community (Algesheimer, Dholakia, & Herrmann, 2005; Bagozzi & Dholakia, 2002; Carlson, Suter, & Brown, 2008). Members' sense of attachment is also directly linked to a variety of positive member behaviors (Feng & Morrison, 2007; Kim, Lee, & Hiemstra, 2004; Qu & Lee, 2011). Combined the TAM and social identity theory, this research treated social identification as members' attitude to the transaction VC. As to behavioral intention, this research proposed three kinds of intention: spreading eWOM, getting information, and purchase. Drawing from the TAM and social identity theory, this research developed framework as Figure 4.

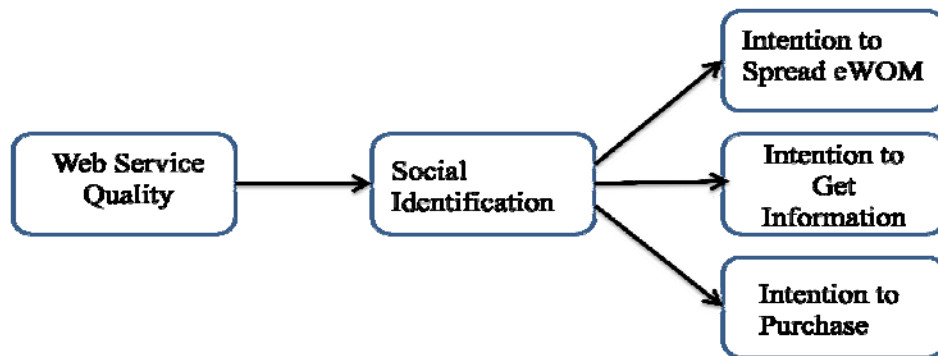


Figure 4. Research Framework

#### 2.4.1 Web Service Quality and Social Identification

Both practitioners and researchers use e-service quality and web service quality interchangeably (Udo et al., 2010). Web service quality or e-service quality is the overall customer perceptions, judgments and evaluations of the quality of service obtained from a virtual marketplace (Santos, 2003). Some researchers have emphasized the importance of web service quality, because it is the antecedent of e-customer satisfaction (Negash, Ryan, & Igbaria, 2003; Udo et al., 2010; Udo & Marquis, 2001; Yang & Jun, 2008). In the Information Systems Success Model (DeLone & McLean, 1992), web service quality is the most important variable in affecting user satisfaction. Most authors conclude that both service quality and satisfaction have direct links to behavioral intentions (Cronin Jr, Brady, & Hult, 2000; Cronin Jr & Taylor, 1992). Cronin Jr et al. (2000) further concluded that the direct link between service quality and behavioral intentions is significant. Therefore, this research inferred that high web service quality will enhance members' satisfaction and members are more likely to perceive usefulness of the community. Thus, members will have positive attitude toward the community and then have greater sense of belonging. Hypothesis 1 is developed as below:

**H1: Web service quality will enhance the VC members' social identification.**

#### 2.4.2 Social Identification and Behavioral Intention

Social identity theory has been widely applied to the various types of online community. Members' strong identification with a particular online community is viewed as the core value that facilitates the effectiveness of the online community (Algesheimer et al., 2005; Bagozzi & Dholakia, 2002; Carlson et al., 2008). Qu and Lee (2011) summarized relevant studies and proposed two major findings: (1) a

member's sense of affective identification with the online community is achieved through the interactive communication around shared interests (Arnett et al., 2003; Blanchard & Markus, 2004); and (2) to the extent that members become emotionally attached to the community, they are more likely to show desirable in-group favoritism (Algesheimer et al., 2005; Kim et al., 2004). According to this finding, members with high social identification will tend to share their knowledge or experience, especially eWOM.

WOM is defined as independent information and opinions about marketplace offerings (Bickart & Schindler, 2001). There are many forms of eWOM, such as chat room, newsgroup, bulletin boards, listservs, electronic consumer forum (Bickart & Schindler, 2001; Gelb & Sundaram, 2002), and online forum which is an online community where visitors may read and post topics (Prendergast, Ko, & Yuen, 2010). These electronically based forms provide consumers with the ability to share their experiences, opinions, and knowledge with others on specific topics. To differ with the traditional (offline) WOM, the scholars called these forms as electronic word-of-mouth (eWOM) (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004). In addition, online consumer reviews, such as consumer-created product information, can be viewed as a special type of WOM (Godes & Mayzlin, 2004). Most scholars' classification and explored the influence of positive and negative eWOM separately (Awad & Ragowsky, 2008; Hennig-Thurau, Gwinner, & Gremler, 2002; Jones, Aiken, & Boush, 2009; Sun-Jae & Jang-Sun, 2009; Zeithaml, Berry, & Parasuraman, 1996). However, this research will only adopt positive eWOM due to our research purpose. Drawing from previous studies, this research defined eWOM as transaction VC members' sharing of their positive experiences and opinions to others.

Consumers always search for information before making a purchase in order to reduce their perceived risk (Bettman, 1973; Srinivasan & Ratchford, 1991). Thus, consumer reviews are important for unsophisticated consumers, who may hesitate to make a purchase if only seller-created product information is available. Highly engaged members tend to enjoy social interactions by acting as important references. Just like they contribute to the interactive online communication, so they directly spread favorable word-of-mouth to others offline (Feng & Morrison, 2007; Qu & Lee, 2011). Therefore, if members have high social identification to the community, they will have greater sense of belonging and will be more likely to share their opinion. Thus, this research proposes Hypothesis 2 as below

**H2: VC members with high social identification are more likely to spread eWOM to others.**

Each member may engage in community activities in a different manner. Beside sharing their experience with the rest of the community, some people may seek information assistance (Ridings, Gefen, & Arinze, 2002). Pavlou and Fygenon (2006) found that the trust belief positively affects consumers' attitude toward getting information from a Web vendor. Thus, consumers are likely to get information from a vendor or website if they trust it and believe that it will provide credible information (Lu et al., 2010). Therefore, this study inferred that members with high social identification will trust the transaction VC, so they will be more likely to get information from the website.

**H3: VC members with high social identification are more likely to get information from the VC website.**

Previous studies on e-commerce have revealed the importance of trust in affecting consumers' behavior (Everard & Galletta, 2005; Gefen, Karahanna, & Straub, 2003; Lu et al., 2010; Pavlou & Fygenon, 2006). When consumers trust an online store, they will be more likely to purchase there. Pavlou and Fygenon (2006) also hypothesized that the intention to get information positively influences the purchase intention. According to the TAM, users' attitude toward using the technology will affect their behavioral intention to use (Davis et al., 1989). This research inferred that members with high social identification will tend to trust the transaction VC. This positive attitude will lead to higher purchase intention. Thus, Hypothesis 4 is developed as below:

**H4: VC members with high social identification are more likely to purchase from the VC website.**

*2.4. Mediating Effect of Social Identification*

In TAM, Davis (1989) proposes that the influence of external variables on intention is mediated by attitude toward using the technology (Davis et al., 1989). From the perspective of the social identity theory, many researchers suggested that members' strong identification with a particular online community will lead to positive member behaviors (Feng & Morrison, 2007; Kim et al., 2004; Qu & Lee, 2011). Combined the TAM and social identity theory, this research hypothesized that social

identification is the mediator of web service quality and members' behavior intention.

**H5: VC members' social identification mediates the influence of web service quality on behavior intention.**

### **3. Method**

#### **3.1 Data collection**

This research adopted online users in Taiwan as research samples. Although North America possesses the highest Internet penetration rate, Asia is the region that possess the largest amount of Internet users in the world (Miniwatts Marketing Group, 2012b). In addition, Taiwan's Internet penetration rate is up to 75.4% and ranks the fourth among Asia countries (Miniwatts Marketing Group, 2012a). In Taiwan, the main purposes of personal Internet are participating in virtual communities, online shopping, and playing online game (Taiwan Network Information Center, 2012). Therefore, Taiwanese data are representative for e-commerce related research.

Online questionnaires were created using mySurvey (<http://www.mysurvey.tw>). To gather data, the URL was posted on the most popular websites in Taiwan: Facebook.com, Youthwant.com, Plurk.com, Twitter.com, and Sos.com etc. Any single computer was restricted from submitting more than one questionnaire in order to avoid duplicate responses. A total of 404 responses were received and 179 invalid responses were excluded. Invalid responses include those containing more than five missing values, those with the same answer to all questions, and those that answered reverse and general questions in the same way. There were 225 valid responses, resulting in a validity rate of 56%. A description of the sample is presented in Table 1. Table 2 shows the sample distribution of VCs.

Random sampling or sample representativeness are always the major issue for an online survey. To overcome the possible bias, this research placed the questionnaire on the target websites for a period of time and then collected all of the responses as the response sample. Because this research adopted convenient sampling, we need to conduct a representative test to ensure the randomness of the response sample. The population of the Internet users is always hard to define and there is no sampling frame for researchers. To test sample representativeness, this research found a similar survey with large samples and detected the difference between these two sample distributions. There is a survey of 2012 online shopping behavior(Chen,

2013), with 7685 samples, by the Market Intelligence & Consulting Institute (MIC) which is a division of Institute For Information Industry. Chi-square testing shows that there is no significant difference (Table 1). Therefore, this research possesses representativeness.

Table 1. Sample Description (N=225)

Demographics	Research Sample		2012 Survey by MIC	$\chi^2$
	Frequency	Percent ( $o_i$ )	Percent ( $e_i$ )	$(o_i - e_i)^2 / e_i$
<b>Gender</b>				
Female	122	54.2	62.0	0.976
Male	103	45.8	38.0	1.592
Total				2.568 <sup>a</sup>
<b>Education</b>				
Below Junior High School	3	1.3	2.3	0.406
High School	42	18.7	12.0	3.704
College / University	149	66.2	68.8	0.097
Graduate School	31	13.8	16.8	0.544
Total				4.750 <sup>b</sup>
<b>Income <sup>c</sup></b>				
Under 15,000	58	25.8		
15,001 – 20,000	16	7.1		
20,001 – 25,000	27	12.0		
25,001 – 30,000	34	15.1		
30,001 – 35,000	32	14.2		
35,001 – 40,000	19	8.4		
Above 40,001	39	7.3		

*Note.* Two studies adopted different classification of income, so it is unable to conduct Chi-square testing.

<sup>a</sup>  $\chi^2(0.95, 1)=3.84$

<sup>b</sup>  $\chi^2(0.95, 3)=7.81$

<sup>c</sup> The average monthly income of NT dollars

Table 2. Sample Distribution of Transaction Communities

Transaction Virtual Communities	Frequency	Percent
ICHIBA	19	8.4
MOMO	39	17.3
Payeasy	27	12.0
King Stone	17	7.6
Books.com.tw	46	20.4
7net	13	5.8
GOHAPPY	8	3.6
Eslite.com	14	6.2
Others	38	16.9
Total	221	100.0

### 3.2 Measurement

**Web Service Quality.** Several authors have developed diverse instruments to measure e-service quality (Santos, 2003; Zeithaml, 2002) and there are discrepancies regarding service quality measurement. One of the first and most widely used instruments to measure service was developed by Parasuraman, Zeithaml, and Berry (1988) and was intended to provide managers with insights into information systems service perceptions, and subsequently to provide a benchmark across information systems business processes (Kettinger & Lee, 1997). Parasuraman, Zeithaml, and Berry (1994) later adapted and extended the model to include dimensions reflecting e-service quality, defined as the extent to which a website facilitates efficient and effective shopping, purchasing and delivery, many of which are identical to the dimensions proposed as factors impacting service quality in physical service encounters. This research adopt Udo et al. (2010)'s definition and measurement, because their study focused on examining the dimensions of web service quality based on e-customer's, expectations and perceptions and have included relevant studies.

**Social Identification.** According to Tajfel (1978) and Ellemers et al. (1999)'s research, this study defined social identification as transaction VC member's sense of belonging to the community. This research measure social identification from three components: cognitive, evaluative, and emotional (Ellemers et al., 1999). Detailed measurement is listed as Table 3.

**Behavior Intention.** Drawing from previous studies, this research measured three kinds of VC members' behavior intention: spreading eWOM, getting information, and purchasing. Firstly, this study defined eWOM as transaction VC members' sharing of their positive experiences and opinions to others. Following Maxham and Netemeyer (2002)'s measurement, this research developed 3 items to measure the likelihood of spreading positive eWOM. This research adopt Lu et al. (2010)'s measurement to measure intention to get information and purchase intention, because their research objective, Taobao virtual community, is transaction VC like ours. Detailed items are shown in Table 3.

**Control variables.** As previously noted, behavior intention may be affected by consumer demographics. Therefore, gender, age, education, vocation, and income were used as control variables. All control variables, except age, are dummy variable. Detailed measurement is shown as notes in Table 4. Age belongs to ratio scale, ranging from 15 to 56. The average age is 31.

Table 3. Reliability and validity of variables (N=225)

Variables	Factor Loadings	Eigenvalue	Cumulative explained variance (%)
<b>Social Identification</b> ( $\alpha=.785$ )		3.634	36.343
I would like to continue using this transactional community.	.710		
I dislike being a member of this transactional community.	.601		
I identify with other members of this transactional community.	.784		
I am like other members of this transactional community.	.677		
This transactional community is an important reflection of who I am.	.670		
I feel good about this transactional community.	.619		
<b>Web Service Quality</b> ( $\alpha=.706$ )		2.157	53.931
In the A transaction website, the vendor gives prompt service to customers.	.781		
In the A transaction website, it is easy to find what you were looking for.	.736		
The A transaction website seems to be up to date.	.663		
The A transaction website provides high quality information.	.753		
<b>Behavior Intention</b>			
<b>Intention to Spread eWOM</b> ( $\alpha=.612$ )		1.722	57.404
It's highly possible that I spread positive word-of-mouth about the A transaction website.	.795		
I would recommend the A transaction website to my friends.	.850		
If my friends are looking for a certain product or service, I would tell them to try the A transaction website.	.606		
<b>Intention to Get Information</b> ( $\alpha=.841$ )		2.277	75.895
I intend to come to the A community to get related information when I want to purchase some products.	.875		
I intend to come to the A community to get related information when I need to know the characteristics of some products	.872		
I will consider coming to the A community to get related information when I need to know other people's experiences of using some products	.867		
<b>Purchase Intention</b> ( $\alpha=.822$ )		2.215	73.822
Given the chance, I would consider purchasing products on the A website in the future.	.871		
It is likely that I will actually purchase products on the A website in the near future.	.866		
Given the opportunity, I intend to purchase products on the A website.	.840		

### 3.3 Measurement development

**Questionnaire design.** Questions came from existing scales that were developed and tested in previous research. As the original items were in English, the author used the following procedures to ensure the translation validity. First, a researcher



whose native language is Chinese forward translated these items into Chinese. Next, another researcher independently backward translated these items into English. Subsequently, the two researchers compared and discussed the two English versions to develop the first Chinese version of the items. After minor revisions to the instrument, 30 students were asked to fill questionnaire. According to the pretest, this research revised the questionnaire again. To avoid potential sources of common method bias, this study adopted the suggestion of Podsakoff, MacKenzie, Lee, and Podsakoff (2003). This study sought to reduce method bias by guaranteeing response anonymity and psychologically separating the dependent and independent variables by mixing all questions. Furthermore, the threat of common method variance was investigated via the Harman one-factor test. No single factor emerged from the analysis nor did a single general factor account for most of the variance in the variables. As a result, common method bias appears to be minimal.

***Validity and Reliability.*** Factor Analysis was employed to verify construct validity. Table 3 shows that all variables have construct validity. Besides, the Cronbach's alpha values of all variables are above .600; this means the measurement of these constructs is statistically reliable.

## 4. Results

Table 4 presents the descriptive statistics and Pearson correlation coefficients for the study variables. The correlation matrix indicates that web service quality, social identification, intention to spread eWOM, intention to get information, and purchase intention have high correlation with each other. However, control variables have no significant relationships with independent, mediator, and dependent variables.

This study used regression analysis to test Hypothesis 1. Table 5 shows that web service quality have significant impact on social identification. Thus, Hypothesis 1 is supported. Standardized regression results in Table 6 shows that social identification has significant positive influence on behavior intention (Models 2, 4, 6). Therefore, Hypotheses 2, 3, and 4 are supported. Finally, this research adopted B-K approach (Baron & Kenny, 1986; Kenny, Kashy, & Bolger, 1998) to test mediating effect of social identification and used hierarchical regression analysis to test Hypothesis 5. Control variables and independent variable (web service quality) were first entered, after which mediator variable (social identification) was next entered as main effect predictors of behavior intention (see Models 1 to 6 in Table 6). Firstly, web service quality positively affects three kinds of behavior intention. Secondly, web service quality positively affects social identification (see Table 5). Finally,

when social identification was put into models, there was a significant increase in Model fit (see Models 2, 4, 6). Furthermore, the impacts of web service quality are lower in Models 2, 4, 6 in comparison with Models 1, 3, 5. These results imply that social identification possesses full mediating effect. Therefore, Hypothesis 5 is supported.

Table 4 shows that all variables have high correlation with each other; this implies the possibility of multicollinearity problem. However, variance inflation factors (VIF) in all regression models are below 3; it indicates that there is no significant sign of a multicollinearity problem.

## **5. Conclusions and Implications**

After surveying 225 VC members in Taiwan, this research found that web service quality will positively influence members' social identification. Members with high social identification are more likely to spread eWOM, to get information and to purchase from the transaction website.

The TAM was designed to apply to computer usage behavior and to explain end-user's behavior towards information technology (Davis et al., 1989; Saadé et al., 2007). Drawing from the TAM, this research found that web service quality is an important external variable which will affect members' attitude toward using. However, the TAM stresses more the influence of information systems on consumer behavior and ignores the effect of social and psychological factors (Lin, 2008). Applying the social identity theory, this study treated members' social identification as attitude toward using the transaction website which will further influence their behavior attention. This research integrated both the TAM and social identity theory into model, so that we are able to emphasize the effect of social and psychological factors. This contributes to academic implications.

According to the research findings, this study suggests that practitioners of transaction websites should continue improving their web service quality, such as giving prompt service to customer, providing abundant, up to date, and high quality information. The web service quality is the most important variable in affecting e-customer satisfaction. Satisfied customers will have positive attitude toward using the website and are more likely to engage in the transaction VC. This leads to members' sense of belong and positive behavior intention. Therefore, this research also suggests that practitioners of transaction websites do their best to encourage members' engagement.

Table 4. Descriptive statistics and Pearson correlation coefficients (N=225)

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Gender	-									
2. Age	.156*	-								
3. Education	.076	.363**	-							
4. Vocation	-.064	-.453**	-.150*	-						
5. Monthly income	-.166*	-.583**	-.183**	.523**	-					
6. Web Service Quality	.007	.033	.004	-.008	.033	-				
7. Social identification	-.111	.026	-.004	.026	.033	.798**	-			
8. Intention to spread eWOM	-.015	.016	.016	.023	.019	.774**	.795**	-		
9. Intention to get information	-.054	.027	.031	.092	.120	.756**	.755**	.761**	-	
10. Purchase intention	-.042	.083	.018	-.001	.021	.755**	.752**	.764**	.724**	-
Mean	.457	30.956	.200	.182	.449	4.766	4.674	4.732	5.016	4.871
SD	.499	8.261	.401	.387	.498	.869	.851	.991	1.048	1.012

Note. Gender is assigned 0 for female and 1 for male. Education is assigned 0 for college and above college, 1 for High School and below. Vocation: 0 for workers, 1 for students. Monthly income is assigned 0 for above 25000, 1 for below 25000.

\*  $p < .05$ ; \*\*  $p < .01$

Table 5. Standardized Regression Results for Social Identification

Variables	Social Identification	
	$\beta$	VIF
Control Variables		
Gender	-.130***	1.037
Age	.028	1.769
Education	-.008	1.153
Vocation	.061	1.454
Monthly income	-.020	1.774
Independent Variables		
Web service quality	.801***	1.006
Model $F$	52.011***	
$R^2$	.632	

\*  $p < .10$ ; \*\*  $p < .05$ ; \*\*\*  $p < .01$

Table 6. Standardized Regression Results for Behavior Intention

Variables	Intention to spread eWOM		Intention to get information		Purchase intention	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Control Variables</b>						
Gender	-.030	.033	-.055	.000	-.052	.003
Age	.051	.040	.103*	.091*	.100*	.087
Education	.003	.007	.028	.031	-.007	-.006
Vocation	.067	.037	.088*	.062	.025	-.001
Monthly income	-.016	-.004	.106*	.114**	.032	.041
<b>Independent Variables</b>						
Web service quality	.773***	.374***	.748***	.415***	.746***	.404***
Social identification		.497***		.416***		.426***
Model <i>F</i>	54.059***	66.914***	51.167***	56.197***	46.953***	52.011***
<i>R</i> <sup>2</sup>	.602	.687	.588	.648	.569	.632

*Note.* Gender is assigned 0 for female and 1 for male. Education is assigned 0 for college and above college, 1 for High School and below. Vocation: 0 for workers, 1 for students. Monthly income is assigned 0 for above 25000, 1 for below 25000.

\* $p < .10$ ; \*\* $p < .05$ ; \*\*\* $p < .01$

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# **Social Network Applications: Creation of Negative Emotions**

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## **Abstract**

Most research on social network application (SNA) has concentrated on positive aspects of such applications. Few studies have examined the negative impacts of social network applications. This study investigates the impact of negative emotions, desire for revenge, and retaliatory actions created by social network applications utilizing Stimulus-Organism- Response Framework Theory and social capital framework.

We propose that social capital can have a significant impact on creating negative emotions for the users of social network applications. The results of our research using structural equation modeling and correlation analyses set forth strategies that can assist the web site operators addressing the negative impact of social network applications.

**Keywords: Social capital, Social network application, Negative emotions**

# GENERATIONAL IDENTITIES AND ITS IMPACT ON ENTERPRISE INFORMATION SYSTEM SECURITY

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## ABSTRACT

In today's global environment, it is essential that businesses develop and implement a security module within an Enterprise Information System (EIS). An effective security module should protect both the company's intellectual property from outsiders *and* prevent insider breaches from its employees. Overall, the security breaches stemming from internal sources are not usually reported due to the sensitive nature. Previous research has indicated that an EIS security model can be exhibited with four key components to address internal breaches. These components are Security Policy (e.g., set rules for employee behavior), Security Awareness (e.g., continued education of employees), Access Control (e.g., access linked to employee job function), and Top Level Management Support (e.g., engrain information security into the company's culture). In a recent article, the global director of information security for a world's leading organization of independent assurance, tax and advisory firm stated that "when it comes to security policy, most enterprises treat all users the same way. But perhaps this is a mistake. When you take a closer look at the age of your end users -- their so-called "generational identities" -- you may find that users of different generations have very different attitudes and practices with regard to online privacy and security." In this research, we plan to test a variety of issues related to the generational identities of organizational employees and the various components of the EIS security model. For example, are there differences in employees' attitudes towards security policy that is directly linked to the concept of a generational identity? If there is a divergence of attitudes based on this type of segmentation, how would firms develop more salient training materials for security awareness? In what way does generational background impact the adoption of cloud computing under the security umbrella? A questionnaire is being developed and will be administered to a convenience sample of respondents attending various graduate programs in America, Asia, and Europe. The initial results of this exploratory research will be reported as part of this paper.

**Enterprise Information System, Security, Generational Identities**

# **GAP ANALYSIS OF INDUSTRY-INSTITUTE EXPECTATIONS FROM PROFESSIONAL EDUCATION IN THE KINGDOM OF SAUDI ARABIA**

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## **Abstract**

It is evident that the value of professional education to individuals, organizations and society is enormous. Professional education directly influences the effectiveness of organizations in ways beyond the critical role which graduates play by leading and participating in organizations. An institute can not function in isolation for developing sustainable professional programs. Similarly, as an important stakeholder, organization must also play a vital role in planning and execution of professional programs. In the recent past, Industry-Institute partnerships have become important enablers of economic development. Unfortunately, in Saudi Arabia, there are hardly any structured collaborative programs between the industries and institutions. Though the end products of the institutions are absorbed by the industries by way of on-campus or off-campus placements, the necessary support schemes to the institutions are not being extended by the industry. The result is poor performance of students in their placement efforts and in industries.

The object of this research is to ascertain the industry-institute view on current professional education in Saudi Arabia. The research will involve a literature review and an empirical study. A quantitative approach with regard to the method of research shall be applied. An ex-post facto (non-experimental) research shall be undertaken by using a questionnaire as research instrument to collect the data from different company managers in industry and professional teachers from academia in Saudi Arabia. The research shall help to determine the important skill sets for increasing the employability of professional graduates. The findings shall disclose whether there is a gap between the company requirements and the output of the professional institutes. The research shall also suggest some guidelines for better industry-institute collaboration in Saudi Arabia, especially in curricula design, implementation and evaluation.

**Keywords:** Industry-Institute partnership, professional education, collaborative education, gap analysis, professional teachers, etc.

## **1. Introduction**

### **Role of Professional Education in Developing Economy**

It is essential to understand the basic link between business, the environment and society in the present competitive world. The roles and responsibilities of business as a global force are becoming more urgent and complex. Globalization has given professional education an increasingly important role in the success of individuals and organizations. Professional education has spread in the last ten years in Saudi Arabia. Saudi Arabia is an oil based economy. They are the largest exporter of oil in the world. For the year 2012, total expenditure is budgeted at SR690 billion. As in previous years, education and training have received the largest share, at 24 percent of total spending or \$44.1 billion (SR165 billion). However, the rate of unemployment in Saudi Arabia is still 10.9% which is one of the major concerns for the policy maker. [7]

According to a research published by Al-Arabiya News on unemployment, one of the major causes of the unemployment problem in Saudi Arabia is education system. The education system is failing to equip young Saudis with the right skills. The young Saudis are not studying the subjects the society needs most. The existing programs are not covered by the needs of labor market. The population of fresh graduates is increasing every year, but most of them are struggling to find a job in the market. They lack in employability skills. Indeed, there is mismatch between the number of skilled graduates from public and higher education institutions and the needs of the labor market. Professional education, at this juncture, needs a critical examination as only developing talent can take Saudi Arabia forward. There is a gap in the performance expectation of industry from students graduating from educational institutions.

This paper examines the issues that need to be addressed and a possible direction so that professional education can be rejuvenated. The purpose of this paper is to engage all concerned in a serious discussion with a view to revamping professional education in Saudi Arabia as a prelude to better participation and viability in the global economy. It is the joint responsibility of Government, public sector and private firms and educators, to put professional education on a new growth trajectory.

## **2. Literature Review**

### **2.1 Role of professional Education in Nation Building**

Education is normally the acquiring of knowledge as well as the skills that are accepted by a given society. On the other hand, nation-building is the implementation of processes that are geared towards recomposing the nation's institutions so that they can reflect the wishes, needs and aspirations of the wider society.

A nation cannot be built without education. With education, professionals are nurtured that will enhance nation-building. In the same way, education leads to efficient usage of a nation's resources which in turn is very crucial to nation-building because without efficient usage of a nation's resources, nation-building will not be successful. This is evident in the developed nations. To continue to build their nations, they educate their citizens, because education shapes the attitudes and behaviors and values of citizens. These are qualities that are needed for nation-building and it is only education that will bring those mechanics.[1]

Success is the catchword these days, the more victorious; more popularity one gains among its audience. People these days are more excited about earning fame and glory as soon as possible. Also, with the globalization of the world, the need of the skilled labor is increasing. The route to success is getting shorter with the opening up of varied prospects and fields, one can adopt as his career. The students are therefore, grabbing these opportunities and are very keen to structure their career according to the need of the hour.

Professional courses are the education or curriculum designed, keeping in mind the need of a particular industry, courses like this are very focused and future oriented. Professional courses have gained importance in the recent years, with the graph going high for job opportunities in the respective sectors. A professional course helps students to get trained and aware of the latest trends in the market and the respective work environments. These courses can be in the form of degree or diploma certificates depending upon their curriculum and the time period.[6]

A 2005 report by Access Economics on the study of "The Economic Benefit of Increased Participation in Education and Training" in Australia concluded that increasing the participation rate in education increased productivity, wage rates and rate of participation in better paid jobs. The result being an increase in GDP by 1.1% in a generation by increasing participation by about ten percent.[8]

In a speech in 2004, Alan Greenspan, Chairman of the Federal Reserve Board of the USA, commented on the impact of the state of knowledge and skill of a population as an important factor in determining the

level of economic growth. “Generic capabilities in mathematics, writing, and verbal skills are key to the ability to learn and to apply new skills and thus to earn higher real wages over time, he said.[9]

Education clearly is a driver of better productivity giving rise to a higher competitive ability and hence more jobs and higher economic growth rates which enables more money to be invested in, for instance, better education. It is a virtuous circle.

The success of Higher Technical Education in developed countries like the US, Canada, UK and others can be attributed to the close collaboration between citadels of learning and industry. This opens up many avenues and it is a win, win situation for the good of both and the country too.

Every year millions of technical and professional graduate and Post graduate students are coming out of the portals of learning. On every such student, parents, governments, institutions are investing huge amount in terms of fees, books, transport, food, lodging, maintenance, coaching etc. The parents have a lot of expectations from their wards. The companies that give jobs to the graduate and Post graduate technical and professional students grumble about the quality and standards of these job seekers. They feel that they are not useful to the industry and cannot be put to a job immediately. Such selected graduates are subjected to in-house training as the industry feels that these fresher are not properly equipped necessary skills during their years of study.

The industries absorbing these graduates should extend a helping hand to these institutions to upgrade the quality of education. There is a feeling that industries are doing very little to these institutions in this direction. They can help the institutions in updating the syllabi, providing practical experience to final year students by way of mini and major projects, industrial visits, giving guest lectures, providing an insight on the latest trends and their expectations, instituting Endowment chairs / awards / rewards in the institutions.[13]

## **2.2 Industry-Institute Collaboration**

Cooperative education has existed in the US for most of the 20th century as a method of combining academic education with practical work experience. While at Lehigh University, Dr. Herman Schneider an engineer, architect, and educator, concluded that the traditional classroom was insufficient for technical students. Schneider observed that several of the more successful Lehigh graduates had worked to earn money prior to graduation. Gathering data through interviews of employers and graduates, he devised the framework for cooperative education in 1901. In 1903 he began working at the University of



Cincinnati and in 1906 was allowed to implement his plan for one year. Following that experimental year, the University of Cincinnati gave him full permission for the cooperative program. In 1911 an experimental high school program was established in York, Pennsylvania. Boston High School in 1912 established the first retail cooperative training program. Cooperative education programs were established in ten New York City schools in 1915, and cooperative instruction was established in Dayton Cooperative High School in 1949.[10]

### **Definition**

A number of definitions have been suggested in the literature for the term 'cooperative education'.

The Canadian Association for Cooperative Education defines cooperative education as *"a program that formally integrates a student's academic studies with work experience with participating employers"*.

This definition is further elaborated to include programs which are based on either work experience alternating with academic studies or internship programs which are based on a single work experience.

The National Commission for Cooperative Education defines cooperative education as *"a structured educational strategy integrating classroom studies with learning through productive work experiences in a field related to a student's academic or career goals."*[5]

### **2.3 Objectives of Industry-Institute Interaction**

Close interaction between the institute and the industry/enterprise is seen as the platform for showcasing best practices, latest technological advancements and their implementation and impact on the Industry. It is basically considered to improve the quality of technical and vocational education adequately to meet the needs of the industry and economy. Having a close interaction in place, industries are able to participate in technical and vocational education programs, with the goal of cross-fertilizing ideas for systems improvement. To integrate industrial training and other inputs from the industry with the teaching-learning processes, interaction is necessary as it develops students' awareness on job functions in the industry, attitudes to adapt to industrial environment, proper practical and relevant knowledge, skills and competencies in preparation to becoming self employed.

Mutual benefit is derived from the shared expertise and experiences between the industry and the institute. In addition, operating within the framework of a specific cooperative program is an essential outcome of having both industries and institute agree on specific skills training for some specific jobs.

The characteristics of the workplace as the supreme learning environment must be coordinated properly to ensure that there is a close correlation between the types of training that the workforce is being prepared for vis-à-vis the work environment, tasks and work systems. The institutions' objectives must meet the expectations that industries regard in the context of finding the best in the pool to help them achieve industry goals.[17] The goals need to be looked into in respect to institutional thrusts and objectives, as illustrated below:



**Figure 1: Industry-Institute Collaboration as coordinating agent**

#### **2.4 Best Practices of Cooperative Education**

According to De Lange, most higher education institutions (HEIs) worldwide make use of some form of central office to manage cooperative education. The specific role and functions of cooperative education in an HEI may include, among others, national and international networks, industry liaison, interaction with alumni, staff development and training, budgeting, direct involvement in curriculum development, partnerships with industry, research in cooperative education, promotion of cooperative education and the management and administration of cooperative education.[3]

Mechanisms to involve industry representatives in formulating the curriculum and teaching and learning systems open productive platforms for industry-institute interaction. Collaboration, discussion and decision-making processes produce mutual agreements and understanding of the real conditions in the work place, the systemic functioning of industries and industry expectations. To some extent, such kind of interaction provides a highly effective mechanism to generate feedback based on employer demands to meet half-way in the design of academically-sound and industry-oriented curricula. This kind of interaction has resulted in the creation of such opportunities like offering of sandwich courses, development of courses jointly developed and certified under I-I tie up, joint continuing courses and periodic curricula update in relation to industrial trends and projections.

Suffice it to say, there is a need to review and modify curricula and teaching and learning styles of various disciplines to accommodate technological changes, management practices and needs of the labor market.

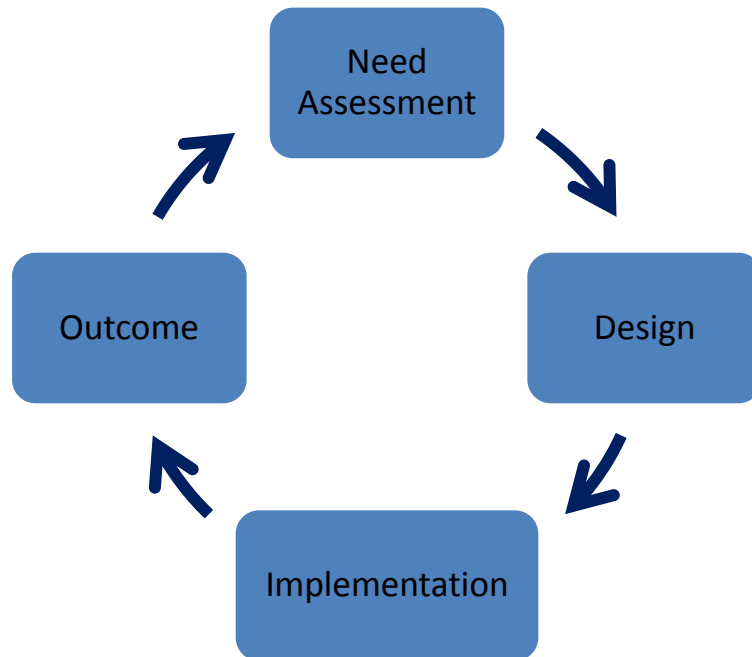
## **2.5 Curriculum Development, Teaching and Learning System**

The word curriculum derives from the Latin *currere* meaning 'to run'. This implies that one of the functions of a curriculum is to provide a template or design which enables learning to take place. Curricula usually define the learning that is expected to take place during a course or program of study in terms of knowledge, skills and attitudes, they should specify the main teaching, learning and assessment methods and provide an indication of the learning resources required to support the effective delivery of the course. A curriculum is more than a syllabus. A syllabus describes the content of a program and can be seen as one part of a curriculum. Most curricula are not developed from scratch and all operate within organizational and societal constraints.

The curriculum that is written and published, for example as course documentation, is the official or formal curriculum. The aim of educational development is to ensure that the official curriculum is delivered as the functional curriculum and there is not a mismatch as development turns into implementation.

## **2.6 The Curricular Cycle**

Peyton and Peyton note that the curricular cycle "involves development through needs assessment, design and implementation phases. After this, outcomes are reviewed and evaluated against the original needs assessment. Needs change with societal expectations. The emphasis on different aspects varies with the participants' and teachers' perceived needs. The dynamic curriculum requires change and resource management".[16]



**Figure 2: Curricular Cycle**

Considering the above mentioned literature following **research objectives** were set:

1. To find out the views of industry and academia on current professional education system in Saudi Arabia
2. To identify the major skill sets required for employability in Saudi Arabia
3. To analyze the gap in the expectations of Industry and institute from professional education
4. To define the role and responsibilities of industry-institute in professional curricula design, implementation and evaluation

### **3. Research Methodology**

A comprehensive literature study was performed to find the relevance of the stated research questions. The literature study was performed to identify areas to be investigated in the target and study populations. An ex-post-facto (non-experimental) research was undertaken in the field of professional education.

**3.1 Data Collection Tool:** Questionnaire Method, Interview Techniques and document analysis were used.

The questionnaire consisted of Section A (Gap Analysis), Section B (Role of Industry-Institute in Curriculum Design), Section C (Barriers for Industry-Institute Collaboration) and Section D (Respondent Profile). The questionnaire was piloted and corrected, after which the questionnaires were distributed to and collected from respondents, mostly by email.

**3.2 Survey Location:** Kingdom of Saudi Arabia – divided into four provinces Riyadh, Dammam, Jeddha and the Rest as most of the universities and industries are located here.

**3.3 Sample Size:** 300 (Industry + Institute)

**Summary:** Out of 300 respondents, 188 filled it completely and send it back resulting in 63% response rate.

### **3.4 Statistical Analysis and Interpretation**

Data collected from questionnaires was analyzed according to descriptive analytical statistics. Frequency analysis of biographical data was conducted. Tests on reliability (Cronbach Alpha) and validity (factor analysis) were done using STATA software and Ms-Excel 2010. D-values of Cohen [4] were used to indicate whether there were any significant differences between the responses of the study populations. The results were found to be within the range and were considered satisfactory.

#### **3.4.1 Section D: Respondent Profile Analysis**

Respondents profile was collected from industry experts and heads of academic departments of professional education institutions with regard to their job profile, gender, education level, experience and type of organization.

The majorities of the respondents were either from government or public sector, predominantly male, held the position at middle level manager and had ten or more years of work experience. The majority of the respondents from industry having degree or master and from institute having doctorate or master as their highest qualification.

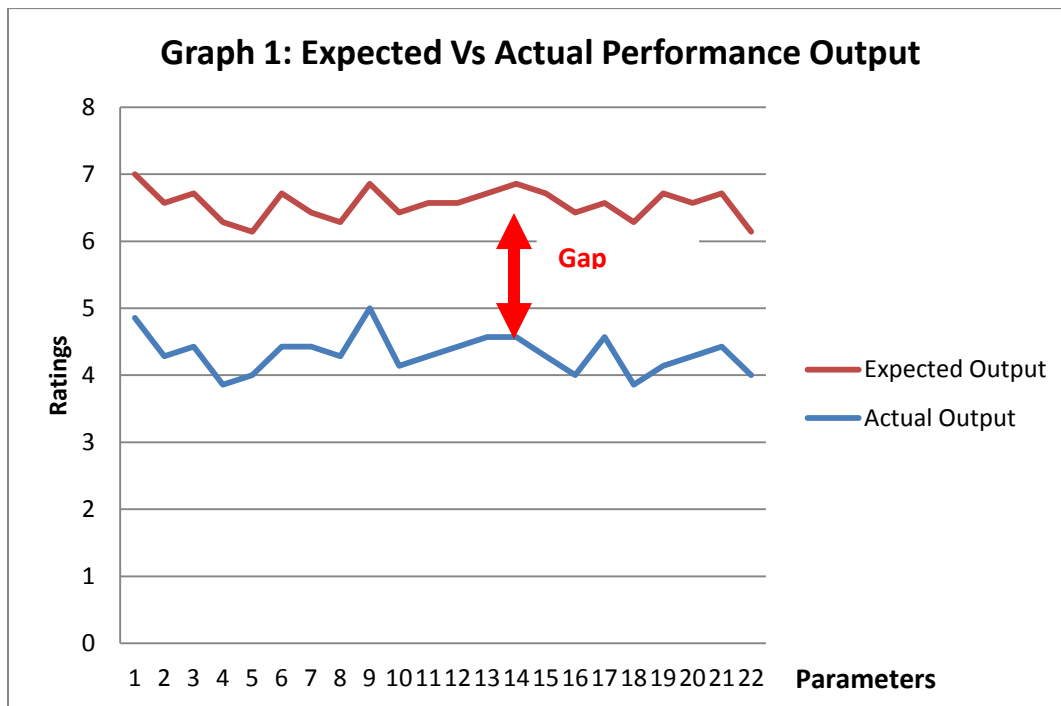
The similarity of the profiles of the two groups is noted with interest. Males dominate industry and institutions in the posts described. This was because females were not very keen to work outside in Saudi Arabia. The level of qualifications in higher education institutions is much higher than those in industry, probably since it is a requirement in institutions as compared to industry.

### 3.4.2 Section A : Gap Analysis of Industry-Institute Expectations from Professional Education in the Kingdom Of Saudi Arabia

Respondents were asked to rate on A- how important the activity is to the successful performance of the job and B- how well your employees currently perform that activity on a scale of 1-7 where for A: 1-Not at all important to 7-very important and for B: 1-Not Well to 7: Very Well.

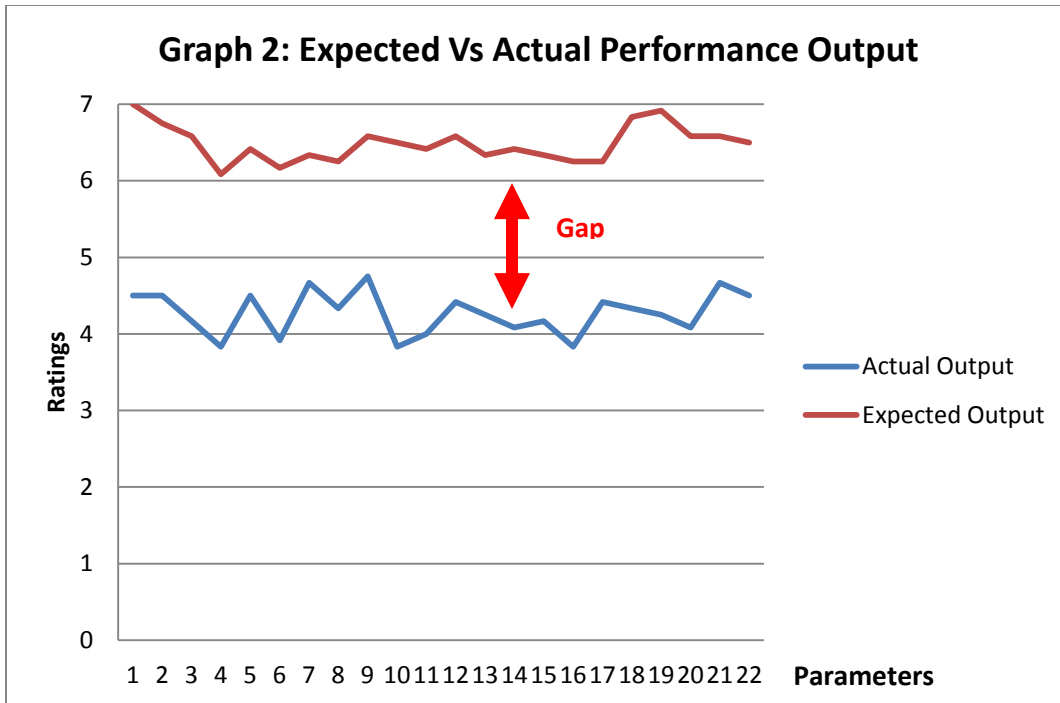
The following graph shows the gap in the expectation of industry-institute from professional education:

#### a) Industry Viewpoint



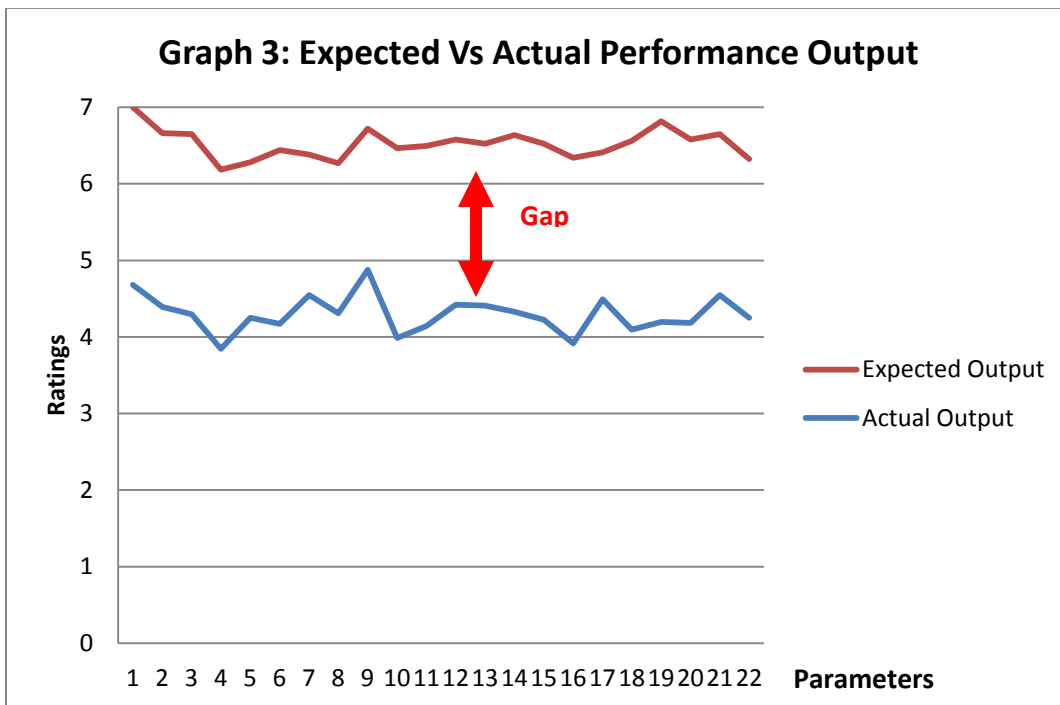
From the above graph 1, it is clear that there is a gap in the expected and actual output in the performance of professional education in Saudi Arabia. The graduates are unable to keep up the expectation of industry resulting in either unemployment or low performance.

#### b) Academia Viewpoint



Surprisingly, academicians also feels that there is a gap in the expected skill sets needed and actual skills possessed by professionals to perform good in industry.

**c) Combined Viewpoint**



The above graph 3 shows the combined effect of the viewpoint of Industry-Institute on performance of professional education.

The following table 1 shows the mean difference and standard deviation for the views collected from industry and institute. D-values of Cohen [4] were used to indicate whether there were any significant differences between the responses of the industry experts and the academicians.

**Formula**

$$d = (\text{Mean}(X) - \text{Mean}(Y)) / \text{maximum SD}$$

Where SD = Standard deviation.

The effect sizes were determined according to the following criteria[4]:

Small effect size:  $d = 0.2$ , Medium effect size:  $d = 0.5$  and Large effect size:  $d = 0.8$

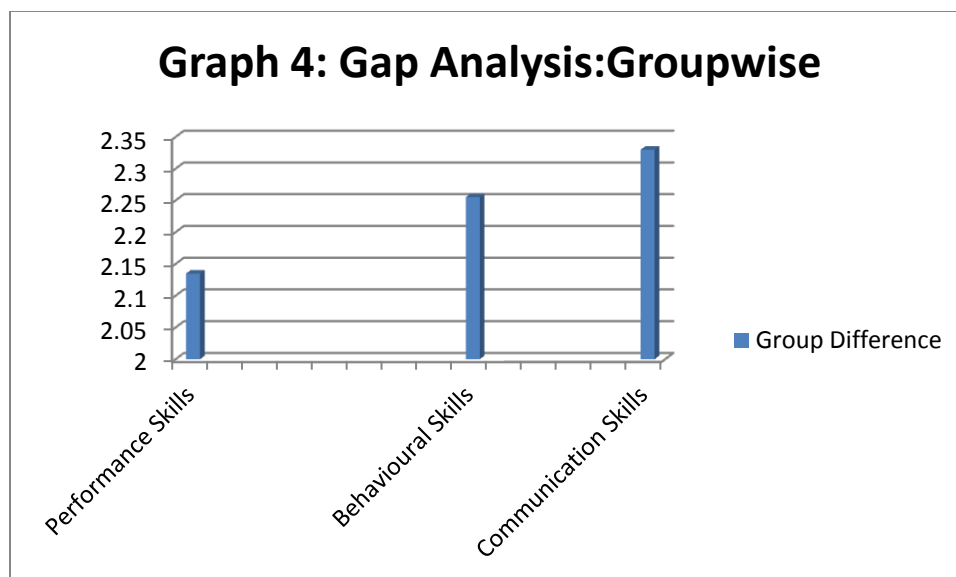
**Table 1: Gap Analysis**

Parameters	Industry		Academia		D-Value
	Mean(X)	Standard Deviation	Mean(Y)	Standard Deviation	
<b>Performance Skills</b>					
Job Knowledge	2.143	0.69	2.50	0.52	0.52
Skills and Abilities	2.286	0.49	2.25	0.62	0.06
Decision Making Capacity	2.286	0.49	2.42	0.67	0.20
Priority Setting	2.429	0.53	2.25	0.62	0.29
Adjustment to Changing work assignments	2.143	0.69	1.92	0.67	0.33
Goal Achievement Capacity	2.286	0.49	2.25	0.62	0.06
Planning & Implementation	2.000	0.58	1.67	0.98	0.34
Report Writing	2.000	0.58	1.92	0.79	0.11
Application of Information & Communication Technology	1.857	0.69	1.83	0.72	0.03
<b>Behavioral Skills</b>					
Initiative	2.286	0.76	2.67	0.89	0.43
Leadership Quality	2.286	0.49	2.42	0.67	0.20



Dependability	2.143	0.69	2.17	0.83	0.03
Market Knowledge	2.143	0.69	2.08	0.67	0.09
Teamwork	2.286	0.49	2.33	0.78	0.06
Attitude	2.429	0.79	2.17	0.83	0.31
Belongingness	2.429	0.98	2.42	0.67	0.01
Learning aptitude	2.000	0.82	1.83	0.72	0.20
<b>Communication Skills</b>					
Written Communication	2.429	0.79	2.50	0.90	0.08
Oral Communication	2.571	0.79	2.67	0.89	0.11
Interaction with colleagues	2.286	0.76	2.50	0.52	0.28
Listening skills	2.286	0.49	1.92	0.79	0.47
Computer Proficiency	2.143	0.90	2.00	0.85	0.16

In most of the observation, the value of  $d$  is either less than 0.2 or 0.5 and none of the observation shows  $d > 0.8$ . Hence it implies that there is no difference in the views of industry-institute on performance of professional education. They strongly feel that there is an urgent need to revise the curriculum to keep up to the expectations of the industry. Following graph 4 shows the priority in revising skill sets. The graph shows that the largest gap is in group of communication skills hence focus should be more on it.



### 3.4.3 Section B: Role of Industry-Institute in Curricular Design

In **Section B** Respondents were asked to reflect on their views on a 5-point Likert scale, with the range 1: *Not at All*; 2: *No*; 3: *Can't Say* 4: *Yes*; and 5: *Definitely Yes*. Respondents were asked questions to collect their viewpoint on their role in curriculum design to improve the performance of professional education.

The following table2 shows mean and standard deviation for the collected observations:

**Table 2: Role of Industry-Institute in Curriculum design**

Parameters	Industry		Academia		D Value
	Mean(X)	Standard Deviation	Mean(Y)	Standard Deviation	
Cooperative education can help to enforce the required skills among the students.	4.25	0.46291005	4.083333	0.514928651	0.32
Cooperative education will be beneficial to my organization.	4.25	0.707106781	3.666667	0.778498944	0.75
Industry-institute experts should work together in curriculum designing.	4.75	0.46291005	4.333333	0.651338947	0.64
Institute gives due importance to the needs of industry while planning a curriculum.	3.25	0.88640526	4	0.852802865	0.85
Industry can play an important role in need assessment.	4.125	0.83452296	3.666667	0.492365964	0.55

There is a gap in requirement definition and requirement mapping in curriculum design.	3.875	0.353553391	4	0.603022689	0.21
The existing teaching methodology is sufficient to train quality graduates.	3	0.9258201	3.166667	0.937436867	0.18
Industry experts can help bringing creativity and innovation in teaching.	4.125	0.353553391	4.333333	0.887625365	0.23
Industry should support the faculties for research & development and help them in technology deployment.	4.375	0.744023809	4.416667	0.668557923	0.06
Industries can help institutes in infrastructure improvement.	3.75	0.46291005	4	0.738548946	0.34

In response to the questions focusing on role, both industry-institute either agrees or strongly agrees that collaboration can play a vital role in improving curriculum design and thereby improving the performance of professional education. However, industry experts were not very clear that how they can get benefit from it. They agree that there is a gap in the curriculum planning and deployment. Both the stakeholders agree or strongly agree that the collaboration will help to bring innovation and creativity in curriculum and also can help to improve the R&D work in institute. As in most of the observation, the value of  $d > 0.8$  means that there is no significant difference between the viewpoint of both the groups.

### 3.4.4 Section C: Barriers for Industry-Institute Collaboration

In **Section C**, Respondents were asked to reflect on their views on a 5-point Likert scale, with the range 1: *Strongly Disagree*; 2: *Disagree*; 3: *Neutral* 4: *Agree*; and 5: *Strongly Agree*. The questions were focusing on the barriers for the industry-institute collaboration. The following table 3 shows the observations collected from the various respondents:

**Table 3: Barriers for Industry-Institute Collaboration**

Parameters	Industry		Academia		D Value
	Mean(X)	Standard Deviation	Mean(Y)	Standard Deviation	
There is a lack of balance in the number of industry-institute representatives.	3.25	0.88640526	3.833333	0.577350269	0.66

The selection of representatives is based only on experience, most of the representatives are either retired or on the verge of retirement.	3.375	0.744023809	3.5	0.904534034	0.14
The work approach of the curriculum design committee is unprofessional and lacks commitment.	3.375	0.744023809	3.75	0.753778361	0.50
The institute representatives normally oppose any major change in the curriculum as that will force them to upgrade themselves.	3.625	0.916125381	4.25	0.621581561	0.68
There is no direct monetary benefit to the industry, so they don't take it seriously.	3.125	0.991031209	3.583333	0.792961461	0.46
There is a lack of trust between industry and institute.	3.75	0.707106781	3.583333	0.99620492	0.17
In most of the institutes, curriculum design and implementation takes lot of time.	3.625	0.51754917	4.083333	0.514928651	0.89

In the above table, the mean score of both the group in response to most of the questions were around 3-4 which implies that some respondent were not sure about it and the rest agrees to it. While observing the responses for reluctance of faculty members for any major change, both groups agree to it. Both the group agrees that curriculum design lacks trust between them and takes lot of time for implementation. Since the value of d in most of the observation is below 0.8 which implies that there were no significant differences between the viewpoints of both the groups.

#### 4. Findings and Conclusion

The performance of professional education plays an important role in the economy of any developing country. Changing economic conditions and intensification of global competition have given professional education an increasingly central role in the success of individuals and corporations. As discussed in literature review, one of the major reasons for unemployment in Saudi Arabia is the failure of education system. The researcher successfully conducted a gap analysis to find out the gap in the level of

expectation of industry-institute from professional education. The research suggested the skills sets required for increasing employment while designing curriculum in Saudi Arabia. The major gap is observed in communication skill. The focus should be on first communication skills, behavioral skills and then on performance skills. Hence the first objective of the research was fulfilled.

The researcher successfully proposed industry-institute collaboration as a tool to increase the performance of professional education in Saudi Arabia. Both the groups- industry-institute agrees that collaboration will help to design such a curriculum which will help to generate industry ready professionals. Surprisingly, the institute professionals having more than ten years of experience and doctorate degree also agrees to the need of industry-institute collaboration. They also agree that collaboration can definitely increases the employment prospects of professional education.

It is observed that industry-institute collaboration is quite an old concept. But the implementation in Saudi Arabia is still not so encouraging. The researcher successfully finds out the different barriers for its implementation. The viewpoints of both the groups agrees that curriculum design is a lengthy process and most of the time lacks commitment from both the groups i.e. industry and institute. There is a lack of trust among the stakeholders. The industry experts were doubtful about the benefit of collaboration to their organization. A further detailed research is required to address the benefits of industry and institute and it should be properly communicated to them. A guideline is proposed to have an effective curriculum for increasing employability:

- While designing curriculum, due important should be given on integrating employability skills.
- Curriculum design should be carried out in consultation with the industry experts.
- In the present era of globalization, periodic course verification must be done to ensure efficient integration of employability skills.
- Employability skills audit can be used to establish baseline criteria against which the inclusion of skills within curriculum areas can be assessed.
- Ensure efficient mapping of employability skills in the curriculum.
- Stakeholders' commitment and engagement is required to be embedded effectively within individual curriculum areas.

Finally, the findings of this research may be used as a guide to conduct gap analysis for other educational programs. The findings will also help to identify the roles and responsibilities of industry and institute in curriculum design. Professional Institutions need to take note of these findings, as they

indicate how highly both industry and academics value cooperative education as a teaching methodology. They should use collaboration as a strategy to tackle the global problems of present and future.

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# UNDERGRADUATE RESEARCH PROJECT IN OPERATIONS MANAGEMENT -A REAL WORLD APPLICATION OF DATA ENVELOPMENT ANALYSIS TO BENCHMARK POWER PRODUCTION EFFICIENCY

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## ABSTRACT

This teaching note demonstrates our experience in implementing a real-world-problem based research project in teaching an Undergraduates Production Operations Management course. In this project, students investigated a multi-million dollars effort Access database compiled by EPA and applied DEA model to benchmark production efficiency among all the coal-fired power plants within the state that they selected in U.S.A. This teaching case works best in terms of weaving the research project through the whole semester, developing students' problem-solving skills, illustrating DEA models with a real production problem, and increasing students' awareness of sustainability in production operations management. However, within the limited time frame (14 weeks), the messy database and the complexity of DEA model, the trade-off between the traditional class materials and this creative project need to be well balanced. Otherwise, students might feel overwhelmed by the heavy research workload without sufficient attention towards to the other subjects required in the course.

**Keywords:** Operations Management, DEA, Power Generation, Pollution Emission, Undergraduate Research

## 1. BASICS OF OPERATIONS MANAGEMENT AND DEA MODEL

Operations Management is the management of the process transforming inputs to outputs. Every organization, no matter in service sector or among manufacturing plants, is consists of variety of activities to complete this transformation. The inputs here can be capital invested, worker employed or energy used etc. The outputs could be the number of products produced, the number of people served, the number of cases completed, or even some outcome undesirable.

In order to evaluate efficiency of a set of decision making units (DMU), Data Envelopment Analysis (DEA) is a nonparametric tool through benchmarking the best performance among the peers. The decision making units under comparison have sets of of inputs and outputs in common although they might have different values in each of these dimensions. The efficiency is usually expressed by the ratio of outputs to inputs. In this sense, the calculation of the efficiency is quite similar to the most traditional way to calculate productivity. To calculate productivity, we only consider one single output or incorporate different type of outputs by using total profit. So do the inputs. A single input such as labor hours is usually considered in the single factor productivity calculation. If multiple outputs exist, they need to be transformed into the format of cost so that all the dimensions can be taken into consideration in this multi-factor productivity calculation. Therefore, DEA model is more powerful in handling multiple inputs and outputs in



the different dimensions, especially when those inputs cannot be easily converted into total costs and all the outputs cannot be easily converted into total profits.

Here are some basic introductions of DEA models. Interested readers can refer to the classical Charnes, Cooper, and Rhodes (CCR model)[1]. In the typical CCR model, assuming that we have  $M$  outputs and  $N$  inputs for all  $K$  DMUs,  $O_i^k$  denotes the  $i^{\text{th}}$  output values for the  $k^{\text{th}}$  DMU and  $I_j^k$  denotes the  $j^{\text{th}}$  input value for the  $k^{\text{th}}$  DMU. The objective function is to find the set of coefficient  $v$ 's corresponding to each input and of  $u$ 's corresponding to each output in order to maximize the weighted efficiency of this unit being evaluated. The constraints require that the efficiency of all the other DMU's efficiency should not be as large as 1, which also means that their efficiencies are lower than the targeted one. The whole model could be written as

$$\begin{aligned} \max E^o &= \frac{\sum_{i=1}^M u_i O_i^o}{\sum_{j=1}^N v_j I_j^o} \\ \text{s.t.} \\ \frac{\sum_{i=1}^M u_i O_i^k}{\sum_{j=1}^N v_j I_j^k} &\leq 1, \text{ for } k = 1, 2, \dots, K \\ u_i, v_j &\geq 0 \end{aligned}$$

The model can be rewritten into its equivalent linear format by 1) normalizing the weighted inputs for the targeted DMU as 1 and treating as a new constrain; 2) Therefore leaving the weighted output of the targeted DMU as the objective function; 3) getting all the weighted outputs minus weighed inputs less than 0 (because if any fraction value is less than 1, i.e., the difference between numerator and denominator is less than 0). The linear model is:

$$\begin{aligned} \max E^o &= \sum_{i=1}^M u_i O_i^o \\ \text{s.t.} \\ \sum_{i=1}^M u_i O_i^k - \sum_{j=1}^N v_j I_j^k &\leq 0, \text{ for } k = 1, 2, \dots, K \\ \sum_{j=1}^N v_j I_j^o &= 1 \\ u_i, v_j &\geq 0 \end{aligned}$$

This DEA model works best for these multi-dimensional comparisons. As the result, it is very common to see wide applications in the service operations area such as measuring the efficiency of hotels[2]. However, it is difficult to find a good application in the production/manufacturing operation field because most of time decision makers are likely to consider the comparison of profits and costs in production system. However, luckily, our class project serves perfectly in demonstrating the application of DEA model in production setting since the pollution emissions cannot be simply estimated as the dollar value.

## **2. COAL-FIRED POWER PLANTS AND THEIR POLLUTION EMISSIONS**

The principle of power generation is quite standard and simple. Coal-fired units produce electricity by burning coal in a boiler to heat water to produce steam. With tremendous pressure, the steam is piped to the turbines which connect to generators. Then generators produce electricity. Coal –fired power plants are widely spread all over world. In 2011’s data, power generated from 1436 coal –fired plants counts for 42% among the total power generation. All the plants consumed more than 90 percent of the coal mined in the United States. For a long time, U.S. power generation heavily rely on the coal because of its large reserve and lower cost, especially compared with the other alternatives.

However, the power generation from coal had notoriously negative influences on the environment. The production process generate tremendous large amount of emissions. “Fossil fuel-fired power plants are responsible for 67 percent of the nation's sulfur dioxide emissions, 23 percent of nitrogen oxide emissions, and 40 percent of man-made carbon dioxide emissions. These emissions can lead to smog, acid rain, and haze.”[3] The public health was under high risk if we continue to increase the power generation from coal-fired power plants.

Not only the air pollution emissions from the coal-fired power plants are impressive, but also the other solid emissions are also increasing public awareness. “In 2005, U.S. EGUs emitted 50 percent of total domestic anthropogenic Hg emissions, 62 percent of total As emissions, 39 percent of total cadmium (Cd) emissions, 22 percent of total Cr emissions, 82 percent of total HCl emissions, 62 percent of total HF emissions, 28 percent of total Ni emissions, and 83 percent of total Se emissions.” [4]

Therefore EPA and lots of states took actions to regulate the emissions from the coal-fired power plants. Although many coal-fired power plants also took efforts (such as install facility emission controls or controls associated with the boiler, even change the boilers etc.) to meet the pollution emission standards, some of them still failed to be efficient. For example, due to the older boiler or the features of specific coal type, it might need to burn more coal to produce a small amount of electricity or burn few coal, however, generating a large amount of emissions. It is easy to require those facilities to shut down. However, considering the large employments and the contribution they have done to the economy, being aware who are efficient and who are not and why some of them are efficient, especially after compare with the peers within the same geographical location is meaningful and important.

## **4. PROJECT IMPLEMENTATION**

### **4.1 The Basic Class Setting**

Our university is a 4 year liberal art public university. The management department is one of the 3 departments in business school. In total, we have 11000 students on campus and 1100 students in the school of business, among which the three departments are management, finance and accounting and aviation. There are 5 concentrations in the management department: General Management, Marketing, Global Management, Operations Management and Information System. The course Production operations management course is one of the three most important concentration requirements for operations management concentration, but it also can be served

as an elective course for the other concentrations. Most students are commuters which mean that they are not living on campus and hardly find the time to work as a group. Meanwhile, more than 70% students have part time job and some of them having to work within the range of 20 hours to 40 hours per week, which create more difficulties in finding time to meet with group members and deep into the topics.

In fall 2013, we had 21 students in this class, among which 65% are senior students and 35% are junior students. 60% of students are from Operations Management concentration while the rest is from General Management. In this project, students were assigned into groups of two to select one of the ten states who have the largest amount of the coal-fired power plants.

#### 4.2 The Timeline and Deliverables

In this course MGMT 427, we introduced the project (the backgrounds and the timeline) at the first meeting of the class. Then we first taught the concepts of operations as transforming inputs to outputs and the way of the evaluation by computing productivity. After that, we switch to the topic of linear programming and DEA modeling, which serve as the mathematical tools for this research project. In between, we were organized the workshop with the librarian to conduct literature survey. Then one and half month was left for students to analyze data and complete the project while at the same time, we continue to discuss the traditional topics such as capacity planning, aggregating planning and inventory management. Three deliverables are 2 presentations and one final paper: 1) a short group presentation at the middle of the semester. Only the introduction to the background is required. This class activity is embedded on the school's sustainability day. 2) a final project group presentation in the end of the semester. These presentations were given at the university's mid-year symposium; 3) a final paper is due by the end of the semester in the final days. Within all the states, we picked the eleven states which have the largest number of coal-fired power plants. Through this research, we also learned that they also have the most serious pollution problems.

### 3. THE DATA

The database compiled by the U.S. Environmental Protection Agency (EPA) was firstly introduced to students to investigate. The main goal of this database is to establish the first ever national standards limiting emissions of hazardous air pollutants such as mercury from coal and oil fired power plants. This database provides lots of information existing in 40 different tables which detailed the features of all the components such as boilers, controls, ports and multiple samples data for the emission collected from different ports from 2004 to 2006. It is very obvious that this data set is very valuable.

**Table 1 - Links to Original Data and Descriptive Information**

MS Access Database	<a href="http://www.epa.gov/ttn/atw/utility/eu_ocr_parti_partii.mdb">www.epa.gov/ttn/atw/utility/eu_ocr_parti_partii.mdb</a>
Data Dictionary	<a href="http://www.epa.gov/ttn/atw/utility/pro/eu_mact_ocr_part-i_ii-data_dictionary.pdf">www.epa.gov/ttn/atw/utility/pro/eu_mact_ocr_part-i_ii-data_dictionary.pdf</a>
Data Diagram	<a href="http://www.epa.gov/ttn/atw/utility/pro/eu_mact_ocr_part-i_ii-db_erd.pdf">www.epa.gov/ttn/atw/utility/pro/eu_mact_ocr_part-i_ii-db_erd.pdf</a>
Survey (see enclosure 1)	<a href="http://www.epa.gov/ttn/atw/utility/g1/eu_mact_ocr_part_b.pdf">www.epa.gov/ttn/atw/utility/g1/eu_mact_ocr_part_b.pdf</a>
Other Related Links	<a href="http://www.epa.gov/ttn/atw/utility/utilitypg.html">www.epa.gov/ttn/atw/utility/utilitypg.html</a>

Since this is an Access database and students have various level of access background, it potentially increases the challenge for students to find the information. However, students have taken MGMT 360 (Information System) and COMP 105(Computer /Applications: Intro) where Access has been discussed. It is vital to revisit this important tool and equip students with the competence using this large business data.

## 5. THE RESULTS AND CONCLUSIONS

### 5.1 The Inputs and Outputs Selection

Students firstly need to understand the generic power generation process. Without fully understand this process, it is hard to find the inputs and outputs variables. Some students come out all the inputs and outputs they can think about. However, the database doesn't include all the information. As the result, students had to either rely on the other resources online or abandon those variables for the time being. One of the sources students used in the project is the secondary data from sourcewatch.com. We were also aware that more reliable data is preferred. Students' selection of inputs and outputs are listed as the table bellowed.

**Table 2 Students' Selection of Inputs and Outputs**

	Inputs	Outputs	# of DMU	Note
Tennessee	Coal consumption, employees (labor hours)	Net Capacity, SO <sub>2</sub> emissions, NO <sub>x</sub> emissions	7 plants	Few are efficient Take Tennessee's paradise fossil plant as an example
Virginia	Coal	Net Capacity, CO <sub>2</sub> , SO <sub>2</sub> and NO <sub>x</sub> emissions	10 plants	Infeasible. Cover is efficient.
Michigan	Coal usage, maximum heat input, health impact	Net generation	17 plants	Few are efficient
Indiana	Fuel consumption, heat input	Annual net generation, CO <sub>2</sub> and SO <sub>2</sub> emissions	10 largest	Few are efficient
George	Fuel consumption	Annual net generation, CO <sub>2</sub> emissions	6 plants	Few are efficient
Pennsylvania	Coal usage	MW Capacity, PM, SO <sub>2</sub> , NO <sub>x</sub> and CO <sub>2</sub> emission	21 plants	Most plants using bituminous are efficient while using coal refuse is

				not efficient. Notice the difference among coal type and boiler type
Ohio	Coal usage, heat input	Capacity, CO2 and SO2 emission	10 largest plants in the state	Few are efficient
Utah	Coal consumption, number of employees	Net capacity, CO2,SO2, NOx and mercury emissions	5 plants	Few are efficient
Texas	# of boilers	Net capacity, CO2,SO2, NOx and mercury emissions	19 plants	Infeasible
Missouri	Fuel usage	Capacity, CO2,SO2 emissions	17 Plants	Few are efficient
North Carolina	# of boilers, coal usage and heat inputs	Power generated, CO2,SO2, NOx and sulfur emissions	8 Plants	Few are efficient

## 5.2 Feedback

After the whole project, we requested students' feedback on this project. Here is the summary:

**Table 3 Students' Evaluation**

	Strongly agree (5)	Agree (4)	Neither agree nor disagree (3)	Disagree (2)	Strongly disagree (1)	weighted average
1. I am better prepared to conduct operations management research.	2	8	3			3.92
2. I have a better appreciation of the challenges of modeling real world decision problems.	4	7	2			4.15
3. I have a better understanding of Data Envelopment Analysis	3	7	3			4.00

models.						
4. I have a better understanding of production efficiency.	3	9	1			4.15
5. I gained competence using MS Access software.	4	5	3		1	3.85
6. Mathematical modeling skills will be useful for my future career.	3	7	3			4.00
7. Database skills will be useful for my future career.	4	5	2	1	1	3.77
8. I liked the research topic of power plant efficiency.		6	6	1		3.38
9. I gained valuable experience conducting research that involved an unstructured problem.	1	7	5			3.69
10. I gained valuable experience working in a team.	2	5	6			3.69

The summary of the feedback shows that this experience serves well regarding to prepare students for the future operations management research, especially facing up with the challenges of modeling real world decision problems. With this research, students definitely enhanced their understanding about production efficiency and DEA models. It is very interesting to find that within this students group, they all agreed that mathematical modeling skills are very important for the future in their career; however, they were kind of underestimating the importance of the database skills. One of the major reasons could be that we did not emphasize the Access enough in the classroom to help students pave the road for this research. As the result, due to the complexity of the database, unstructured research problem, challenges with working in a team and especially lack of the basic understanding in the power generation setting, unfortunately students did not conclude with strong interests in this research topic.

### 5.3 The Conclusions

Students met the following challenges: 1) understanding the electricity power generation (production) process and conducting inputs and outputs analysis; 2) Understanding the large database from the real world data and collecting data from the second source; 3) Using the complicated Data Envelopment Analysis model and further extending to the situation with non-desirable outputs. This experience embraces the idea of student-centered pedagogy embedded in an undergraduate research project, which encourages students to take the responsibility and share the power in classroom learning to achieve the learning outcomes.

The reference is available upon request.

## **Design Decisions: Improving the Energy Efficiency and Production Capabilities of Controlled Environment Agriculture (CEA)**

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Developing more efficient and sustainable means to grow food has become increasingly important due to the rising costs of energy, water, and fertilizer, the rise in market demand for organics, the negative impacts of pesticides on human health, and the unequal distribution of food resulting in fresh food “deserts.” The purpose of this study is to explore the design decisions required to grow crops in a Controlled Environment Agriculture (CEA) setting using fewer resources such as energy and water without sacrificing food quality and output.

Five key design elements are examined: the production system, lighting, heating and cooling, structural design and solar photovoltaic (PV) design. Hydroponic production system designs are reviewed and a case is made for nutrient film technique (NFT). The challenges of maximizing light transmission while minimizing heat loss are discussed based on the types of materials used and the ratio of transparent to opaque surfaces. The design and orientation of the greenhouse structure is examined in light of the principles of passive solar design, orientation, shape and the use of heat sinks. Finally, we look at how to incorporate solar PV into the design as an active energy component.

Data from a small-scale CEA system developed by the author are shared in addition to existing research from horticultural science. Work on a preliminary optimization model is shared. The long-term goal of the project is to determine the triple-bottom line sustainability of CEA ventures. The results have implications for commercial development, as well as teaching and research.

## SUSTAINABLE GROUND SOURCE HEAT PUMP

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A heat pump is essentially a device that moves energy from a heat source to a heat sink using some form of work. Almost all modern heat pumps use a vapor-compression cycle. A compressor is used to pump a refrigerant between two heat exchanger coils – a condenser and evaporator. The performance of heat pumps is usually described by a coefficient of performance (COP). In heating mode, this is the ratio of the amount of heat energy delivered from the system divided by the net energy input (e.g., electrical energy) to the machine. In cooling mode, the COP is given by the ratio of thermal cooling provided, divided by the work input to the machine. Heat pumps can be configured to use water or the ground as a heat source (or sink). Ground-source heat pumps typically demonstrate higher efficiencies than air-source heat pumps because the average ground temperatures are lower than air temperatures in the summer, when cooling is required; and similarly higher than average air temperatures in the winter, when heating is required. These units are typically more expensive to install as they require the use of a buried ground loop. Geothermal energy is classified as a renewable resource, where “renewable” describes a characteristic of the resource: the energy removed from the resource is continuously replaced by more energy on time scales similar to those required for energy removal.

The Mechanical Engineering laboratory facility at Western New England University includes a fully operational heat pump utilizing geothermal energy, which has a potential to heat and cool the engineering labs. The heat pump experiment was integrated with the geothermal source loop on the campus over ten years ago. This facility is fully instrumented for the collection of key performance data and allows for moderate scale demonstration of efficiency and COP to students. Through this lab, students not only understand the operations and capabilities of energy removed from the ground, but it also allow them to analyze the cost and the extent of efficiency and sustainability of ground source of energy. This form of hands-on education can have wide ranging functional incentives for businesses large and small in terms of energy consumption, in addition to impacting the design and manufacture of different products such as home heating and air-conditioning systems. This paper describes the development, operations and capability of the energy laboratory to educate and train future managers/owners of companies in addition to how we can enhance our students’ understanding of sustainable sources of energy and their application to more cost efficient operations and production in an organization.



## **MNCs and Sustainable Development in Emerging Markets: The Case of Siemens-India**

**Jean Pol Mura**

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### **ABSTRACT**

This study investigates the attainment of sustainable practices in emerging countries. The research focuses on Siemens corporation rail automation operations in India. Siemens is the leading electronic and electric engineering MNC in India. The study traces the history of Siemens in India, examines the cultural differences, and explores the challenges associated with implementation of efficient and sustainable technologies and practices in this country. The final section of the study discusses the opportunities associated with carrying out innovative ways of sustainable growth and achievement of environmental solutions in emerging countries.

# Assigning Employees of a Utility Company for Emergency Responses

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## ABSTRACT

This paper is about analyzing and improving the emergency response system to gas leaks of a utility Company in central Pennsylvania .We will use the past thirty months' gas leak data in each county to specify which employee should report to the location at nights, on weekends, and on holidays, This determination is based on distances between his/her home and the incident. The company requires the response time to be shorter than 45 minutes. In this paper, we use the center-of- gravity method and linear programming to accomplish these assignments. The recommendation of the model is validated by the results of its successful implementation.

**Key words: Emergency response, Assignment method, Center of gravity.**

## INTRODUCTION

Facility location has a well-developed theoretical background. Since the formulation of the classical Weber problem [1], location theory has been an active area of research, particularly during the last 30 years. Today, facility location is viewed as a substantial body of knowledge with a rich variety of models, methodologies and solution techniques that can be found in the literature pertaining to fields such as industrial engineering, operations research, operations management, urban economics and political science [2,3]. The readers who are interested in learning about facility location models are referred to the books by Francis and White [4], Handler and Mirchandani [5], Francis, McGinnis, and White [3], Drezner and Hamacher [6] and Church and Murray [7] .

One of the most popular models among facility location models is the covering problem. While covering models are not new they have always been very attractive for research. This is due to their applicability in real-world problems, especially for service and emergency facilities. In some covering problems, a customer should be served by at least one facility within a given critical distance, which is not necessarily the nearest, but it is based on response time within certain minutes. This critical predefined number is called coverage distance. Most available studies on such problems apply to ambulances. There has been a marked evolution over the past three decades in the development of ambulance location models and algorithms. Some of the earliest models are the Location Set Covering Problem (LSCP) proposed by Toregas et al [8], and the Maximal Covering Location Problem (MCLP) introduced by Church and ReVelle [9]. In the LSCP, the aim is to minimize the number of service providers required to cover a set of demand points. In this model, a point is said to be covered if it can be

reached by at least one service provider within a preset driving time. The MCLP, on the other hand, works with a given number of service providers and attempts to cover the largest possible demand. Both models make sense in practice. The first can be used to determine an appropriate fleet size to meet a certain demand, whereas the second can optimally help allocate available but insufficient resources. Several extensions of these two basic models have been proposed by Schilling *et al* [10], Daskin and Stern [11], Hogan and ReVelle[12], and Gendreau *et al.*[13].

In this study we concentrate on MCLP model, in a real world situation, given a number of response crew units to satisfy the Harrisburg area emergency response to gas leakage.

### **MATHEMATICAL MODEL**

The proposed model includes two parts. The first part requires deciding where to place centers-of-gravity in Harrisburg's 3 counties (quads) see Figure 1 . Solving this part can be done in a number of ways, including using mathematical programming. A much simpler method is the center-of-gravity, which is used in this paper. The second part of the model is a mathematical programming model. The objective is to minimize the distance traveled as a whole by employees of the ABC Company, the demand coverage. Constraint guarantees that all employees are assigned to a quad, total number of employees assigned to each quad is specific number, and the distance travelled by employee to quads should be less than or equal to again certain number.

### **DATA COLLECTION AND ANALYSIS**

The data required for the two models discussed earlier are compiled from the ABC utility company. The Company has the responsibility to respond to gas leak emergencies that occur across the gas distribution system within 45-minutes of a leak being detected. In order to meet this obligation, the Company employees are trained to respond quickly to reported leaks, make the area safe, pinpoint the leak(s), and perform a repair to stop the leak(s). To do so, employees are dispatched either from their workplace during business hours or from their homes during nights, weekends, and holidays when a leak occurs. Since the ABC Harrisburg office is located in Middletown, east of Harrisburg its coverage encompasses four different counties ( Dauphin, Lebanon, York, and Cumberland). This coverage, based on interviews with the management of the ABC Company, seems adequate when the office is open during the day. The more challenging are those leak emergencies that occur outside the regular business hours. In this study we only concentrate on these calls. So far, ABC has been very successful in

responding in a timely fashion to the gas leaks calls, meeting the 45-minute response timeline in about 97% of times. However, since leaking gas can be dangerous and can lead to explosions, the company must continually strive to optimize its response strategy. In addition, as new employees are qualified to respond to gas leaks and experienced employees either retire or leave the company, it is necessary for ABC management to occasionally re-evaluate its response assignments. For example if a new employee is added to the crew, depending on his/her home location, it might affect the assignment of the other members of the crew.

In order to evaluate ABC's effectiveness in responding to gas leak emergencies in Harrisburg area within given 45-minutes, we had to look at each employee's address, who perform this critical function. ABC currently has 26 employees who work in its main office and are qualified to respond to gas leaks. Some time ago, in order to manage the Harrisburg area more effectively, the company divided the territory into 4 distinct quadrants labeled Quad 1, 2, 3, and 4. However, 2 years ago the ABC management decided that there were not enough qualified employee to effectively share coverage of four distinct quadrants without overburdening these workers with evening and weekend overtime commitments. As a result, the company combined Quad 2 and Quad 3 into one quadrant. Today, the ABC Company has in effect split the Harrisburg territory into three areas, and still referred to them as quadrants. (Quad 1, Quad 2 & 3, Quad 4). These areas are shown in Figure 1. It should be noted that each of the 26 employees are assigned based on their home location to one of these 3 quadrants. The employees in each quadrant divide the response obligations among themselves in rotating one week duty obligations.

Given this history, our chosen task was to assign each of the 26 current employees to the 3 quads to which he/she can most quickly respond. This would allow the ABC Company to change some of the employees' assigned quads, if necessary, and identify those individuals who cannot respond to any gas leak within a given quad in 45-minutes or less.

We started gathering leak history data for the Harrisburg territory. ABC has a central dispatching office that responds to gas leak calls from customers, municipals, fire department, police, and 911 emergency systems. The data on frequency and location of leak emergencies for last 30 months were provided See Figure 2. The use of historical data would be justified, as a certain portion of ABC distribution network is historically more prone to leaks, given the variation in age and condition of the pipelines throughout the system. The central dispatching office of ABC tracks each leak according to the physical address where the leak occurs. These leaks are grouped according to political subdivision (POLSUB) in which the leak occurred. POLSUB are generally used by municipal, county and state officials for various purposes and they roughly equate to township boundaries. Some of the larger POLSUBs, such as the city of Harrisburg, are divided into smaller divisions to refine data analysis capability. ABC has assigned alphanumeric codes called WPA zones to each of these POLSUBs.

In order to apply the center-of-gravity method to each quadrant based on volume and leaks of each WPA zones, we needed the geographic centroid of each of the WPA zones. These centroids (latitude and longitude) data were provided by the ABC Company. For a sample of these data see Table 1. Next, we calculated the center of gravity for each of the three quadrants. We then used Google Maps to convert this latitude and longitude coordinates to actual addresses on the geographical maps. Once we had this information, we were ready to establish each of the 26 employees' response time to those addresses.

We again use Google Maps, this time to calculate the distance in miles and driving time in minutes from each employee's home address to each of the 3 quadrants center-of gravity. Then we used special case of linear programming technique to assign each of the employees to quadrants, although it was not always the quadrant to which he/she could most quickly respond. Instead we restricted our model to split the employees into roughly equal sized groups.

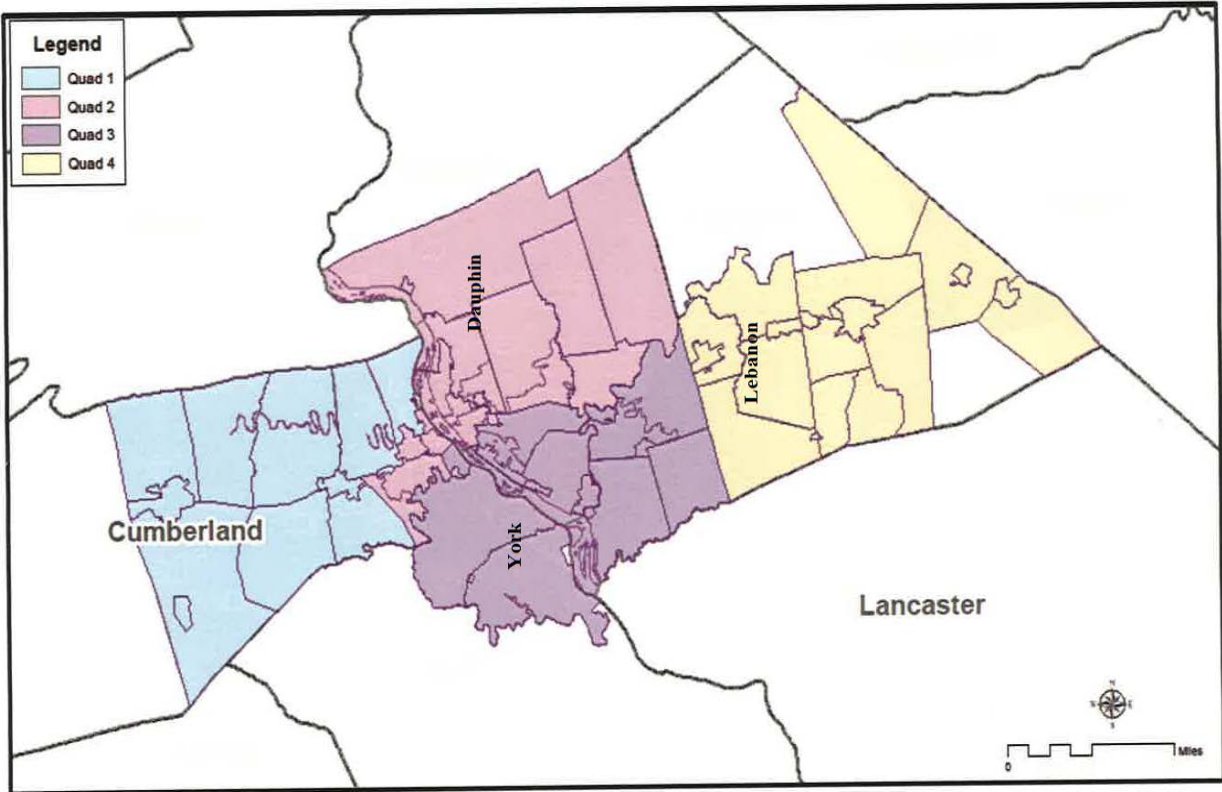
## CONCLUSIONS

The purpose of this study was to apply analytic techniques to assist management of a utility company in assigning tasks to its employees in the most efficient way. The mathematical model presented in this manuscript is based on center-of-gravity and a special case of linear programming to assign the employees to various quads. There are two unique features about the proposed model. First, the model provides a powerful analytic tool to complement implementing changes required when new employees are added to the crew or experienced employees retire or change residency. Traditionally, changes in assignments in this company were based on trial and error, and did not include any analytic models and corresponding decision support system. The proposed model does not completely eliminate subjectivity, but that is not an attainable or desirable end result. The advantage of the proposed analytic model is that it adds quantitative precision and fine-tuning to an otherwise ad-hoc decision-making process. Second, the model has proven to be useful in an operating utility company. This evidence leads us to believe that the mathematical model provided can be used appropriately in other service industries where coverage and efficient crew assignments are necessary.

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Figure 1; Quad boundaries of Harrisburg area



## **SOCIAL MEDIA: POKING, TWEETING, BLOGGING, AND POSTING ARE BECOMING A PART OF THE EVERYDAY OFFICE LINGO**

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### **ABSTRACT**

Social Media is often seen as a distraction at the workplace by management. Whether it is checking Facebook or liking a picture on Instagram, the desire to check social media is a constant itch. Blocking access to social media sites may seem like a solution, however, many studies have shown that this action backfires and slows down productivity. This paper will discuss the use of social media in the work place and provide a template for building a social media policy and cases of SocialCorps that have implemented social media policies to their advantage.

### **Social media, socialcorps, workplace policies**

### **INTRODUCTION**

What exactly is the definition of social media? Social media is “a social networking service focuses on building online communities of people who share interests and/or activities, or who are interested in exploring the interests and activities of others” [1, p. 139]. This definition indicates that there are endless possibilities for the use of social media and its use could be positive or negative for a company. Many employers see these sites as a distraction, because employees are taking time to check “who wrote on their Facebook wall” rather than performing work related tasks.

Employers are worried about letting their employees loose on the internet. They want to convey their businesses’ message in a controlled way, but have failed to see that because social media already exists, they have already lost that control. According to Moore, “74 percent of employees say it is easy to damage a company’s reputation via social media” [13, p. 1]; disgruntled customers and competition can post anything they desire online, good or bad. The best way to fight this battle is to empower employees to collaborate electronically to be company promoters. Companies that do this will transform into SocialCorps: “a progressive, forward-thinking company that has adopted social media effectively, in a way that accomplishes strategic business and communication objectives without compromising the company’s primary obligations as a corporation” [15, p.2]. This paper will investigate the problems with social media use at work, its benefits, examples of SocialCorps, the results of employers who are too strict or too lenient regarding access, and recommendations for companies that want to take advantage of the SocialCorps phenomenon.



## **PROBLEMS WITH SOCIAL MEDIA USE AT WORK**

The simple truth about the corporate world is that employees always have, and always will, waste time at work. Unfortunately, social media has provided another outlet for wasting time, and an even greater distraction for employees. According to a CNET article, –Sixty four percent of employees visit non-work related websites each day... The winners for the time-loss warp are Tumblr (57%), Facebook (52%), Twitter (17%), Instagram (11%) and SnapChat (4%)” [3, p. 2]. The numbers of social media sites available today can clearly reduce the time that employees spend on completing their tasks at work.

Along with creating distractions, social media, if not used properly, can also carry viruses that could damage a company’s hardware and/or software. This could lead to social account hijackings, system shutdowns, leaked information, and create huge Human Resources and Public Relations problems.

Lastly, the constant Wi-Fi/Internet usage puts the company’s own systems in jeopardy causing slowdowns, malfunctions, failures, or even complete overloads. According to Stainburn,” –one-third of employees spend at least an hour a day on Facebook, Twitter, and other social media sites during working hours” [18, p. 1]. The article does not state, however, whether these employees were using social media for personal use or for work related research.

## **BENEFITS OF SOCIAL MEDIA USE AT WORK**

The use of social media can help boost customer loyalty and convey a respectable corporate image to the community. Social media can also be used as a tool for the four generations in the workplace to communicate. Millennials are the most comfortable with technology; therefore, they can train fellow workers who are older to use it more efficiently and effectively. Through this training process, employees bond, build their skills and break down generational barriers. By conducting training in-house with existing employees, training costs are reduced as well. Three of the benefits to having a social media policy that allows employees to access sites while at work are communication, advertising, and information gathering. Understanding these benefits so as to use social networking to its full advantage can be a vital asset in today’s corporate environment.

### **Communication**

Social media provides a whole new way for employees to interact and communicate with coworkers, supervisors, and clients. While it can be seen as an unprofessional communication channel, much depends on how it is used. Improved connectivity can lead to a higher comfort level for brainstorming, increasing the likelihood of forming new ideas. Social media can also serve as an equalizer in an organization. Businesses also need to network so they can monitor the competitive environment. Social media allows them to be in contact with their target market within seconds [20].

## **Advertising**

There are most likely one or more computers in every home and a smart phone in every hand, with the power to effortlessly connect to the internet at any point in time reaching millions of people. This access provides an outlet through which an organization can easily and instantly advertise to millions, and most of the time, through social media, it costs nothing. “74% of all marketers say Facebook is important to their lead generation strategies” according to Romeri [17]. The power of marketing via the social media route is already known by many.

An organization’s own staff can be its best publicist; they already know the company thoroughly. They also have knowledge of what the target market would like and be interested in hearing about. According to Lowitz, “85% of fans of brands on Facebook recommend brands to others” [11]. Word of mouth is the most powerful form of marketing; social media has the power to convey these words to millions immediately with a simple click.

All businesses should have a corporate page on popular forms of social media. CNET News tweeted that, “1 million businesses have pages on Facebook and hundreds of thousands of businesses advertise” [3]. Hanson stated that according to a *Digital Media Wire* report, “Companies are investing in social media as a marketing/communications tool... nearly all of them (94 percent)” [5, p. 1].

## **Information Gathering**

Social media is becoming one of the most popular ways to acquire today’s breaking news. While most Americans still receive their news from conventional TV News stations (78%), social media is a close second; outweighing traditional newspapers and radio stations (Schroeder, 2010). “25 percent of employees rely heavily on social networks in the workplace. I would guess that they are most likely your star employees...(tech-savvy and with the biggest professional networks)” [5, p. 2]. One article specified “79 percent of employees admit to using social media at work for ‘business reasons’” [13, p. 1]. Companies can receive instant feedback and public opinions about anything through social networking. A benefit that stems from this more frequent feedback is an increase in customer service/satisfaction. Within the organization, workers can research and publish electronically, and in doing so, they are sharing their findings with co-workers and supervisors. Employees can brainstorm using one another’s information, all the while creating an electronic breadcrumb trail (physical evidence of communication) of material and ideas.

## **Productivity**

There are social networking sites, other than Facebook, that can provide advantages for companies. One example is Google Docs, introduced in 2007 as a free web-based program, which allows users to create, edit, and share documents live with other users. Users virtually collaborate no matter where they are in the world, improving productivity. Facebook provides similar, yet less formal, features through its site. There, managers can create private pages on which they control access to information posted. This feature is ideal for managing projects and/or groups. Employees can easily post questions, initiate new ideas, share articles, or can even video chat. Interviews and/or meetings using video technologies are increasingly popular because they provide a more personal, face-to-face experience for both parties and can be conducted anywhere at any time. Using these methods also ensures that all posted information is

documented and is on record; it can easily be referred to in the future if need be. Blogs can also be created for a specific group of individuals. Employers could use such blogs to share information within the organization by posting company news or requesting that senior leaders share a few words to employees to keep up morale or motivate; a small gesture can go a long way. A study conducted at the University of Melbourne found that “employees with access to social networks were actually more productive than employees in companies that block access... employees who can reward themselves between the completion of one task and the start of another with a visit to their Facebook or Myspace page are more motivated than the workers who do not use social networks” [6].

## EXAMPLES OF SOCIALCORPS

Although social media use in the corporate world is still in its early stages of development and utilization, there are many companies that have already initiated successful social media policies; they are known as SocialCorps [15]. Some are designed to reward and motivate employees, others are meant to create connections within the organizational community, and still others are implemented because its customers are online, so they want to have a presence there as well. Again, each business is different, so they may use just one of these reasons or incorporate all of them as a basis for their own social media policy.

Serena Software Company, located in California, has a program they call “Facebook Fridays” [1, p. 138]. Employees are allowed one free hour on every Friday to update or keep in touch with their colleagues/friends on Facebook. A representative from Serena stated that “800 employees in 18 countries have an hour of personal time specifically for participating in Facebook—building profiles, playing with apps, and connecting with coworkers, customers, family, and friends” [8]. Facebook Fridays were originally started because the company needed to revamp their Intranet but did not have the funds to do so. The benefits that resulted from using Facebook were it saved money and it provided much sought after transparency. For employees, Facebook Friday is a reward. It’s something that they look forward to after a long week. Serena realized that little incentives like this convey great meaning to employees as well as provide them with an information empire.

Another company that has realized the advantages of embracing social media is Outlook Amusements, a technology and marketing company located in California. It has created its own internal social networking site which they named “The Owl’s Nest.” This is where employees can create profiles and interact. It has all the same features of Facebook, however, in order to belong to The Owl’s Nest, one must be an employee. It creates a closer-knit community within the organization. Outlook Amusements has observed, “# [The Owl’s Nest] really creates a lot of excitement and strengthens that sense of community” [21]. It was an easy, free, and effective way to bring employees together.

Sabre Holdings, based in Texas, is a global travel technology company, which started a similar networking site in 2007 called “Sabre Town.” Roughly 70 percent of the employees located in 59 countries use the site regularly (Samuel, 2009). The organization gives the site much credit for bringing its employees closer. Both Sabre Town and The Owl’s Nest may not seem like they

encourage business productivity as much as they encourage community bonding, however, it is the growing employee network that *is* the advantage. If employees know more about each other and have a deeper connection, they are going to collaborate better which, in turn, will lead to better ideas.

Kodak is another SocialCorp that is using the internet to its full potential. In its Social Media Tips section online, Jeff Hayzlett, Vice President of Kodak, was quoted as saying, “Why do I take the time to use social media like Twitter and Facebook? Because in today’s media landscape, it’s vitally important to be where the customers are” [9, p. 2]. It maintains an active Facebook page, three company blogs, several Twitter accounts, a YouTube channel, Google+, a Flickr profile, LinkedIn, and more. It has a Chief Listening Officer who “listens” to the conversations online to see what customers are saying they want and also to see who/what people are saying about Kodak. This is another form of customer research to learn market needs. It has gone out of its way to create separate Kodak B2B channels that focus on topics that business customers would find interesting.

Dell is an extremely successful SocialCorp is and it is currently the leader in social media usage. The key to its success is that it “got in on corporate social media early, and worked hard to get it right” [10]. Dell started undertaking this challenge in 2006, a full year before Facebook even came into existence. A spokesperson for the company was quoted as announcing in 2008 that “Twitter has produced \$1 million in revenue over the past year and a half through sale alerts. People who sign up to follow Dell on Twitter receive messages when discounted products are available from the company’s Home Outlet Store” [12]. Simply displaying discounted products directly to the customers generated a million dollars. Lastly, one of its most successful online programs is IdeaStorm. It was launched in 2007 and “provides customers with avenue to share ideas on products, services, and operations” [2]. Since its launch, “Dell has received close to 10,000 ideas from customers [15, p. 1]. These examples show how committed Dell is to using social media and using the power it holds. SocialCorps take the time and effort to develop these practices and programs.

Companies are generally handling social media use on an ad hoc basis. The tendency is for them to either be too strict or too lenient in their policies regarding its use. Problems emerge from both of these approaches.

## TOO STRICT

An article by Holtz (2013) stated, “Recent trends show that more than half of US employers are blocking social media access at the workplace” [6, p. 1]. This may seem like a simple and complete solution to the social media use issue – block employees’ access therefore, the problem goes away. Unfortunately, rather than resolving the problem, it is equivalent to placing a Band-Aid on a broken leg. It is not dealing with the problem. One risk to companies that are too strict with their social media policies is that they will drive away potential applicants, particularly Millennials, who are the next generation of vital players for organizations. “A quarter of workers told Intelligent Office that they would not work for a company that banned or blocked social media sites in the office” [17, p. 1]. Similarly, a study done by American Express found that “39

percent of younger workers won't even consider working for a company that blocks Facebook" [5, p.2]. Forbidding access may also decrease in morale in current employees due to a sense that their employers are oppressing them. This leads to a lack of motivation, which inevitably is followed by less productive employees.

An additional problem with strict social media policies is that they can be counterproductive. "It's [blocking social media access at work] like waving the proverbial red flag in front of your staff – it's almost a challenge to them to find a way around it" [6, p. 1]. Employees spend more time trying to get around the system than they would have by just visiting the sites in the first place. The rise in technology usage is not going to slow down; managing and incorporating usage into the office environment instead of preventing it is the only solution.

### **TOO LENIENT**

On the other end of the spectrum, companies that do not have policies or are too lenient with social media use, are destined to run into problems, if they have not already. "Nearly half of the companies (120 worldwide) did not have social networking policy" [14, p. 120]. It is not enough to have a policy in place, it needs to be constantly developed, taught to employees, and enforced. It may seem obvious that employees should not constantly be on social media sites or should not be posting inappropriate subject matter that can reflect badly on the company, but without a policy, people may assume these actions are allowed. A written policy helps to ensure that everyone is on the same page when it comes to the use of the internet at work

### **HOW TO BUILD A SOCIAL MEDIA POLICY**

As noted above, there is no one, standard, social media policy that can be effective at governing social networking usage at work for all companies. Each employer needs a policy that fits the dynamic of its business. The benefits to having a social media policy in place is that it helps employees, supervisors, and the company as a whole in understanding what is considered appropriate and inappropriate usage of the Internet at work.

The first step to drafting a social media policy is to make it a team endeavor. Using a team helps ensure that all areas will be touched upon and their proposed solution will have more legitimacy as well. The next, and most important, step is to create a clear definition of social media. The next step is to address whether personal use, work-based use, or both will be permitted in the workplace. In addition, the policy must provide an explanation of appropriate and inappropriate uses of such media. Examples of each should be provided in this section. In the article, "Eight Tips for Crafting a Successful Social Media Policy," it is suggested that two policies be formed – one to cover personal social media use and one to cover work related social media use [19].

It may not be necessary for companies to create a policy from scratch. Existing policies for technology use, such as those developed for cell phones, may provide a basis for social media policies. Using material or rules from these policies creates familiarity since it incorporates policies they already know. If social media is redesigned as a tool for employees to use to

complete their work, a social media culture will be more easily accepted and viewed in a positive light.

Training is extremely important when it comes to implementing a policy. If employers spend time educating employees about the reasons for the policy implementation, as well as the details of the policy itself, they are diminishing the risks to their business. Training will cost time and money, but it is a small price to pay to protect a company's information and reputation. Finally, the policy needs to be enforced. Because social media changes so rapidly, policies should be reviewed at least every six months.

## **SOCIAL MEDIA MANAGEMENT SYSTEMS**

Social media has brought forth many new business opportunities for existing companies. However, along with opportunities for existing companies comes the prospect of new business ventures based on social media. One up-and-coming industry is social media management systems. These companies are created for the sole purpose of assisting other organizations to create, mold, and control their social media platforms. Social media management system companies may be considered a type of SocialCorps. These companies can incorporate all of a business' social media sites into one control panel. This consolidation process can help employees be more productive by enabling them to access the information they desire more quickly and efficiently.

There are several social media management service companies; however, HootSuite is one of the most well-known. It was founded with the intention to help "businesses and organizations to collaboratively execute campaigns across multiple social networks from one secure, web-based dashboard" [7]. The company's purpose is to "save your time and sanity. Improve productivity by managing all of our social networks within HootSuite" [7]. They provide assistance with launching marketing campaigns, identifying and growing audiences, distributing targeted messages, and reorganizing team workflow with convenient scheduling and assignment tools, etc.

The key social networking platforms that the company integrates are Facebook, Twitter, LinkedIn, Google+ pages, YouTube, Flickr, and Tumblr. They incorporate the social media sites that are desirable to the client into a single, cohesive and convenient dashboard; easily accessible to the employees. HootSuite also offers an App Directory that allows companies to add even more social media sites and tools to their dashboard. Everything is completely customizable and designed to meet the needs of the client.

A similar social media management company is Fan Page Direct. This company is based out of San Francisco, CA, was founded in 2009, and is very similar to HootSuite [4]. It has an innovative team of social media marketers who have helped guide some of America's best known companies and organizations with effectively using the world's largest social media sites, such as Facebook, Twitter, Yelp, and LinkedIn. The founder and CEO, Cameron Halstead, also recognized that social media changes the way businesses interact with their customers and used that concept to build Fan Page Direct. Halstead formed the company "out of my dedication to

help businesses expand and meet their goals” [4]. The team does this by following their values of service, execution, and results. Like HootSuite, Fan Page Direct will improve productivity and management of social networks for other organizations through its social media dashboard software.

These two companies illustrate the potential that social media holds for any organization. It is likely that the number of social media management companies will continue to grow. Due to the level of expertise they have developed thus far, these types of companies are the best candidates to lead a business to social media success.

## **CONCLUSION**

Social media use at work can be risky. Information can be leaked, viruses can infiltrate systems, and it can be a huge distraction to employees. However, research indicates that social media provides more benefit than harm. The problems with social media use can generally be addressed and monitored through the institution of a social media policy. The advantages of social media use by organizations are many. As seen from the examples provided herein, becoming a SocialCorp is an ideal way for organizations to progress in their ability to harness the power of today’s technology. Employees at SocialCorps can connect more easily with their peers and clients. A workplace culture that incorporates social media can improve worker satisfaction, leading to increased productivity. Social networking sites provide a shared language among all generations and are capable of making connections globally. This familiarity among employees can help them to complete projects more quickly and efficiently. Businesses must change to accommodate the social media revolution; there is no choice. If they refuse to adapt, it will likely lead to an avoidable failure. As stated by Erik Qualman, “Businesses don’t have a choice on whether or not to DO social media, their choice is how well they DO it” [16, p. 37].

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*This project was supported by the Roger Williams University Provost's Fund for Student Research*

# **THEORETICAL FRAMEWORK OF THE DIFFERENCES IN POPULARITY AMONG SOCIAL NETWORKING SITES USING THE HOFSTEDE CULTURAL DIMENSION**

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## **ABSTRACT**

Social networking sites have exploded in popularity over the past decade. However, some of these sites are more popular in some nations than in others. The authors of this paper argue that this may be due to the differences in culture between nations. To this end, we create a theoretical framework founded in the Hofstede cultural dimensions scale and relate it to common aspects of social networking sites. Examples of social networking sites that exhibit high and low levels of each dimension are included as part of the framework. It is the author's hope that this framework will serve as a starting point for further examination of social networking sites in the context of culture.

## **Social Networking Sites, Culture, IS Adoption, Hofstede Cultural Dimensions**

## **INTRODUCTION**

In recent years, the tremendous growth and usage level of social networking sites (SNS) have become a phenomenon throughout the world [16]. SNS such as Facebook, Google+, V Kontakte, and QZone gained in popularity among Internet users for establishing and maintaining social relationships. SNS allow individuals to create a public or semi-public profile within the network, connect with other users with whom they share a connection, and view and navigate their list of connections within the network [1]. Although most SNS share this basic purpose and functionality, how this functionality is delivered to the users differs from site to site. Brief descriptions of four popular SNS referenced in this paper are presented in Table 1, below.

**TABLE 1**

**Descriptions of Popular SNS**

SNS Name	Description
Facebook	World's most popular SNS. Users can post status updates consisting of text, images, or video that are seen by their "friends." Additionally, they have the ability to "like" the status updates of others, and/or share them on their own profile. They can also "like" companies and organizations, join groups, and play games. All of this activity is reflected in the user's profile page, known as their timeline.
Twitter	Twitter is a microblogging site where users post 140 character "tweets" about anything they wish. Users can attach images and videos to their tweets. They have the ability to add someone else's tweet to their feed by "retweeting" it or they could recognize another's tweet by adding it as a favorite. You can view the tweets of others by "following" them. There are no group membership or game options.
LinkedIn	A SNS for professional networking. Users create profile pages that effectively serve as online resumes. They then build their network of professional contacts by adding connections. Group membership is encouraged on this site and there are many options to choose from. Users can post relevant status updates and news stories and may receive recognition in the form of a "like".
Pinterest	Pinterest is a relative newcomer to the SNS scene. Users have the ability to create "virtual pinboards" where they "pin" items of interest from around the Web. These pins are images with a text description that are hyperlinked to the corresponding website where it was pinned from. Pinterest is a fairly open platform as users can follow any boards from other users that they wish and other users can follow theirs as well. Much like twitter, pins can be "repinned" from another user's board and/or you can also recognize the content by liking it.

Because they are on the Internet, most of these platforms are available to anyone with an Internet connection regardless of their geographic location. However, there seems to be a difference in the popularity between the various sites amongst different countries. For example, Cyworld, a South Korean social network has more than a third of the country's population participating in the SNS [10]. Furthermore, another SNS called Orkut, is very popular in Brazil and India [10]. For a listing of the top 3 SNS in several countries as of June 2012, refer to Appendix A at the end of this paper.

Given, that social network users have different backgrounds, live in different environments, and belong to different cultures [10], we argue that these differences impact the level of comfort that users have in using one SNS versus another. Therefore, the purpose of this paper is to develop a set of theoretical propositions founded in elements of the Hofstede cultural dimension scale to assist in explaining the differences in popularity amongst different SNS in different parts of the

world. The remainder of this paper is structured as follows. First we will review the literature on SNS, the Hofstede cultural dimension scale, and the cultural differences in SNS. This will be followed by the presentation of our theoretical framework. Finally, we will close with a discussion on the potential contributions of this research to theory and practice as well as some avenues for future research.

## **BRIEF REVIEW OF THE LITERATURE**

### **Social Networking Sites (SNS)**

The popularity of Internet sites such as Facebook, Google+, and Twitter has led to the prevalent study of SNS. Generally, social networking involves social relations amongst people who have some type of affiliation [17]. Therefore, SNS may be conceptualized as socio-technical linkages that incorporate technologies that support such activities [12]. Furthermore, SNS are applications that enable Internet users to connect by creating personal information profiles, inviting friends and online acquaintances to have access to the profiles [8]. These personal profiles include information such as current occupation, hometown, relationship status, photographs, videos, and other private information. SNS enable users to present themselves, connect to a social network, and develop and maintain relationships with other users [3].

The acceptance of SNS has gained in popularity throughout the world. Facebook is the leading SNS in the majority of countries, followed by Twitter and LinkedIn [9]. Specific to the Facebook usage, Europe had the largest membership at 234.6 million visitors, followed by North America with 163.9 million [9]. In the United States, 185.2 million social network users averaged 6.9h on SNS in 2011 [9]. These statistics show that people across the globe spend a lot of time on SNS.

### **Hofstede cultural dimension scale**

Many cross cultural studies have been conducted that focus on behaviorism-based theories proposed by [4]. The behaviorism-based theories refer to the objective behaviors as objects and consider culture as a resulting object of behavior [7]. The most frequently used model in cross-cultural-studies is Hofstede's [4] theory. [4] conducted a study to determine the patterns of cognitive, emotional, and subconscious activities of humans. This study resulted in the creation of the dimensions of uncertainty avoidance, power distance, masculinity-femininity, and individualism vs. collectivism. Time-orientation was later added by [6].

Hofstede's cultural dimension scale is widely used since it allows one to measure five cultural dimensions quantitatively and make comparisons among nations by creating ranks based on the quantitative measures [7]. The five elements of the Hofstede scale are listed in Table 2, below.

**TABLE 2**

**Hofstede's cultural dimensions**

<b>Category</b>	<b>Definition</b>
Power Distance [4] [7] [11]	A value related to the acceptance of a society to equality of power distribution in its institutions or organizations. People in countries with a high power distance are acceptant to status differences among group members, while people in low power distance countries demand justification for these differences.
Individualism vs. Collectivism [4] [7] [11]	This is a measure related to whether people in a nation generally prioritize their needs and desires over the needs of any group that they might be affiliated with (individualism) or whether they expect that the group will provide for them in exchange for their loyalty (collectivism).
Feminity vs. Masculinity [4] [7] [11]	A measure of the preference that people have in a nation for achievement and material success (masculinity) versus their preference for human relationships (femininity).
Uncertainty Avoidance [4] [7] [11]	A value of the degree of comfort that people in a nation feel with uncertainty and ambiguity. Those nations with high uncertainty avoidance prefer less uncertainty and ambiguity than those nations that have low uncertainty avoidance.
Time Orientation [6] [7] [11]	This is a measure of whether or not people in a nation are comfortable sacrificing in the present to achieve some long-term benefit (long-term orientation) or if they would rather seek more instant gratification (short-term orientation).

It should be recognized at this point that the Hofstede cultural dimensions are done at the national level of analysis. While there are other cultural values that assess culture from the organizational or subunit level of analysis (see [11] for an extensive list of these values), we feel that using the Hofstede scale is appropriate since we are examining the cultural differences in SNS use among national cultures.

**Cultural differences in SNS**

Culture is defined as a constellation of loosely organized values, practices, and norms shared by a group of people in a given community [2]. Even though this definition refers to cultures in the real world, it may apply to the cultures in the online communities. Earlier research conducted on online cultures focused on online communities that were created for special purposes or common

interests [15]. With the rise of SNS, online cultures are not only relevant to focused groups [15]. The main purpose of SNS are to maintain and strengthen social relationships, the cultures within SNS emphasize on social interaction by providing tools to encourage users to disclose personal information and engage in social interactions such as photo tagging [1].

Recent studies found that users of different SNS show different online practices. For instance, users of the Korean based SNS, Cyworld, have fewer but closer friends, tend to keep their public profile anonymous, and use more non-verbal communication means [15]. Conversely, users of the American based SNS, Facebook, have more friends, exhibit more frequent self-disclosure, and rely more on text-based communication [15]. Another study found that users of Japanese SNS tend to use animal pictures or cartoons as their profile pictures, while users of American based SNS tend to display their real pictures [13]. Overall, the research studies suggest that the shared practices on SNS appear to be different throughout the nations across the world.

## **THEORETICAL FRAMEWORK**

The authors of this paper argues that cultural differences impact the level of comfort that users have in using one SNS versus another. Therefore, the theoretical framework developed here is based on the elements of the Hofstede cultural dimension scale to assist in explaining the differences in popularity amongst different SNS in different nations. We developed our framework by taking each of the five cultural dimensions and then identifying elements of SNS that are illustrative of each dimension. Examples of popular SNS sites that exhibit low or high values of each dimension are then presented. It should be noted that this is an initial attempt to develop this framework, so it is by no means comprehensive with respect to the various cultural dimension values that exist and the SNS elements that exhibit those dimensions. We felt that the five dimension Hofstede scale was a good starting point because of its long history in IS research and because of its appropriate level of analysis. Our framework is presented in the sections that follow and in Table 3, below.

**TABLE 3****SNS Cultural Difference Framework**

Dimension	Brief Definition	SNS Element	High Value SNS	Low Value SNS
Power Distance	The acceptance of unequal levels of power in a society.	Membership levels	LinkedIn	Pinterest
Individualism vs. Collectivism	Prioritizing yourself over the group or expecting the group to provide for you in exchange for your loyalty.	Group membership	Pinterest Twitter	LinkedIn
Masculinity vs. Femininity	Seeking achievement and success versus seeking human relationships.	Ranking and recognition	FourSquare LinkedIn	Pinterest
Uncertainty Avoidance	The extent that one seeks to avoid uncertain and ambiguous situations.	Privacy controls	Facebook	Pinterest
Time Orientation	Sacrificing in the now in exchange for some long-term benefit or seeking instant gratification.	Time and duration of value	LinkedIn	Twitter

**Power Distance**

Power distance is essentially a measure of the degree that members of a particular nation expect and accept that power is distributed unequally [4] [7]. High values of power distance mean that the members of the nation are acceptance of this inequality and low values are indicative of that the people of the nation are generally non-acceptant of the inequality. In SNS, this can be exhibited by those sites that offer some members of the community with an increased level of benefits for being a member or increased site functionality. One SNS where this difference of benefits is particularly evident is on LinkedIn, where some members have access to premium benefits such as the ability to see everyone that has viewed their profile or the ability to send unlimited emails to members that are not connections. An example of a SNS that shows low power distance is Pinterest. All members of this particular SNS have the same ability to “pin” visual links to websites and there are no premium levels of service available.

**Individualism vs. Collectivism**

This is a measure of a person’s preference for prioritizing their own needs and desires over the needs and desires of the group. High values of this dimension lean towards individualism while lower values indicate collectivism [4] [7]. In SNS, we argue that this dimension manifests itself in the emphasis that the SNS puts on groups and group membership. Some sites such as LinkedIn place a high value on becoming a member of groups. In fact, the site provides

suggestions for group membership to users. These groups exist to help their members grow professionally by sharing relevant information and opportunities amongst group members. Members benefit by being a part of the group and work to enhance the group for all members by adding content and opportunities. At the other end of the spectrum, SNS such as Pinterest have no group membership options. Instead users can pin whatever items that they choose to their boards and those boards serve to satisfy the desire of the individual user. Users are also able to follow whatever other boards that they wish without having to associate with the owner of the board. Twitter is also a very individualistic SNS as it provides no mechanism for group membership.

### **Masculinity vs. Femininity**

In the context of the Hofstede scale, masculinity represents a preference for achievement and material rewards while femininity represents a preference for human relationships [4] [7]. In SNS, those sites that have mechanisms for ranking users or providing recognition to users for various achievements are much more masculine in nature than those that do not. For example, on the SNS, FourSquare, users can achieve different “badges” that recognize various achievements defined by the SNS. Masculinity is also exhibited in those sites that rank users based on some metric such as the number of users. LinkedIn is one such site where user prestige is tied to the number of connections that they have in their network. Twitter is also in this category as it places a high value on the number of followers that a user has. In this context, Pinterest and Facebook can be seen as more indicative of femininity. While they do display the number of friends or followers on an individual user’s profile, the user’s prestige is not highly tied to these metrics and they do not have any kind of achievement awards associated with them.

### **Uncertainty Avoidance**

This is a measure of how comfortable people in a nation feel with uncertainty and ambiguity [4] [7]. In the context of SNS, this can be seen in the control that users have over who their friends are, who can post on their profiles, and also with what other users can do with the content that the user posts on their own profiles. An example of a site that exhibits high levels of uncertainty avoidance would be one that allows users a high level of control over the content on their site. Facebook is one site that falls into this category if users choose to make it so. Facebook users have multiple options with respect to the control of who can post on their site, whether or not they choose to be tagged in status posts, and who can share items from their profiles. Pinterest is at the other end of the spectrum. Users on this SNS can follow any boards that they choose and also pin any item from another’s board. Inversely, they can also be followed by any users and have any of their pins pinned by someone else as well.

### **Time Orientation**

The long vs. short-term orientation dimension is a measure of the how far away that people feel that future is when one is making plans and how quickly people expect results from their efforts [6] [7]. In the context of SNS, this is exhibited in how quickly value is derived from the site and the duration of that value. Sites that provide instant results for a posting might be seen as a SNS that is illustrative of a short-term orientation. For example, SNS such as Facebook, Twitter, and



Pinterest can allow users to achieve results from their posts in the form of a retweet, share, or like almost instantaneously. While on other SNS, such as LinkedIn, it takes time and effort to develop one's professional network to a point where it contains enough connections in order to be considered valuable to them. However, while the gratification that one derives by being recognized with a like or share of their post is many times immediate, it is also short-lived. Whereas, the long-term value derived from a strong network of professional connections takes time and effort.

## DISCUSSION

If you look at the most popular SNS in the world in the context of our framework, you can begin to see some interesting parallels. For example, an examination of Facebook through the lens of our theoretical framework seems to indicate that it is one of the more culturally adaptable SNS, having either midrange values for many of the cultural dimensions or providing users the ability to tailor the SNS to their cultural preference.

Users can promote their own posts for a fee, but it does not create a meaningful power distance. Users are free to join or establish groups or maintain their individuality with little difference in the usage experience. While the overall experience of Facebook is more relationship oriented, the users have the ability to achieve recognition and awards by playing games embedded in the SNS and posting their achievements to their profile. Facebook allows for users to account for their individual level of uncertainty avoidance by providing an extensive array of privacy settings so that users can specify who has the ability to post on their profile, share items from their profile, or to tag them in pictures or events. Finally, Facebook provides for both short and long-term time orientations in that people can receive instant gratification through others liking their posts, but also allowing users to develop a network of friends over time that can provide value in the long-term.

It is interesting to note that Facebook used to not always be so culturally agile. For example, in its early years, membership to the SNS was restricted to university students and then later when the membership was opened up to anyone with a valid email address, people were required to choose a primary "network" to affiliate themselves with (collectivism). This affiliation had influence over search results and what posts users saw first on their pages. Furthermore, the ability to "like" pages and posts (providing for short-term orientation) was not introduced until 2006. While there are undoubtedly many more reasons for the global adoption of Facebook across the globe, one cannot discount the fact that it has changed to become more adaptable across cultural divides.

Given Facebook's position as the number one SNS in most every country in the world, it may be even more interesting to examine the SNS that holds the number two position. For example, let's take a look at Twitter. As of June 2012, the microblogging site holds the number two position worldwide in the countries of Japan, Sweden, the United Kingdom, and the United States [14]. From our framework, we see that Twitter is a site with low power distance as there are no premium membership options, it exhibits high levels of individualism as there are no groups to join, and is fairly short-term in orientation as people often tweet about what is going on in the moment and they receive feedback on their posts generally within a short time frame. This

fits well with the national cultures of Sweden, the United Kingdom, and the United States as they are all nations that have a very low power distance, are individualistic, and generally have short-term orientations [5]. Japan, in contrast, is a society that is mildly high power distance, individualistic, but has a very long-term orientation [5]. This might indicate that individualism is the strongest factor influencing adoption of Twitter across cultures or that there may be other factors not accounted for in our limited framework that are driving global adoption.

## **CONCLUSION AND FUTURE RESEARCH**

This paper serves as an initial attempt to create a theoretical framework to assist in explaining the differences in SNS popularity in different countries. It leverages the elements of the Hofstede cultural dimensions and relates them to common aspects of SNS that reflect those elements. While we feel that this is an initial step in the journey to understanding the variations in SNS popularity between nations, there is still much work that remains to be done. First, we will have to expand upon the SNS elements that reflect the cultural dimensions in an effort to make it more comprehensive. After that, the expanded framework will have to be validated both qualitatively and quantitatively.

Once it has been validated, we feel that it can make contributions to both theory and practice. With respect to theory, the framework can be used to help to explain the adoption and diffusion of SNS across the globe. With respect to practice, having an understanding of what aspects of SNS affect adoption and popularity can guide practitioners in the design of SNS to foster adoption and diffusion of their platforms globally.

Future research efforts in this area might include expanding the framework by adding other relevant cultural values, applying the framework to different contexts, or modifying it to be used at the organizational or personal levels of analysis. Regardless of what direction is taken, we feel that the area of culture and SNS is a very rich area of study and worthy of the attention of information systems research.

## APPENDIX A

### Most Popular SNS As Of June 2012 [14]

<b>Country</b>	<b>SNS #1</b>	<b>SNS #2</b>	<b>SNS#3</b>
Australia	Facebook	LinkedIn	Twitter
Austria	Facebook	Badoo	Twitter
Belgium	Facebook	Badoo	LinkedIn
Brazil	Facebook	Orkut	Badoo
Canada	Facebook	LinkedIn	Twitter
China	Qzone	Tencent Weibo	Sina Weibo
Denmark	Facebook	LinkedIn	Badoo
Finland	Facebook	LinkedIn	Twitter
France	Facebook	Badoo	Skyrock
Germany	Facebook	Wer-kennt-wen	Xing
India	Facebook	LinkedIn	Orkut
Italy	Facebook	Badoo	Twitter
Japan	Facebook	Twitter	Mixi
Netherlands	Facebook	Hyves	Twitter
Norway	Facebook	LinkedIn	Twitter
Portugal	Facebook	Badoo	Orkut
Sweden	Facebook	Twitter	LinkedIn
Russia	Odnoklassniki	V Kontakte	Facebook
Spain	Facebook	Tuenti	Badoo
United Kingdom	Facebook	Twitter	LinkedIn
United States	Facebook	Twitter	LinkedIn

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## **SOCIAL NETWORKS & INFORMATION PRIVACY IN THE ERA OF BIG DATA**

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### **ABSTRACT**

This is a work-in-progress paper examining privacy concerns in the big data era. The specific context area is through the lens of social media. Social media use is pervasive today and provides a rich environment for analysis of user behaviors and perceptions. As the use of different social networking websites grows, so too does the amount of data that is generated, collected, and potentially analyzed. The boundless collection, storing, analyzing, and sharing of high volume data is an essential technique for the evolving big data technology. In this study, we present a theoretical model, informed by the current literature to test the relationship between the users' big data perception and awareness and their impact on information privacy concerns. Ultimately, we posit that this will impact the quality of the data and its future analysis. This project contributes both to the literature in information privacy and big data by examining the critical interplay of user privacy concerns.

### **KEYWORDS**

Big data, big data analytics, information privacy

### **INTRODUCTION**

The volume of data in our world has exploded during the last few years. The entire digital universe was 281 exabytes in 2007, it increased by almost sevenfold in 2011 to 1800 exabytes, and is expected to continue growing exponentially to 8000 exabytes by 2015 (Gantz et al., 2008). This is largely as a result of the increased use of information and communications technologies (ICTs) and computer networks. Consequently, traditional databases are not sufficiently suited to handle the amount of highly unstructured data that is created today. This occurrence has led to the growth of the big data technology, coupled with data analytics. Big data is defined as “data sets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze” (Manyika et al., 2011, p. 11). Data analytics refers to the variety of tools and techniques employed to decipher and add meaning to big data.

One aspect of the big data matrix is an examination of the sources from which the data originates. According to IBM and Gartner reports, the top five sources for big data are: transactions, log data, events, e-mails and social media, respectively (IBM, 2012; Kart, Heudecker, & Buytendijk, 2013). While it is on the fifth position, social media, per se, produces a torrent of new data. Currently, Facebook embraces 600 million active users who spend more than 9.3 billion hours a month (Manyika et al., 2011). Furthermore, Facebook is about to initiate a big move in big data analysis (Edward, 2013). In early 2013, Facebook launched new advertising products to help marketers target their customers on Facebook. It established strategic alliances with Datalogix, Epsilon, Acxiom, and Bluekai and bought Atlas to provide marketers with more pertinent advertisements for users. The acquisition of Atlas will enable Facebook to report to advertisers the performance of their ads even when consumers are offline. Thus, Facebook will dominate and elevate the social media classification a higher contributing source for big data. The explosion of data throughout a promising big data source provides the founding rationale for this study.

As more and more data is collected from individuals, a multi-faceted array of concerns emerges. Security, privacy and data quality are the top three issues plaguing big data (Kart et al., 2013). Another report from the Gartner institution cautions big data adopters about privacy risks given that privacy policy is still incomplete (Buytendijk & Heiser, 2013). As postulated by Smith, Dinev, and Xu (2011), new information technologies may change our understanding of the term *information privacy*, and big data is one of the evolving technologies that can lead to a major change in this context.

To move forward, addressing the big data piece into the privacy research field becomes imperative. Research in the area of big data and big data analytics is heavily oriented toward the organizational impact. In this work-in-progress research, we focus on the user side of the big data equation. The primary research question driving this study is: What is the impact of big data perception and big data awareness on information privacy concerns among social networking websites (SNWs) users and to what extent may this impact affect the big data analytics in terms of the validity of personal information provided by SNWs users?

## **RELATED WORKS**

### **Information Privacy Concerns**

The notion of privacy is a multidimensional concept, which has led scholars to define it in different ways (Mohamed & Ahmad, 2012). Stone, Gardner, Gueutal, and McClure (1983) define information privacy as the “ability of the individual to control personally information about one’s self” (p. 460). Smith, Milberg, and Burke (1996, as cited in Mohamed & Ahmed, 2012) define information privacy concerns as “the extent to which an individual is concerned about organizational practices related to the collection and use of his or her personal information” (p.2367). The literature shows that privacy can be examined in different levels, for instance, privacy concerns between an organization and employees, consumers and corporations, and Internet users and online traders (Dinev & Hart, 2004).

Due to the complexity of information privacy concerns and the several constructs associated with it (Buchanan, Paine, Joinson, & Reips, 2007), the literature showed different perplexing frameworks that attempted to measure the antecedents and outcomes of this construct. There are mainly three categories of empirical studies in this context: studies that examined the antecedents of information privacy concerns (Dinev & Hart, 2004; Fogel & Nehmad, 2009; Park,

2010), studies that examined the association between privacy concerns and behavioral reaction outcomes (Krasnova, Gunther, Spiekermann, & Koroleva, 2009; Son & Kim, 2008; Tufekci, 2008), and studies that exploited a macro model to examine the mediation effect of privacy concerns on behavioral reaction outcomes (Acquisti & Gross, 2006; Buchanan et al., 2007; Dinev & Hart, 2006; Mohamed & Ahmad, 2012; Phelps, D'Souza, & Nowak, 2001; Taddei & Contena, 2013).

Various antecedents including but not limited to risk taking, self-efficacy, response efficacy, perceived vulnerability, perceived severity, and trust from those studies were found statistically associated with information privacy concerns among SNWs users. Other studies focused on demographics and socioeconomics and found strong correlations as well (Hargittai & Litt, 2013; Kuo, Tseng, Tseng, & Lin, 2013). Some behavioral reactions, e.g., fear of disclosure, misrepresentation, privacy measure use, and other protection behaviors, were also found statistically associated when information privacy concerns is measured as a predictable variable (Cavoukian & Hamilton, 2002; Dinev & Hart, 2006; Hoffman, Novak, & Peralta, 1999; Son & Kim, 2008; Turow & Hennessy, 2007; Xie, Teo, & Wan, 2006). Yet, Smith et al. (2011) proposed a framework based on a thorough study and evaluation of the literature (320 privacy articles and 128 books and book sections). Their framework includes all major aspects, antecedents and outcomes, pertaining to information privacy concerns.

### **Big data Perception and Awareness**

The essential technique that makes big data an important technology to businesses is that it enables businesses to collect, store, manage, analyze, and share a massive amount of data. A majority of Internet users are now aware and worried that their information is being utilized by companies or other third parties (Turow & Hennessy, 2007). However, users may not be aware that this practice is essential to big data projects and that the big data technology has several future values to both businesses and individuals. In addition, users may not be familiar with the term *big data* as it has evolved recently.

Several studies revealed that the practice of collecting, storing, analyzing, and sharing personal information brings about a concern to online users, particularly online consumers (Phelps et al., 2001; Sheehan & Hoy, 2000). Krasnova et al. (2009) found that SNWs users tended to reduce the amount of digital information they revealed due to the perceived organizational threats; organizational threats were measured based on several dimensions including the practices of collecting, storing, analyzing, and sharing personal information by SNWs. Although Acquisti and Gross (2006) found that Facebook users, in general, are unaware that Facebook collects, analyzes, or shares its users' information, this study was conducted in 2006 and now SNWs users have become more aware of this practice.

Past studies measured this kind of perception among Internet users to explore the impact of other technologies, e.g., data mining, on information privacy concerns. However, big data is a new emerging technology, and the literature has not yet covered this particular subject. While it can be rationalized that the above studies measured the same variable this study intends to measure, which is big data perception, previous studies did not conduct their studies for big data purposes in particular. So far, we could not find any study that particularly measured this variable with the highlight of big data among online or SNWs users. To do so, this study will investigate two variables, namely, big data perception and big data awareness.



## Misrepresentation

Ensuring the quality of the data collected about online users is of immense importance to online businesses (Xie et al., 2006). Several past studies found that around 20% to 50% of Internet users had misrepresented their personal information (Cavoukian & Hamilton, 2002; Hoffman et al., 1999). For instance, some people would provide incorrect name, age, sex, or address on the Internet. This pursuit was reasoned to the users' concern of privacy, as they believe that misrepresenting information is more convenient than reporting a privacy issue to third-party privacy organizations (Lwin & Williams, 2003). Such falsified information may incur costly mistakes to online companies (Son & Kim, 2008). Xie et al. (2006) found that Internet users with high level of concern toward privacy tended to falsify their personal information in response to requests by online companies. However, Son and Kim (2008) did not find this relationship significant. Although the literature shows mixed results with regard to data misrepresentation, the emergence of big data may reveal distinct results.

Data validity is necessary to ensure the quality of the results provided by the big data analytic tools. Decision makers rely on analysts who should be extra vigilant regarding data validity when it comes to moving data from exploratory to actionable (Hurwitz, Nugent, Halper, & Kaufman, 2013). Although data validation process undergoes different phases to ensure data quality, examining the root cause of invalid data becomes very important, especially to big data adopters who will utilize social media as a source, and can effectively facilitate subsequent phases.

## MODEL AND METHODOLOGY

In this study, we will adapt the framework proposed by Smith et al. (2011), Antecedents → Privacy Concerns → Outcomes. Due to the complexity of their framework, only two antecedents, big data awareness and big data perception, and one outcome, misrepresentation, will be investigated in this study. A mediation analysis will be conducted to test this framework.

Information privacy concerns refers to the extent to which an SNW user is concerned about the SNW's practices related to the collection and use of his or her personal information (Stone et al., 1983). Several studies revealed valid and reliable measurements in this context. Questions regarding the information privacy concerns variable were adapted from Dinev and Hart's (2004) study. Recent operationalization established by Krasnova et al. (2009) is suitable to be used to measure big data perception because big data perception denotes people's level of perception that their data are being collected, stored, analyzed, and shared by companies or SNWs (Craig & Ludloff, 2011). Big data awareness refers to extent to which a SNW user is aware of and familiar with the term *big data* and its value to both individuals and businesses. Big data awareness's items were developed by the authors based on the theoretical concept of big data, and four dimensions were considered. Misrepresentation refers to the extent to which an SNW user would falsify some of his or her personal information to avoid potential privacy threats (Son & Kim, 2008) when asked by an SNW or on the basis that it will be used for big data analysis. The Items were adapted from Son and Kim (2008). Figure 1 depicts the model of this study.

Figure 1: Big Data and Information Privacy Model



We will use a survey instrument to examine the above proposed theoretical model. The sample population for the survey will be students (both undergraduate and graduate). We believe this is the appropriate environment given the proliferation of social media use by young adults. To reduce selection bias, and online privacy concerns, we will distribute a paper-based survey for data collection. The students are all located at a large public institution in the northeast United States. Furthermore, the paper-based questionnaire will help avoid bias against those students who spend less time on the Internet, feel less comfortable answering online surveys, or have less private access to the Internet (Hargittai & Litt, 2013).

### **FUTURE RESEARCH AND CONCLUSION**

The big data technology has promising values to both individuals and businesses (Manyika et al., 2011). Yet, it is still a growing area, and policies to ensure its security, privacy, and ethical issues have not yet been resolved. Thus far, behavioral research studies have not investigated the big data issues in detail, especially from individuals' perspectives. Future research should focus on enhancing the privacy research field by embedding the big data piece into the privacy framework. Also, researchers should conduct thorough research studies in order to construct and validate the conceptual and operational definitions for new variables pertaining to big data. While part of this study is focused on the extent to which SNWs users would misrepresent their personal data, it measured this variable based on general questions. Future studies should measure more specific items that will be analyzed for big data purposes, e.g., accuracy of name, age, address, political view, post, comment, etc.

In conclusion, this study will contribute to the information privacy research field by examining new factors that could change our understanding of information privacy. In addition, it will provide big data adopters with a general picture of the validity of personal data extracted from social media, which is a critical issue to big data analytics. This study also aims to spur future researchers to examine and delve into the intervention of big data in the information privacy domain.

### **Acknowledgment**

The authors wish to thank Kathy L. Brode for providing writing consultation services.

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# **A STUDY OF THE RELATIONSHIPS AMONG SELF-DIRECTED LEARNING, MANAGERIAL COMPETENCY AND MANAGER'S JOB PERFORMANCE**

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## **ABSTRACT**

This study explores the relationships among “Self-Directed Learning”, “Managerial Competency” and “Job Performance”. A questionnaire survey was conducted to test the study’s hypotheses. Copies of the questionnaire were sent to 220 managers of companies in Taiwan and 139 effective questionnaires were received that results in an effective response rate of 63.2%. After analyzing the survey data and testing the hypotheses, the study finds: (1) Among the three constructs of “self-directed learning” examined in this study, “initiative in learning” has positive impacts on “competency of conceptualization” and “problem-solving skill” but has no impacts on “interpersonal skill”; “active learning” has positive impacts on “interpersonal skill” and “problem-solving skill” but has no impacts on “competency of conceptualization”; while “learning preference” has no impacts on the three constructs of “managerial competency”. (2) Among the three constructs of “managerial competency”, only “interpersonal skill” has positive impacts on the two constructs of “job performance” that are “effectiveness” and “quality performance”, and both “competency of conceptualization” and “problem-solving skill” have positive impacts on “effectiveness” but have no impacts on “quality performance”.

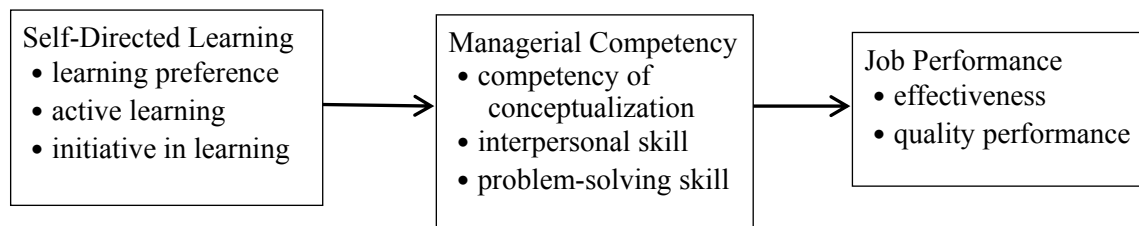
**Keywords:** Self-Directed Learning, Managerial Competency, Job Performance

## **INTRODUCTION**

To promote managers’ competency has been a central issue in most companies. However, it was usually incorporated as parts of the companies’ human resources management or organizational learning, typically in the forms of corporate training courses or corporate designed learning projects. Because these managers’ competency-enhancing learning efforts are mainly made by the companies themselves, they may be confined by the experience and corporate culture of the focal companies. In nowadays fast-changing business environment, these arrangements are not enough to nurture innovative thinking managers that are badly wanted by most companies.

Therefore, this study will focus on an emerging trend of self-directed learning that seems more suitable for many managers to prepare themselves to cope with new challenges. Self-directed learning mainly exhibits in adult learning. After completing a series of education and having acquired certain amounts of specific knowledge and skills, a person may compile a learning plan to arrange a sequence of learning activities to enhance his(her) own specialties to meet the challenges and opportunities in the work career (Roberson and Merriam,2005). Basically this is not a new idea, but a revived idea prevailed in the adult learning literature (Tough, 1966). Peterson (1983) had indicated that adult learning is mainly actuated by the adult’s inside motives. Artis and Harris (2007) also confirmed that self-motivated learning has better performance than mandated learning. But, there are relatively few studies focusing on the nuance of the effects of self-directed learning for managers, for example, we still don’t know which types of self-directed learning are more suitable for managers to enhance their managerial competency (or certain parts of it). In sum, the purposes of

this study are to investigate the impacts of self-directed learning on managers' managerial competency and the resulting job performance enhancement of the managers. Figure 1 depicts the relationships among these researcher variables.



**Figure 1 Research Framework**

## LITERATURE REVIEWS

### Self-directed learning

The term “self-directed learning” was first coined by Tough (1966) to depict that a person assumes the responsibility of designing a learning plan and maintaining a learning momentum in acquiring certain targeted knowledge or skills, and in the meantime insists on completing every required steps in the learning process. Guglielmino (1977) argued that a person with high level of self-directed learning will exhibit active, independent and continuous learning behaviors. S/he is a self-disciplined person equipped with necessary basic learning skills and is a goal-orientation person good at meeting the self-set learning schedules. In this line of theory, self-directed learning has been treated as a personal characteristic that will influence the person’s learning attitudes and behaviors. Other scholars (Knowles, 1975) emphasized the “self” concept in the learning process. They argued that self-directed learning is a learning process in which a person diagnoses his(her) own learning requirement and makes clear what are the targeted knowledge sphere or skills, and selects (designs) a learning plan according to the resources of his(her) environment and implements it with a self-monitoring manor. During this process, the learner may learn all by himself or he may receive some kinds of help from others.

In this study, we combine these two lines of research in self-directed learning, and choose some aspects of self-directed learning that are used frequently in the research literature, named “learning preference”, “active learning” and “initiative in learning”. Learning preference reflects a person’s innate traits that are prone to continuous learning such as a higher level of curiosity and a desire for fulfilling a work career. These are deemed born in nature, although some scholars argued otherwise. Active learning reflects a person’s self-activated learning behaviors usually in the forms of designing a self-learning plan in his professional knowledge sphere or taking part on some training courses that are not obliged by his job requirements. Initiative in learning reflects the learning from the dynamics between a person’s professional specialty and his work practice. This learning is dynamic because there are no obvious learning courses or precise schedule for this type of learning activities. They are usually in the forms of learning by doing. The key point is a learning attitude in the work practice especially when facing difficult work-related problems. A person with high level of “initiative in learning” views these challenges in work practice as valuable opportunities to refine or revise his professional knowledge and skills.

## **Managerial competency**

From a management viewpoint, competency usually means a person's underlying characteristics related to his occupation that may influence his work behaviors and work performance. Spencer et al. (1993) argued that through these underlying characteristics we can realize how a person implements job-related activities and we also may be able to predict this person's job capabilities. There are two types of underlying characteristics of competency. One is visible, such as a person's work-related knowledge and skills. The other is hidden and is related to a person's innate characteristics such as traits, motives, and self-concepts. Some scholars (Spencer, 1993) maintained that the hidden parts of a person's competency are more important than the visible parts when practicing interpersonal affairs that are a staple in many managers' day-to-day management practice. Thus, we use both parts of competency and defines managerial competency as: the visible and hidden characteristics possessed by a manager that can help the manager practice his works and result in a qualified performance, including the manager's work experience, knowledge, skills along with his personal work-related traits.

In this study, we choose "competency of conceptualization", "interpersonal skill" and "problem-solving skill" as three aspects of managerial competency. Competency of conceptualization reflects a manager's professional knowledge and experience in the focal work environment. A manager with high level of competency of conceptualization can grasp the work situation more quickly and clearly. Interpersonal skill reflects a manager's hidden characteristics that are deemed less related to his professional knowledge but can be acquired by more experience in interacting with colleagues and co-workers. Problem-solving skill reflects a manager's ability of handling challenging situations. Recently, these challenging work encounters are becoming normal for many managers.

## **HYPOTHESES**

### **The relationship between self-directed learning and managerial competency (H1)**

Distinct from traditional personnel training courses that are designed by organization aiming to cultivate the learners to acquire certain competency that the organization deems important, self-directed learning emphasizes the learner's discretion on his own leaning plan. Comparing with passively following organizational training courses, the leaner can decide what knowledge domains are more important for him, which learning schedule is more suitable to his circumstance, and what learning model is more effective for him (Dragoni et al., 2009). Yeung et al. (1999) find that the learners' learning intentions and learning performance will be raised if the learners can make their own learning projects. Furthermore, as mentioned in previous section, a large parts of managerial competency result from the manager's hidden characteristics that are hard to promote by using traditional training courses. They are acquired in a cycle of learning, practicing, reflexing, and re-practicing (Artis and Harris, 2007). Yang (2004) also finds that, comparing to learners who passively received organizational training courses, self-directed leaners are easier to obtain tacit knowledge and skills, and combine them with explicit knowledge to make some new knowing. Thus, self-directed learning should be able to promote managers' managerial competency. The study makes hypothesis 1 as following:

#### ***H1: self-directed learning has positive impacts on the managers' managerial competency***

*H1-1: learning preference has positive impacts on the managers' managerial competency*

*H1-2: active learning has positive impacts on the managers' managerial competency*

*H1-3: initiative in learning has positive impacts on the managers' managerial competency*

## **The relationship between learning managerial competency and job performance (H2)**

Job performance is the evaluation of the work output of organizational members. Some scholars (Motowidlo, 1997) focused on the process and strived to evaluate work behaviors of the focal person. The others may focus on the results and compare them with a series of standards set by the organization. In this study, we define job performance as the extent to which a person can timely implement and complete his designated works and provides a work result that confirms the organizational standards. Aside from the effectiveness and efficiency of the results that are frequently used in performance evaluation, we also include a set of standards that are related to the qualities of those results.

Surely, managers with higher level of managerial competency will reach high level of job performance than managers with lower level of managerial competency. These effects of managerial competency on the managers' job performance had been found in some empirical studies (Wu, 2010), although these studies may only use some aspects of managerial competency. We hypothesize that:

### ***H2: managerial competency has positive impacts on the managers' job performance***

*H2-1: competency of conceptualization has positive impacts on the managers' job performance*

*H2-2: interpersonal skill has positive impacts on the managers' job performance*

*H2-3: problem-solving skill has positive impacts on the managers' job performance*

## **METHODS**

### **Measures of research variables**

In this section, we present the measure content of research variables.

#### *A. self-directed learning*

This study compiles the measure items of the three constructs of self-directed learning by adapting items of Guglielmino's (1977) Self-directed Learning Readiness Scale (SDLRS), in which "learning preference" is measured with four items, "active learning" with three items and "initiative in learning" with four items.

#### *B. managerial competency*

The measure items of the three constructs of managerial competency are mainly adapted from Shi et al.'s (2011) empirical study, in which "competency of conceptualization" has three items, "interpersonal skill" has four items and "problem-solving skill" has three items.

#### *C. Job performance*

The measure items of the two constructs of job performance are adapted from Lee et al.'s (1999) study, in which "effectiveness" has four items and "quality performance" has five items.

### **The survey**

A questionnaire survey was designed to test the study's hypotheses. The targeted respondents of the survey are managers of companies in technology industry in Taiwan. Copies of the questionnaire were sent to 220 managers and 139 effective questionnaires were received that results in an effective response rate of 63.2%. The data of each research variables is tested by using Cronbach's alpha



reliability test and then by confirmative factory analysis (CFA) method. AMOS 21 software was used to implement CFA tests and to test hypotheses in the linear structural equation model of the research framework.

## **RESULTS**

### **Reliabilities and CFA tests**

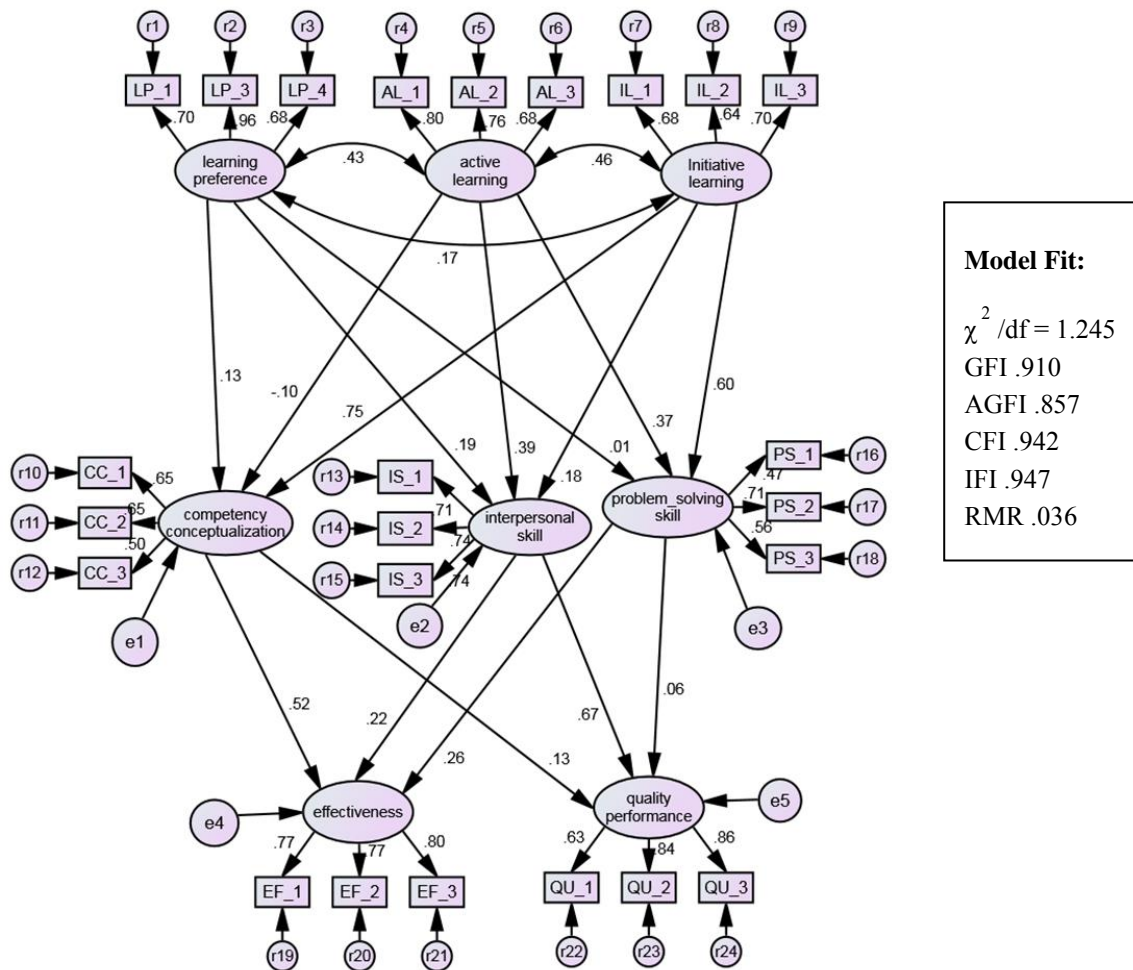
During the process of reliabilities tests, we delete some of the items that are inconsistent with other items. After deleting some items, the values of each constructs' Cronbach's coefficient alpha are larger than the 0.7 criterion. This indicates that all research constructs have acceptable reliabilities. Furthermore, the results of CFA tests also indicate that the data largely have a good fitness with research constructs' measure model. Thus the data are deemed suitable for the hypotheses tests.

### **Research Model test and Hypotheses tests**

We use the standardized coefficients (beta value) of the causal paths to test the study's hypotheses. The results are showed in Figure 2 and Table1. First, among the three constructs of "self-directed learning" examined in this study, "initiative in learning" has positive impacts on "competency of conceptualization" and "problem-solving skill" but has no impacts on "interpersonal skill; "active learning" has positive impacts on "interpersonal skill" and "problem-solving skill" but has no impacts on "competency of conceptualization"; while "learning preference" has no impacts on the three constructs of "managerial competency". Thus, Hypothesis 1 ("self-directed learning" has positive impacts on "managerial competency") is only partially supported.

Second, among the three constructs of "managerial competency", only "interpersonal skill" has positive impacts on the two constructs of "job performance" that are "effectiveness" and "quality performance", and both "competency of conceptualization" and "problem-solving skill" have positive impacts on "effectiveness" but have no impacts on "quality performance". Hence, the results of testing of Hypothesis 2 ("managerial competency" has positive impacts on "job performance") indicate that it is only partially supported.

**\* References upon request**



**Figure 2 The results of research model testing**

**Table 1 Beta value of the paths**

Paths	Beta	P	
Learning preference ---> Competency conceptualization	.134	.234	H1-1-1
Learning preference ---> Interpersonal skill	.192	.063	H1-1-2
Learning preference ---> Problem-solving skill	.014	.894	H1-1-3
Active learning ---> Competency conceptualization	-.098	.501	H1-2-1
Active learning ---> Interpersonal skill	.390	.004 **	H1-2-2(S)
Active learning ---> Problem-solving skill	.366	.015 *	H1-2-3(S)
Initiative in learning ---> Competency conceptualization	.754	.000 **	H1-3-1(S)
Initiative in learning ---> Interpersonal skill	.180	.132	H1-3-2
Initiative in learning ---> Problem-solving skill	.597	.000 **	H1-3-3(S)
Competency conceptualization ---> Effectiveness	.520	.000 **	H2-1-1(S)
Competency conceptualization ---> Quality performance	.133	.280	H2-1-2
Interpersonal skill ---> Effectiveness	.215	.032 *	H2-2-1(S)
Interpersonal skill ---> Quality performance	.674	.000 **	H2-2-2(S)
Problem-solving skill ---> Effectiveness	.262	.045 *	H2-3-1(S)
Problem-solving skill ---> Quality performance	.060	.659	H2-3-2

Note: \* <.05, \*\*<.01 ; (S) means the hypothesis have been supported.

# A FIRST ORDER MARKOV CHAIN MODEL FOR AUTOCORRELATED PROCESSES

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## ABSTRACT

This paper discusses a first order Markov Chain (MC) model of the lot quality distribution for autocorrelated processes and how it can be integrated into statistical process control applications. The proposed model is based on a summary of the previous works by the authors on developing a first order Markov Chain (MC) model for the lot quality distribution. The model assumes that lots are formed from items that are sequentially produced by an autocorrelated process. Potential applications of this lot quality distribution and how it can improve the performance of some statistical process control and acceptance sampling methods are discussed.

**Key words: Markov chain, lot quality distribution, processes with autocorrelation.**

## DISCUSSION

The number of nonconforming items contained in a lot determines “the lot quality.” The probability distribution of the lot quality is referred to as the “lot quality distribution” (LQD). In this study a first order Markov Chain (MC) with two states (“conforming” and “nonconforming”) is used to describe the autocorrelated process and assumes that the quality of the item at time (t) is positively correlated with the quality of the item at time (t-1). The result of the study is a probability function that describes the lot quality distribution for a first order MC.

The autocorrelated, i.e., dependent, processes have been increasing over time. There are various reasons for this, such as the use of Automatic Process Control (APC) systems (also known as the Engineering Process Control (EPC)) in controlling the processes. APC/EPC systems are valuable in terms of improving the capability of the process. However, they may cause autocorrelation among the data points, which would distort the independence assumption of the traditional process control techniques (see, for example, Holmes and Mergen [6], Montgomery and Mastrangelo [14], Krieger, Champ, Alwan [8], Lu and Reynolds [10], Apley and Shi [1], Apley and Tsung [2] and Jiang [7]). Autocorrelation, on the other hand, can also be a natural part of the process, such as tool wear. In either case, it has to be modeled and the process control applications should be modified accordingly. The proposed model in this paper would be a way to build the lot quality distribution that can be used for various applications in such processes.

Traditional statistical process control (SPC) techniques consider continuous (i.e., high volume) processes to be independent processes, i.e., no autocorrelation. If the process is an independent

process, the quality of the item produced at time (t) is independent of the quality of the item(s) produced at previous time interval(s), and the lot quality distribution would be the Binomial distribution. However, as stated before, some high volume processes display the sign of autocorrelation; and thus not all the empirical lot quality distributions would be of the Binomial type. Some researchers, such as, Chiu [3], Lauer [9], assumed that the Beta distribution would be an appropriate description for lot quality distributions. However, lot quality distributions observed in practice exhibit shapes that do not always appear to be in the Beta form. The model discussed in this paper, which takes into account the autocorrelation structure in the process, yields lot quality distributions that are very similar to those empirical lot quality distributions coming from autocorrelated processes.

**Model:**

When the manufacturing process is described as a first order Markov Chain, the process can be represented in a matrix form as in Table 1 below.

	<b>Next item</b>	
	Good (g)	Bad (b)
<b>Last item</b>	Good (g)	Bad (b)
	x	1-x
	Bad (b)	1-y
	y	1-y

Table 1. Transition probability matrix.

where

- g = conforming,
- b = nonconforming,
- x = probability that the item is conforming given that the last item was conforming,
- 1-x = probability that the item is nonconforming given that the last item was conforming,
- y = probability that the item is conforming given that the last item was nonconforming,
- 1-y = probability that the item is nonconforming given that the last item was nonconforming.

If the process described by this matrix continues for a sufficient period of time, the steady state probability of nonconformance,  $\pi$ , (i.e., the fraction nonconforming) can be shown to be:

$$\pi = \frac{1 - x}{1 - x + y} \tag{1}$$

When the process starts to form a new lot, the first item will be either a conforming one or a nonconforming one with probability  $1 - \pi$  and  $\pi$ , respectively. From that point on, the condition of an item depends on the preceding outcome.

Let  $P(d : g, N)$  and  $P(d : b, N)$  denote the probabilities of  $d$  number of nonconforming items in a lot of size  $N$  where the last item was conforming and nonconforming, respectively. To obtain the general solution for the lot quality distribution, the following difference equations can be written:

$$P(d : b, N) = (1 - x)P(d - 1 : g, N - 1) + (1 - y)P(d - 1 : b, N - 1) \quad (2)$$

$$P(d : g, N) = xP(d : g, N - 1) + yP(d : b, N - 1) \quad (3)$$

for  $d = 1, 2, \dots, N$  and  $N > d$

and

$$P(0 : b, N) = 0 \quad (4)$$

$$P(0 : g, N) = xP(0 : g, N - 1) \quad \text{for } N > 1 \quad (5)$$

Then the lot distribution can be obtained from the solution of the above recursive equations, assuming that the Markov process starts, say, from the steady state probability of a conforming item, namely,  $1 - \pi$ . This is a reasonable choice, since the Markov process is a convergent process. The solution of the difference equations results in the following distribution (see Mergen [11], Mergen and Holmes [12] and Mergen and Deligonul [13] for details):

$$P(d)_N = \sum_{i=1}^{\text{Min}(N-d, d-1)} \left[ \binom{N-d-1}{N-d-i} x^{N-d-i} (1-x)^{i-1} y^i (1-y)^{d-i-1} [C] \right] + x^{N-2d-1} (1-x)^{d-1} y^d [D] \quad (6)$$

for  $d = 1, 2, \dots, N-1$

where

$$\begin{pmatrix} R \\ Q \end{pmatrix} = 0 \quad \text{if } R \leq 0 \text{ and } Q < 0 \quad (7)$$

$$C = \frac{\binom{d-1}{d-i-1}(1-x)^2 + 2\binom{d-1}{d-i}(1-x)(1-y) + \binom{d-1}{d-i-1}(1-y)^2}{1-x+y} \quad (8)$$

$$D = \frac{2\binom{N-d-1}{N-2d}x(1-x) + \binom{N-d-1}{N-2d}(d-1)x(1-y) + \binom{N-d-1}{N-2d-1}y(1-x)}{1-x+y} \quad (9)$$

$$P(d) = \frac{yx^{N-1}}{1-x+y} \quad \text{for } d = 0 \quad (10)$$

$$P(d) = \frac{(1-x)(1-y)^{N-1}}{1-x+y} \quad \text{for } d = N \quad (11)$$

As a point of interest, Mergen [11] showed that the above lot quality distribution ( $P(d)_N$ ) reduces to a Binomial distribution, as it should, when there is no autocorrelation in the process, i.e., the transition probabilities are equal ( $x = y$ ). In other words, the process outcomes are independent of each other.

## EXAMPLES

The lot quality distribution described above can be used in various different applications. Mergen and Holmes [12], for example, used this distribution to approximate the lot quality distribution of a subassembly of an aircraft jet engine; and the result was very close to the empirical distribution. Deligonul and Mergen [4], on the other hand, used this lot quality distribution to demonstrate autocorrelation bias in p-charts when the process is autocorrelated. They examined the impact of correlated data on the control limits for p-chart. Their study showed that the autocorrelation in the process causes some distortion in determining the control limits on the p-charts, i.e., the limits could be over or under estimated depending on the direction of the autocorrelation. Mergen [11] and Holmes and Mergen [5], again by utilizing this distribution, developed a new measure called expected average outgoing quality (EAOQ) as an alternative to the traditional outgoing quality measure of average outgoing quality limit (AOQL) to evaluate the performance of acceptance sampling plans in terms of outgoing quality. The advantage of the EAOQ over AOQL is that the former incorporates the lot quality distribution into the process of determining the average outgoing quality and as a result the status of the process becomes an integral part of the selection of the sampling plan. The results showed that the level of quality of the lots leaving the inspection area is much better than the one would think using AOQL approach. This may help quality control managers reduce their sample sizes and in turn reduce the inspection cost.

Mergen and Deligonul [13] recently developed a posterior quality distribution for the outgoing quality of the lots to better design and assess the performance of the acceptance sampling plans. In their study, they used the above lot quality distribution as a prior distribution to derive the posterior quality distribution of the accepted lots. Using this posterior distribution, they also proposed a measure, Mean squared nonconformance (MSNC), which incorporates the autocorrelation characteristics of the process and the dispersion of nonconformance fraction as an integral part of the sampling plan. Thus, this measure helps to improve the efficiency of the acceptance sampling plans.

The examples listed above indicate the versatility and also the advantage of having a lot quality distribution. Due to changes in process control technology, more and more processes display the sign of autocorrelation in practice. The existence of autocorrelation violates the very basic assumption of independence for many statistical process control methods. Thus getting a lot quality distribution that reflects the true nature of the process can help adjust the standard process control tools and get a better understanding of the process performance.

## CONCLUSION

In this paper the derivation and various applications of a lot quality distribution for autocorrelated processes are discussed. This distribution, based on a model of a process, has the ability to fit a number of empirical lot quality distributions. In addition, since it reduces to the Binomial distribution when there is no autocorrelation, it can be considered to be a generalization of the Binomial.

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## **Revisiting and Extending Service Quality Model in a Unique Context, Qatar**

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October 2013

## **Abstract**

This study examined service quality at a university in a unique context, Qatar utilizing the SERVQUAL model. Among other uniqueness universities in the Middle-East region are staffed by expatriates from all over the world on contractual terms. There is no tenure system, which can have possible impact on job commitment and job satisfaction of these expatriates. As such service quality at universities as perceived by students and the consequent student satisfaction with university services can be affected. A sample of over two hundred students assessed service quality along the dimensions of tangibility, reliability, responsiveness, assurance and empathy. Results indicated students' perceptions of all the five dimensions of service quality were lower than their expectations of the same dimensions. The biggest discrepancy was observed for the dimension of reliability followed by responsiveness and the lowest was found in tangibility. Implications are discussed.

## **Introduction**

Service quality is recognized by academicians and practitioners as a valuable means to achieve important organizational outcomes such as customer satisfaction, customer loyalty, competitive edge, operational efficiency, and the overall organizational performance (Bala and Nagpal, 2011; Hung, Huang, and Chen, 2003; Isik, Tengilimoglu and Akbolat, 2011; Malik and Naeem, 2011). While scholars have offered various theoretical perspectives to explain service quality (Gianesi and Correa, 2004; Lovelock, 2001; Mousavi and Rezaeian, 2007), Parasuraman, Zeithaml and Berry's (1985) service quality model based on gap analysis has drawn the most research attention. In this conceptualization, the gaps between customers' expectations and perceptions pertaining to different traits/dimensions of services such as credibility, reliability, accessibility, courtesy, security, tangibility, responsiveness, communication, and understanding of customers represent service quality. Subsequently, the service quality dimensions have been simplified and regrouped into five namely tangibility, reliability, responsiveness, assurance and empathy (Shahin and Samea, 2010).

This service quality model has been applied in various contexts including banks, information technology firms, financial services organizations, insurance companies, health-care providers, hotels, tourism services, travel services, restaurant services, transportation services, libraries and web-portals. Not surprisingly, Parasuraman et al.'s (1985) service quality model is being increasingly utilized in the contexts of higher education institutions (Ueno, 2010). Severe competition, limited resources, financial constraints, and changing demographics are driving higher education institutions to increasingly focus on service quality (Brown and Bitner, 2007; Ueno, 2010). Additionally, service quality is increasingly being demanded of higher education institutions by political/public forces simply because higher education institutions are considered instrumental in the development of human capital (Gruber, Fub, Voss and Glaser-Zikuda, 2010; Lawrence and Sharma, 2002). Governments and other funding sources are increasingly linking financial support to the results produced by educational institutions (DeShields, Kara and Kaynak, 2005).

Scholars argue higher education has become a service and the target customers are students (Yeo, 2008). As such universities are increasingly adopting marketing strategies to address student expectations. Not surprisingly, among other issues research is increasingly being focused on service quality at universities (Yen-Ku and Kung-Don, 2009). Even though education sector has become a national priority sector in the Gulf-Region (Gulf Cooperation Council countries), very little research attention is given to study education service quality at higher

educational institutions from students' perspectives. The six GCC countries have a burgeoning young population (sixty percent under the age of 25 years) with a high unemployment rate (thirty-five percent). One of the reasons is the young population is ill-prepared to compete for private sector jobs, while employment opportunities in the public sector are saturated. In such a context, GCC countries are aggressively trying to develop a knowledge-based economy. Specifically, in its 2030 national vision Qatar stresses education as one of the basic pillars of human development and aims to build a world-class education system. This requires an attention to the education service quality. Since students are the prime customers of the education service, students' expectations and perceptions of service quality must reflect in the service standard of higher education institutions in Qatar and elsewhere. This study aims to assess service quality at Qatar University from students' perspective.

### **Literature Review**

Although a number of definitions of service quality exists in the literature, the common theme across these definitions is service quality represents the discrepancy between customers' expectations and perceptions of service quality dimensions (Asubonteng, McCleary, and Swan, 1996; Gronroos, 2002; Othman and Owen, 2002; Parasuraman et al., 1985). Initially Parasuraman et al. (1985) advanced ten quality dimensions, which were subsequently consolidated into five dimensions namely tangible (including physical facilities, equipment and appearances of personnel), reliability (ability to perform the promised service dependably and accurately), responsiveness (willingness to help customers and provide prompt service), assurance (including credibility, competence and courtesy of employees), and empathy (including communication, caring and understanding customers). This idea of service quality stems from Parasuraman, Zeithaml and Berry's (1985) gaps model. The model identifies core obstacles that restrain a service provider from delivering a satisfactory level of service quality in terms of five gaps. These gaps include management perception gap, quality specifications gap, market communication gap and perceived service quality gap (Seth, Deshmukh, and Vrat 2005). Parasuraman et al. (1985) argued organizations can improve the quality of its services by managing these gaps in an appropriate manner. Among the five gaps, the gap between customers' expectations and perceptions of service quality is considered most crucial in assessing service quality (Parasuraman et al. 1985). Subsequently SERVQUAL model was constructed to study the gaps between customers' expectations and perceptions related to five service quality dimensions mentioned earlier.

Scholars have widely used the SERVQUAL model to assess service quality of various service-providing organizations based on the notion that service quality is closely associated with customer satisfaction. In the same vein, service quality at higher education institutions has been drawing considerable research attention (Benett and Ali-Choudhury, 2009; Garbarino and Johnson, 1999). Universities are striving to achieve student satisfaction by focusing on service quality attributes to provide better academic experience to students and in turn to increase student satisfaction (Helgessen and Nettet, 2007; Yen-Ku and Kung-Don, 2009). Even though this idea of considering students as customers may compromise the achievement of longer-term education and societal goals (Bay and Daniel, 2001), higher education institutions are increasingly adopting a customer oriented approach (Ng and Forbes, 2009). This is because research on student experience has become essential for universities in order to respond to market forces primarily comprised of increased competition and enhanced scrutiny from government and non-government funding sources. Universities are finding the tracking of student satisfaction important for managing student matriculation rate, attrition rate, positive word-of-mouth from students, support from alumni, and more (Alves and Raposo, 2009).

Although the education sector is booming in the Gulf region, not much research attention is given on education service quality. As mentioned earlier, sixty-five percent population is under twenty-five years of age in the region. At the same time because of the shortages of indigenous faculty and staffs, universities in the region are mostly staffed by expatriates from all over the world. Their jobs are contractual for a limited period of time and are often renewable. The absence of any tenure system or permanency in jobs can have substantial impact on the job commitment and job satisfaction of these faculty and staffs. In turn the service quality of these universities can be impacted. Nevertheless, the region is aggressively pursuing the development of a knowledge-based economy. Specifically, Qatar in its 2030 national vision aims to build a world-class education system. In this context, it is imperative the service quality of education service in Qatar be assessed from students' perspective. Studies showed students are analytic and look for service quality while choosing a university (Donaldson and McNicholas, 2004). Lack of previous research in Qatar prompted us to seek answer to a research question related to service quality of higher education institutions in Qatar. This study should serve as a basis for developing hypotheses in future research. Considering the above, we pose the following research question:

**Q.** Are there significant differences between students' expectations and perceptions in the tangible, reliability, responsiveness, assurance, and empathy dimensions of the SERVQUAL model at Qatar University?

## **Methodology**

All constructs were measured by multiple-item scales drawn from previous research. Also the scales were all on five-point Likert format. Service quality was assessed with an eighteen-item scale adopted from Parasuraman, Zeithaml and Berry (1985). Both expectations and perceived performance were measured. These eighteen items measured five dimensions of service quality namely tangibility (four items), reliability (three items), responsiveness (three items), assurance (four items), and empathy (four items). A pilot study was conducted with a group of twenty students representing both graduate and undergraduate. The questionnaire included both Arabic and English questions side by side. A number of modifications were made based on the feedback received from the pilot test.

Data was collected using both a convenient and a snowball sampling techniques, the most used method in the Middle-East region (Javadi, 2011) from students of Qatar University, the only national university in Qatar. With the help of the faculty, questionnaires were administered in a select number of class rooms. Besides on-line questionnaires were distributed via e-mail to students with the help of departmental secretaries. A total of 240 questionnaires were distributed, whilst 213 were returned. The characteristics of the respondents reveal most respondents were undergraduate students (94.2 percent), females represented 87.1 percent respondents, Qatari and non-Qatari were split into 52.8 percent and 47.2 percent respectively, 92 percent respondents were below 25 years of age, and 85 percent students were from college of business and college of arts and sciences. The characteristics of the respondents closely resemble the population characteristics of the student body at Qatar University, where 78 percent students are females and by and large it is an undergraduate institution.

## **Analysis and Results**

To assess the reliabilities of the measurement scales Cronbach's alpha was estimated for each of the five dimensions of the service quality scale both for the expectations and the perceived performance. The cronbach's alphas for tangibility, reliability, responsiveness, assurance, and empathy concerning expectations were 0.771, 0.726, 0.733, 0.852, and 0.825 respectively. While the Cronbach's alphas for tangibility, reliability, responsiveness, assurance, and empathy concerning perceived performance were 0.756, 0.812, 0.832, 0.806, and 0.837 respectively. The combined (all five dimensions together) Cronbach's alpha related to expectation was 0.938, while that of perceived performance was 0.939. Hence, reliability estimates were all within the acceptable range.

Subsequently, composites, means, were estimated for each dimension both for expectation and perceived performance. Also composites were estimated for expectation with five dimensions combined and for perceived performance with five dimensions combined. The means are as follows: tangible-expectation=4.5239, tangible-perceived performance=3.8537; reliability-expectation=4.5203, reliability-perceived performance=3.1549; responsiveness-expectation=4.5704, responsiveness-perceived performance=3.2762; assurance-expectation=4.6428, assurance-perceived performance=3.3670; empathy-expectation=4.5043, empathy-perceived performance=3.2602; five dimensions combined-expectation=4.5529, five dimensions combined-perceived performance=3.3999.

In order to assess if Qatar University services meet its students' expectations, gap scores were calculated that reflect the differences between students' perceived performances and expectations related to Qatar University services. More specifically, expectations were deducted from perceived performances. The resulting gap scores between perceived performances and expectations related to tangibility, reliability, responsiveness, assurance, empathy, and five-dimension combined were -0.67, -1.366, -1.295, -1.276, -1.244 and -1.152 respectively (see Table 1).

(Table 1 about here)

In addition, paired samples tests were carried out to examine if the gap scores were statistically significant. The difference between tangible-perceived performance and tangible-expectation was statistically significant ( $t=11.176$ ,  $\text{Sig.}=0.000$ ). Also the gap between reliability-perceived performance and reliability-expectation appeared significant ( $t=16.679$ ,  $\text{Sig.}=0.000$ ). Further the variance between responsiveness-perceived performance and responsiveness-expectation was significant ( $t=16.623$ ,  $\text{Sig.}=0.000$ ). In addition the discrepancy between assurance-perceived performance and assurance-expectation appeared significant ( $t=16.732$ ,  $\text{Sig.}=0.000$ ). Also the disparity between empathy-perceived performance and empathy-expectation came out significant ( $t=15.949$ ,  $\text{Sig.}=0.000$ ). Finally the gap between five dimensions combined-perceived performance and five dimensions combined-expectation appeared statistically significant ( $t=18.033$ ,  $\text{Sig.}=0.000$ ). See Table 2 for paired sample test results.

(Table 2 about here)

## Discussion and Conclusion

This study attempted to assess service quality of Qatar university from students' perspective along the dimensions of tangibility, reliability, responsiveness, assurance and empathy. Two hundred thirteen students participated in the study. The results showed the perceptions of all five dimensions were lower than the expectations. That is, there exists service quality discrepancies at Qatar university. The highest gap score was observed for the dimension of reliability (gap score = -1.366). In other words, students are concerned about university's ability to perform the service dependably and accurately as promised. The highest attention needs to be given to improve service dependability and accuracy. The next largest gap score was found for the dimension of responsiveness (gap score = -1.295). This means students found Qatar university's service providers did not show adequate eagerness to help students and provide punctual services. A great deal of attention must be paid to improve the punctuality of task performed and helping attitudes. The third largest gap score pertained to assurance (gap score = -1.276). That is students had doubt about service providers' credibility, competence and courtesy. This points out to the need to further enhance the knowledge and skills of service providers. The fourth largest gap was found in the dimension of empathy (gap score = -1.244). Students found deficiencies in communication with, caring for and understanding of students. Clearly much needs to be done in the areas of communication with students, caring for students and understanding of students. The least gap was observed in the dimension of tangibility (gap score = -0.67). That means students are less concerned about the physical facilities, equipment and appearances of personnel. Nevertheless, there is still a negative gap score indicating the need for a further improvement. The gap score of all five dimensions together is -1.152, which indicates an overall deficiency in service quality, i.e., much is needed to be done to improve service quality and in turn student satisfaction.

The study has its limitations. The study of a single university in Qatar limits the generalizability of the results. Future studies should draw samples from other institutions in Qatar and in the region. Also, lack of existing studies in the area hampered the development of hypotheses and comparisons of results. This study can serve as a basis for the development of testable hypotheses. Further future research can expand the scope of the study to include academic aspects of university services.



This study can serve as a bench mark for efforts directed at improving service quality at universities in Qatar and in the region. Much has to be done to develop institutions that are student oriented in the region.

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**Table 1****Gap Scores**

Dimension	Expectation Mean	Perception Mean	Gap Score
Tangibility	4.524	3.854	-0.67
Reliability	4.521	3.155	-1.366
Responsiveness	4.571	3.276	-1.295
Assurance	4.643	3.367	-1.276
Empathy	4.504	3.260	-1.244
Overall	4.552	3.400	-1.152

**Table 2****Paired Samples Test**

Pair	Gap Score	t	Sig.
Expect. tangible Percd. tangible	-0.670	11.176	0.000
Expect. reliability Percd. reliability	-1.366	16.679	0.000
Expect. responsibility Percd. responsibility	-1.295	16.623	0.000
Expect. assurance Percd. assurance	-1.276	16.732	0.000
Expect. empathy Percd. empathy	-1.244	15.949	0.000
Expect. overall Percd. overall	-1.152	18.033	0.000

## International Student Leader Exchange Conferences--(ISLEC)<sup>1</sup>

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*In the nightmare of the dark, all the dogs of Europe bark  
And the living nations wait, each sequestered in its hate  
W.H. Auden*

Hiroshi Takehashi's mood was buoyed by the surge of energy in the room. The three full time staff members, augmented by five volunteer interns, occupied every square inch of the small conference room. Himself only 35, everyone else in the room was at least 8 years younger than he. The interns in particular, current university students all, were barely old enough to drink. Yet everyone exhibited great enthusiasm and a high degree of professional pride in their tasks. Here at ISLEC (International Student Leader Exchange Conferences), an NGO dedicated to peace through international understanding, the excitement engendered by youth and a common background was self-evident and heartening.

Many of the occupants of the rooms were happily chatting away about the group's recent excursion to London, where ISLEC held a reception at the Japanese Ambassador's official residence. The young interns in particular were thrilled by the opportunity, though even the more matured full-timers were no less impressed by the occasion.

Hiroshi called the meeting to order, and the room quieted down. All eyes were on him, though Hiroshi could tell that many were still filled with visions of the grandeur of the reception. "It was a good event we just had," Hiroshi said. "The Ambassador was very supportive of our organization. He himself was a participant in one of our past conferences, you know."

He turned to Mary Chiba, the coordinator for the Japan conference and unofficially his right-hand person, and said, "So, Mary, can you give us a snapshot of the results of the reception?"

Mary shuffled some papers in front of her before speaking. "Other than the eight of us, and the Ambassador's staff, we hosted a total of 32 people. Fifteen of them were former student participants (alums), mostly from the 1980s. Of the other 17, ten were guests of alums, and seven were professors from London-area universities."

She looked up from her papers and continued, "Since the Ambassador picked up the tab, ISLEC's out of pocket expenses were primarily our travel expenses, which came to a total of 1,500 pounds. We received pledges totalling 2,000 pounds from those who attended. And the seven professors all

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<sup>1</sup>The organization's name, location, and financial information are disguised. All individuals are fictionalized to protect their identity.

promised to tell their students about our conferences. So in all, I'd say it was a great success.”

Hiroshi smiled and said, “Well done, Mary.” Everyone nodded in agreement, and Mary was visibly pleased with the compliment.

Then the conversation turned to less upbeat items. Though it was only March, all indications suggested that once again this year's fundings would be severely compromised. Unless some significant contribution came through in the remainder of the year, 2013 could see another 10% decline in revenues, especially contributions from foundations.

“Expenses continue to grow,” Jeff Bruno, the coordinator for the Taiwan conference interjected, as though reading Hiroshi's thoughts. “We're on track to see a further 5% increase in expenses this year.”

The meeting went on for another twenty minutes, but Hiroshi's mind was preoccupied with the imminent dangers that ISLEC faced. He was hired to put the house back in order, to resurrect the prestige and former glory of the conferences, and balance the books. Six months into his tenure, he wondered what he had gotten himself into. Small victories like the recent reception were all wonderful, but the big picture remained dismal. He shook his head. It was going to be a tough road ahead.

## **BACKGROUND AND HISTORY**

ISLEC is the umbrella organization that houses two separate student exchange conferences. Until recently, there was only one conference, and the organization was called (until 2007) JBSLC (Japan-Britain Student Leader Conference). A brief history of the organization follows.

ISLEC was originally established purely as a bilateral student exchange conference between Japan and the UK. Its original name was the Japan-British Student Leader Conference, with headquarters in London, England. Started in 1936, the first conference took place in 1937 just weeks before Japan's invasion of China. Officially, Britain and Japan were not at war at the time, however. That did not happen until 1941. Many did see the dark clouds of war between the two empires looming, and JBSLC was established as a way to promote better understanding and hopefully peace. The idea germinated that if student leaders, who one day would become leaders in government and industry, from the two countries got to know one another and to understand the other's point of view, the risk of war would subside considerably.

Alas, that was not to be, and the two empires clashed in the culmination of WW2. The conference naturally was discontinued during the world war. But after the war, rising optimism and mutual concern over communism led to recommencement, and JBSLC renewed itself.

Since inception in 1936, JBSLC's mission has been, with minor modifications over time, “to promote peace by furthering mutual understanding, friendship and trust through international student interchange.” Indeed, over the last seven decades, as Japan's economic stature grew after the war years, the annual conference took on increasing importance, though the threat of war between the two countries was but lessons in history books.

Commenting on the mission statement, Hiroshi said, “the Board is really into this world peace thing. I understand it’s a bit arcane now to speak of peace between Britain and Japan, what with Japan’s pacifist constitution and all that. But you must remember, most of the board members are old-timers who continue to fervently stick to the past. My predecessor tried to change the mission, and she only lasted seven months and left in frustration.”

With the exception of the WW2 years, the conference has continued uninterrupted and JBSLC has firmly established itself as a long-standing NGO with significant funding coming from various foundations and corporations. The conference boasts thousand of “alumni,” many of whom have gone on to lead major institutions.

Student participants not only exchanged ideas and viewpoints, but they also become the organizers for the following year’s conference (see section on Operations), thus acquiring hands-on experience in leadership and organization skills.

The incoming Chair of the Board, Martha Collins, herself a former participant back in 1984, remarked, “This is a student-run organization. We provide support, but this is their chance to shine. They set the agenda, they organize things, and we just offer advice. I think it’s a great model, and I’d hate to see that changed in any way.”

At the beginning of the 21<sup>st</sup> Century, a movement was afoot to branch out JBSLC to a third county – Taiwan. In 2007, the TBSLC (Taiwan-British Student Leader Conference) was initiated. A decision was made at the time to not operate a trilateral conference, but rather to have two bilateral conferences. Part of the reasoning was the board’s and management’s understanding that it would be easier to attract funding from organizations if the conference were bilateral (many companies and foundations have nationalistic interests and would be more inclined to fund projects that promote their respective nation-states only). As a result, since 2007, the Student Leader Conference renamed itself the International Student Leader Exchange Conference (ISLEC), operating two separated but related bilateral conferences under its auspices – the JBSLC and the TBSLC.

As expected, a number of foundations and companies threw their lot behind the new conference, many of whom with Taiwanese political or commercial interests on their agenda. TBSLC was off and running.

But all was not well at ISLEC. In the three years leading up to 2013, the organization has had three different Executive Directors (CEOs). Some board members have resigned, and foundation and corporate funding began to slow and then drop in the last two years. For example, total revenues dropped almost 10% from 2011 to 2012, down to about half a million GBP. At the same time, the dual conference setup exerts increasing pressure on costs, driving up total expenses by almost 20% to almost six hundred thousand GBP. Participant quality also declined, with the organization no longer able to steadfastly accept into the conference top-notch driven students from quality programs. Indeed, since the conference itself is student-run, a decline in the quality and motivation of each successive crop of participants also undermines the caliber of each subsequent conference, thus self-perpetuating a vicious cycle. In an era of rising calls for accountability, ISLEC found itself being questioned about the efficacy of its programs, indeed its *raison d’être* even. Assessment being the battle cry of the 21<sup>st</sup> Century, ISLEC management finds itself under stress to provide quantifiable

measures of its effectiveness.

Since the beginning, JBSLC drew its participants from major universities in the two countries. Oxford and Cambridge and the like provided the bulk of British participants, while Japanese students came from renowned institutions like the universities of Tokyo, Kyoto, and Keio. Selection was restrictive, and most applicants were rejected outright. Statistics were not kept, but it was believed that only about 15% of applicants were accepted into the conference each year.

The location of the conference alternated between the UK and Japan, so each year students from either country would be traveling to the other country as part of the program. Student participants from each year would be responsible for organizing the following year's conference.

Over time, the conference rooted itself in the summer months, when students were off school and university professors were often asked to participate as facilitators and speakers. Over the years, "alumni" of the conference have gone on to important government and industry leaderships (including ambassadorships, cabinet secretaries and ministers, CEOs, and so on).

As JBSLC grew and matured, some alumni became board members and their experience with the conference and sense of pride and attachment greatly shaped the direction of JBSLC.

## **THE TAIWAN DECISION**

As the 21<sup>st</sup> Century arrived, JBSLC found itself embattled by a host of environmental forces. First, study abroad programs became standard practice among colleges and universities, and many students took advantage of such travels. Consequently, JBSLC's student exchange and travel feature no longer offered a unique point of differentiation.

Second, Japan underwent an extended period of economic stagnation, so much so that China replaced it as the world's second largest economy. The proclamation, albeit arbitrary, of such acronym-driven phenomena as BRIC countries further dimmed Japan's appeal. Many began to see other countries such as China taking on more international significance.

Third, other student exchange programs and conferences also sprouted in various ways, further diminishing the uniqueness of JBSLC.

Along with these environmental forces, or perhaps partly as a result of them, external funding became more difficult to obtain. Student interest also waned, especially among students from elite schools who faced myriad similar opportunities.

JBSLC decided in 2007 to launch TBSLC, a second bilateral conference featuring the UK and Taiwan. This was not a student-driven strategy, but rather one that came from executive leadership and the board. It was felt that funding would be available for such a move, and indeed, TBSLC did receive foundation and corporate funding for the initiative.

Martha Collins remembered that decision well. "I was not entirely for it, but I wasn't Chair then. The decision to branch out to Taiwan was not something the students came up with. It was a top

down decision. I don't even understand why we got into that.”

TBSLC was modeled more or less along the lines of JBSLC in terms of its operations. Both conferences report through the central organization and the board. Before long, the organization changed its name formally to ISLEC as an umbrella organization housing the two conferences.

The need to establish the ISLEC identity arose because by this time the organization was running two separate but related conferences, each with a different name, and a “neutral” organizational identity was needed. The board approved the move, and ISLEC became a reality, and assumed the mission of the original JBSLC.

## **OPERATIONS**

Each year ISLEC operates two international conferences. While the theme changes each year, the bilateral nature of the conferences ensures that they would be on either British-Japan or British-Taiwan issues. Student participants can come from any country, though primarily each bilateral conference attracts students from the two respective countries.

For example, in 2012, the Japan-British conference had a total of 70 participants, half from the UK and half from Japan. The Taiwan-British conference had a total of 45 participants, with 24 coming from the UK and 21 from Taiwan. Students apply to ISLEC to participate in the conferences. Up till the last decade or two, ISLEC received many more applications than they could accommodate, and it was not uncommon for acceptance rate to drop below 20%. In recent years, with a decline in the number of applicants, the admission rate has gone much higher, possibly to 80-90%, though no official records are kept.

Applicants normally find out about ISLEC through their schools. Sometimes they received flyers and other information from their Study Abroad people, sometimes from their professors, and sometimes from their friends. Since ISLEC does not advertise the conferences in any meaningful way, it attracts applicants mainly via word of mouth. Part of the executive team's job is to solidify relationships with colleges and universities, though each person was free to try whatever tactic s/he thinks would work.

From the accepted applicants (each of whom pays an application fee of £15 for processing) a small group is earmarked to become the organizers for the following year's conference. To some, this task is particularly onerous and so some turn down the opportunity. However, enough participants from each year's pool would agree to undertake the task and keep the flame alit. The organizers pick the sites (they alternate between each pair of bilateral countries each year), set the agenda, invite speakers, develop the marketing material, and so on. ISLEC staffers provide advice and support where needed, and guidance to ensure ISLEC's mission and standards are maintained. ISLEC also raises funds to support the operations, since student fees cover only about half the costs (see section on Finance and Direction).

In recent years ISLEC has been called upon to provide some assessment of the conference's effectiveness. Historically, such assessment was purely anecdotal, and no concerted effort was put into collecting any form of data. This has to change, however, and the executive team still struggles



with doing just that. As Hiroshi often quotes Einstein, “Not every that counts can be counted.” This does not however reduce the pressure on ISLEC to measure its effectiveness, and the problem continues to plague the team. Currently, the only tangible data collected on this topic was end-of-conference surveys asking if participants were satisfied with their experience<sup>2</sup>. It has become quite clear to Hiroshi and his team that this was not sufficient. “The wolves need to be fed,” Hiroshi quipped often.

## **ORGANIZATION AND EXECUTIVES**

ISLEC is administered by an executive office consisting of a team of three full-time officers. This team consists of the Executive Director who is essentially the CEO of the organization. Reporting directly to him are two conference directors, one each for JBSLC and TBSLC. This team of three is assisted by an ever-changing cohort of nonpaid interns from local universities.

The Executive Director reports to a Board of Directors which met once a year. There are 20 board members. Drawn mainly from past conference attendees, mostly those who long ago participated in JBSLC conferences, the board is heavy in its leanings towards Japan. Taiwan was an opportunistic afterthought, and TBSLC does not enjoy the kind of patronage that its sister conference possesses.

Martha Collins is the incoming Chair of the Board. A graduate of Oxford (MA in history) and Imperial College (MA in sociology), Collins was a former student participant in 1984. Now retired, her career was mainly in early childhood education and she had done consulting work with education think tanks in the UK. She has been on the Board since 2004.

Hiroshi Takehashi is the Executor Director of ISLEC. A lawyer by training, he immigrated to the UK in the late 1990s and obtained his law degree from a UK university. Since then he worked for almost a decade with a major British manufacturing company, with a main responsibility to promoting relationship with government officials. He joined ISLEC in the fall of 2012.

Mary Chiba is the Conference Director for JBSLC (the UK-Japan conference). A former participant, she has a graduate degree in International Relations from a British university, and has worked for a few years with a major consulting firm. She joined ISLEC in Spring 2011, so has the longest tenure among the three members of the executive team. During her time at ISLEC, she has worked for three different Executor Directors. She speaks English, Japanese, and French.

Jeff Bruno is the Conference Director for TBSLC (the UK-Taiwan conference). Fluent in English, Chinese, Korean, and Spanish, Jeff is a former participant of one of the initial Taiwan conferences, and has a graduate degree in political science from a British university. This is his first full-time job, and he joined ISLEC in the spring of 2012.

While Hiroshi, Mary, and Jeff comprised the three salaried staff members at ISLEC, the NGO’s operations necessarily involves many other people. Complementing the salaried staff are a number of unpaid interns, primarily university students seeking community engagement and hands-on

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<sup>2</sup> Respondents almost unanimously “strongly agree” or “agree” with the statement that they were satisfied.

experience. Although their hours and commitments vary, it is not unusual to find upwards of six or seven such individuals working at ISLEC's office in the outskirts of London. Their duties depend on what is required at any point in time, but they are often called upon to do some data entry work, make inbound as well as outbound phone calls, occasionally monitor and maintain ISLEC's limited social media presence.<sup>3</sup>

Occasionally, volunteers also render services to ISLEC, usually as consultants. As opposed to student interns, these volunteers are active or retired professionals who offer their time for free, out of a call to service. From late 2012 to early 2013, a former banker volunteered her services to ISLEC, initially to help them write grant applications, and subsequently to assist in planning. However, these individuals have various other commitments, and their availability at ISLEC is both unpredictable and short-term. By March 2013, for instance, the banker had withdrawn her services due to other demands on her time.

## **FINANCES AND DIRECTION**

After the staff meeting ended, Hiroshi called his two full time staff into an executive meeting. He knew the situation was grave, both personally for him and for the organization.

A synopsis of the financial data is provided in **Exhibit 1**. In 2012, ISLEC incurred a loss of £40,000.

ISLEC does not collect or report data on the two individual conferences. Instead, all revenues and expenses are totalled and then allocated to each conference (for internal reporting purposes) based purely on the respective number of participants. See **Exhibit 2** for the breakdown for 2012.

Fees and Scholarships represent the largest source of revenue, but this must be interpreted with a caveat. Participants pay on average £2,000 to participate, in addition to a £15 application fee (non-refundable). According to Mary Chiba, it costs an average of £4,000 per participant. In other words, each participant only pays about half the actual cost of running the conferences. ISLEC must secure the balance of the funding elsewhere.

“And this elsewhere,” Mary said, “is mainly in the form of foundation grants. Each year we write grant applications to just about anyone who gives out money, and with our fingers crossed hope to net a big fish or two. As you can see from our numbers, we don't always catch enough.”

Mary continued, “We would love to get our alums to contribute more, but the fact remains that the only alums who give consistently, or in any meaningful way, are the older ones who were participants 20, 30 years ago or longer. My guess is that we have roughly three or four thousand alums still alive. If each one would give us an average of just £50 a year, our problems will be solved. The trouble is we don't really have any kind of database on them. We have some paper

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<sup>3</sup> ISLEC maintains a website which provides basic information to visitors. It links to a blog and a photo gallery of recent events (e.g. the Ambassador's reception), downloads for conference applications, and internship opportunities. No official data was kept on site visitors. ISLEC also has a Facebook page offering similar information while allowing visitor to add comments and ask questions. In early 2013, the Facebook page had a total of 72 “Likes.”

files, but much of the information is not up to date.”

Jeff chimed in, “We have lots of interns, but there’s no permanence or continuity. And as you can see, we don’t have anyone on staff who is a professional grant writer either.” He looked at Mary and said, “And personally, I think the way we allocate costs to the conferences is crazy. The Taiwan conference is young and need support. But we don’t get any because we don’t yet have the numbers. It’s insane.”

Mary shook her head and said, “Here we go again. Jeff, you have to earn your budget around here.”

Hiroshi intervened before the conversation turned into a debate. “Since I came on board,” he said, “I’ve been visiting various universities, foundations, corporate charitable giving managers, and so on, to build relationships. I didn’t realize until now that many of them want fully developed strategic and marketing plans, and that foundations want annual grant applications that can run on to 20 pages. This is not going to be easy.”

“Our strength is our heritage and history,” Mary said. “We’ve been around since before WW2. I think we just need to emphasize that.”

Jeff rolled his eyes. “People have so many other options now. Why ISLEC? We need to give them a reason,” he said. “And no offence to you, Hiroshi, but we really do need to have a business plan. I think we’re going nowhere fast.”

Just then Hiroshi received an email on his phone. It was from Martha. He showed it to his two colleagues.

The email read:

Hiroshi,

The Board meets in two weeks. You will be expected to make a full presentation to the Board on the state of affairs, and the direction that ISLEC is headed.

You should consider this as we consider strategy: The whole organization is student-run. So, as we consider the possibilities, we should keep in mind the boundaries with what we “adults” can dictate while keeping ISLEC “student-run”.

You told me the staff has also been discussing this a lot lately. There has been creeping adult oversight and management over the past decade. For example, adults (staff and board) decided to launch the Taiwan thing, rather than have that idea coming from students. It is a slippery slope. Adults do almost all the fundraising to subsidize the student fees.

I am not saying that adults can never take the reins and decide strategy; I am saying that if we (staff and board) decide to do so, we must first “vote” on the change in our culture and the shift from our historic roots and what makes it special. I can make an argument for doing that, or at least separating what part is “student-run” (the conference content and table topics for example) and what part is adult (long term strategy, year-to-year continuity issues, funding, etc.). We must decide as an organization, with the students, if we want to take those roles from them. That in itself would be a big strategic shift that must be taken with full analysis and awareness.

Secondly, I have a recommendation, though you’ve probably already done this. It is very helpful to go back to the original founding documentation, to see what this organization is about. Specifically, revisit the mission from time to time. We must stay true to our mission of world peace. Hiroshi, you mentioned to me previously something about identifying what value-add we offer. I’m not sure what you were contemplating, but this is not

a marketing exercise, and we must remain true to ourselves.

Lastly, fundraising is a big issue. You will need to come up with concrete plans about our finances. Our Board of Directors already make personal contributions each year and cannot be expected to do more on that front. As I recall, in 2012 we contributed a combined total of £3,000, paving the way for you and your executive team to secure external financing.

Let me know if I can help.

Martha

Hiroshi looked at his two colleagues. “Well, I guess we should clear our calendars for the next two weeks then.”

<b>EXHIBIT 1</b>				
Financial Data Summary				
(ALL FIGURES IN '000 GBP)				
				<b>3 mos</b>
	<b>2012</b>	<b>2011</b>	<b>% change</b>	<b>2013</b>
<b>Revenues</b>				
Fees & Scholarships	247	251	-1.6%	60
Corporate Donations	37	45	-17.8%	8
Foundation Grants	175	185	-5.4%	42
Individual Donations	50	63	-20.6%	12
Other donations	10	9	11.1%	3
Misc. Income	12	6	100.0%	3
<b>TOTAL</b>	<b>531</b>	<b>559</b>	<b>-5.0%</b>	<b>128</b>
<b>Expenses</b>				
Program Services	500	440	13.6%	132
GSA and salaries	65	66	-1.5%	16
Fundraising	6	9	-33.3%	2
<b>TOTAL</b>	<b>571</b>	<b>515</b>	<b>10.9%</b>	<b>150</b>
<b>NET CHANGE</b>	<b>-40</b>	<b>44</b>	<b>-190.9%</b>	<b>-22</b>

<b>EXHIBIT 2</b>				
<b>Split between Japan and Taiwan 2012</b>				
Financial Data Summary				
(ALL FIGURES IN '000 GBP)				
	<b>Total</b>	<b>Japan</b>	<b>Taiwan</b>	
	<b>115</b>	<b>70</b>	<b>45*# participants</b>	
<b>Revenues</b>				
Fees & Scholarships	247	150	97	
Corporate Donations	37	23	14	
Foundation Grants	175	107	68	
Individual Donations	50	30	20	
Other donations	10	6	4	
Misc. Income	12	7	5	
<b>TOTAL</b>	<b>531</b>	<b>323</b>	<b>208</b>	
<b>Expenses</b>				
Program Services	500	304	196	
GSA and salaries	65	40	25	
Fundraising	6	4	2	
<b>TOTAL</b>	<b>571</b>	<b>348</b>	<b>223</b>	

## **ISLEC Teaching notes**

### Case Synopsis

The case is about ISLEC (International Student Leader Exchange Conferences), a student-run organization, with the mission of promoting peace through global understanding. It consists of two bilateral conferences: the older JBSLC (Japanese-British Student Leader Conference) and the younger TBSLC (Taiwan-British Student Leader Conference). ISLEC is run by 3 full-time employees (executive officers) and unpaid interns (university students). The two bilateral conferences are funded by student fees, scholarships (one half) and external grants by government agencies, alumni and businesses (the other half). Occasionally, it brings in volunteers, usually retired professionals, who donate their time to help the organization. The case has been written at a time when the organization faces challenges related to environmental demands (stronger competition, diluting of competitive advantage, fundraising challenges and heightened assessment pressures), higher expenses and lower revenues. The organization has been traditionally student-run, although recently the boundaries between student and adult roles (the board and the executive team) have been called into question.

### Uses of the case

ISLEC, although not a very long case, can be used in a variety of contexts. There are obvious strategic management issues presented in the case. Also, the case can be used in a marketing management course with emphasis on positioning, differentiation, and customer/alumni relationship building implications. Depicting an NGO, the case is also applicable for not-for-profit management courses, where the standard profit motive no longer applies.

The case can be used in an upper-level undergraduate or core-level MBA class.

Currently, these notes are written with strategic management issues in mind.

### Class outline (100 minutes class period)

Students should come to class having read the case and one of the following supplemental readings:

- Mintzberg, H. (1994). *The fall and rise of strategic planning*. Harvard Business Review, Jan-Feb. 1994.
- Neuhoﬀ, A. and Searle, R. (2008). *More bang for the buck*. Stanford Social Innovation Review (Spring 2008), pp. 33-37.
- Schein, E. (1993). On dialogue, culture and organizational learning. *Organizational Dynamics*, 22, pp. 27-38.

## Teaching objectives

The case provides five main objectives:

1. To discuss how strategy often emerges as a result of environmental changes, rather than being a deliberate process
2. To discuss the importance of data collection for strategic and business planning
3. To discuss the difficulty of measuring the effectiveness of a nonprofit organization
4. To discuss how subcultures emerge in an organization and their implications
5. To discuss how managing a non-profit organization is similar to or different than managing a publicly-owned, for-profit organization (if the case is used in Business schools)

## Assignment Questions

1. Discuss the process of strategic planning in this organization. Does strategy emerge or is it a deliberate process?

*Possible answer:* Strategy often emerges as a result of environmental changes, rather than being a deliberate process. For example, as study abroad opportunities became ubiquitous at major universities, JBSLC saw its competitive advantage weakened; also, as the economic power of Japan decreased, so the attractiveness of JBSLC decreased as well. That's when the board decided to start TBSLC, because Taiwan was considered a market that would potentially attract more students than Japan.

The instructor could engage students in a discussion of the following: How can ISLEC continue to differentiate itself in the years to come (given that study abroad opportunities at universities became more prevalent over the years and other trends continue to dilute its competitive advantage)? What environmental threats do you see in the future for ISLEC? What strategies should ISLEC take in order to 'compete' effectively and keep its mission alive? Any other parts of the world they could branch into? For example, given the recent EU crisis, feelings about the EU are at an all-time low, especially in Italy, Greece, Spain and France; would starting a bilateral European conference make sense?

2. Describe the nature, amount and use of data collected by ISLEC. What data would you collect and whom would you share data with?

*Possible answer:* Many times in the case it is mentioned that 'records are not kept,' (e.g., no data on admission rate; no data on site visitors); only statistical guesses are made. The only data that the organization collects are end-of-year surveys (asking participants of their experience with ISLEC).

To start with, ISLEC needs a database on alumni (they don't have current addresses for alumni and most of what they have is on paper; they need email addresses); they know they have about

3000-4000 alumni still alive. Moreover, ISLEC should continuously evaluate how the broader community views the organization. It should also use donor surveys to learn more about its donors. It should also seek intern and volunteer input on a regular basis.

3. To what degree are ISLEC procedures and processes formalized? Would more formalization impede or help the functioning of this organization?

*Possible answer:* Several processes need more structure. ISLEC needs to be more intentional/deliberate and less intuitive/informal in its planning, operations and marketing efforts.

First, their grant writing process is very informal. Right now, they write grants and “hope for the best.” They should be more deliberate in their approach to grant writing. Since volunteers are only with the organization for a short amount of time, they may not feel part of the team and might not be in synch with the purpose and mission of the organization. At the very least, they should have a full-term employee on staff whose specialization is writing grant applications.

Second, we infer from the case that ISLEC doesn’t have formal strategic, business and marketing plans; this lack of planning presents fundraising challenges. Not having a written strategic plan is problematic. ISLEC should research more its external environment and re-examine its mission to determine its relevancy to the community and possible duplication by any other organization. It should take the time to identify the challenges facing the organization. The Board, interns, volunteers and executive staff should all participate in the strategic planning process. The strategic plan should identify key constituents, their ‘service’ expectations and how the organization will respond to them. A financial plan should be developed, to ensure financial stability for the next 3-5 years and should be consistent with the strategic plan. Right now, the focus seems to be short term, from one budget cycle to another; leadership needs to be focused on the long term.

There should also be a plan for diversified funding, including traditional and non-traditional sources. For example, it is mentioned in the case that mostly the older alumni ones donate to ISLEC. A question that the executive leadership might address is how should they attract younger alumni (those who graduated less than 20 yrs ago)?

Third, ISLEC has an informal marketing approach; its main advertising channel is ‘word-of-mouth.’ ISLEC should develop a marketing plan that is consistent with its strategic plan.

Fourth, ISLEC doesn’t seem to have a formal operational plan either. It should establish an evaluation process and performance indicators to measure the achievement of goals and objectives. The plan should then be communicated to all its stakeholders- students, board, volunteers, staff and the general community. Budgets and resource needs should be shared with Board members, staff, student interns and volunteers (it is not clear whether they are currently shared).

Fifth, although criteria for student selection are not mentioned in the case, it can be assumed that excellent academic performance and perhaps an essay on the topic of peace and global understanding are required to be admitted in ISLEC. The organization needs to spell out these



criteria, especially since in the recent year, the admission standards have been watered down. The huge increase in admission rate from 15% to 80-90% in one year should be of concern.

Sixth, it is not clear how Board members are selected/ promoted. We know that Martha Collins is the incoming Chair of the Board, but we don't know if she was elected or how (by majority or unanimity). Also, we know that most Board members are former alumni, but we don't know whether they were formally interviewed and selected. They meet only once a year; is that enough? Are there performance evaluation measures in place for Board members? What are the procedures for dealing with an ineffective Board member? There was lack of communication within the board, as evidenced by the Taiwan decision, which was a top-down decision; some board members didn't agree and didn't understand that decision (shows lack of consensus within the board).

It is important for students to realize that, while too much formalization might go against the young spirit and informal culture of the organization, too little formalization diminishes its effectiveness. The organization has to find the right balance between the formalization of its operations and informality of its culture.

4. What are some measures of effectiveness of this organization? How can you determine whether this organization is effective or not?

*Possible answer:* This is probably the most challenging aspect of the case. It is very difficult to develop valid and reliable effectiveness measures. The effects of participation in ISLEC are long-term and uncertain, because they depend on many variables. The intended purpose of the organization is increasing peace through global understanding: presumably, students who participate in these conferences will carry with them the spirit of peace later on, when they become government, business and community leaders. The instructor might point out the difficulty of making cause-effect inferences with certainty (for example, participating in ISLEC increases global peace; or, "ISLEC participation might reduce the propensity of war between two countries").

5. How is managing a non-profit organization alike and how is it different than managing a publicly-owned, for-profit organization (assuming that students are familiar with managing a publicly-owned, for-profit organization)? In particular, how is the role of an Executive Director of a non-profit organization similar to or different than the role of a CEO in a for-profit organization?

*Possible answer:* Certain management concepts are the same across business and nonprofit organizations. Both types of directors have to plan strategically, organize and staff, lead employees and monitor the achievement of objectives. In nonprofit organizations such as ISLEC however, shareholder pressures and the profit motive are missing, which affects the kind of decisions made by its executive team. Also, as we have seen above, measuring outcomes is generally more difficult in a nonprofit organization.

6. Describe the culture of this organization and the formation of its subcultures (if applicable).

*Possible answer:* The Board, executive team, interns and volunteers are passionate about the

mission of the organization. Since the student interns graduate after a few years of involvement with ISLEC, there is, naturally, high turnover among the part-time staff. The pros are that they help maintain a high level of enthusiasm and energy for the purpose of the organization; however, the cons are that training is frequent, tedious and time-consuming.

There seems to be a rift/ some jealousy between the young TBSLC and the more mature JBSLC (the Board leans more toward the latter). The rift might be due to real or perceived differences between the two groups. For example, Mary tells Jeff, with a superior tone, that “you have to earn your budget around here,” which seems to indicate a certain competitive attitude between the Japan and Taiwan conferences.

Further, the Taiwan conference is underfunded because they have fewer alumni (their oldest alumni graduated only 6 years ago), while the Japan has older alumni and more funding opportunities.<sup>4</sup> The differences between the two groups are also reflected in their strategic thinking: while Jeff, the executive officer of TBSLC is wondering about the competitive advantage of the organization in an increasingly competitive world, Mary, the executive officer of JBSLC, emphasizes the importance of tradition as a differentiating point. The development of different sets of values and assumptions between the two groups provides the foundation for the development of two different subcultures within the organization.

Similarly, subcultures might develop between student interns and adults, or between volunteers and the full-time staff as well. The formation of subcultures within an organization might result in the goals of the two groups not being aligned with the goals of the overall organizations; thus, the two groups might end up competing rather than cooperating with each other.

Activity: In the end, the instructor might group students in small groups of 2-3 people each and have them play the role of the executive team making a presentation to the board.

Your team is the executive full-time staff, composed of Hiroshi, Mary and Jeff. In the light of the board meeting, develop a presentation to the board in which you address the following:

- Role division between students and adults?
- What strategic direction should the organization take?
- What fundraising strategy will you propose?
- Any other issues that your team should bring up at the meeting?

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<sup>4</sup> However, in 2012, JBSLC had a wider gap between expenses and revenues compared to TBSLC (25,000 vs. 15,000 GBP).

# Integrating and Improving Quality, Trust, and Comprehension of Financial Data Using Semantic Web Technologies: A Proposed Conceptual Model

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## **1 Abstract**

There is no single data source for financial data. Integrating financial data sources reveals multiple challenges such as lack of a common terminology as well as trust and quality concerns resulting from a lack of knowledge concerning the origins of data. This research proposes a conceptual methodology to integrate data from multiple sources such as XBRL, Linked Open Data, public data sources, and national and international financial data while maintaining the provenance of the data and integrating the data into a machine understandable format and improving comprehension of the data. Future directions include the refinement and development of the proposed conceptual methodology.

## **2 Introduction**

Business analysis commonly requires the integration of diverse financial information sources. The eXtensible Business Reporting Language<sup>1</sup> (XBRL) has made great strides in standardizing financial reporting and provides a machine interoperable format for such information. While XBRL has become an integral part of the financial domain it only provides part of the picture. Emerging Open Data initiatives are contributing additional sources of information, which are being used in conjunction with XBRL [1]. For example, when valuing companies, quarterly and yearly filings are insufficient and must be considered together with information on markets and exchange rates [2].

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<sup>1</sup> <http://www.xbrl.org>

Much of the information being integrated is now accessible via Semantic Web technologies and standards, which are playing an important role in sharing and integrating large quantities of data via the Web. The so-called Web of Data enables machine interpretation of data as well as computational reasoning leading to new inferred information. The Linked Data initiative [3] is a best practice data publishing methodology used to expose, share, and connect semantic data on the Web. The XBRL community has acknowledged this move toward semantic technologies with the World Wide Web Consortium (W3C) and XBRL joint workshop on “Improving Access to Financial Information on the Web” discussing complimentary approaches to bridging the two communities [2]. To this end, a number of initiatives are working towards expressing XBRL as a formal ontology allowing it to be used in semantic technologies.

Yet, the combination of Open Data, XBRL, and semantic technologies is still in the early stages of realization. Major research issues exist in semantic integration and data provenance [1]. Provenance refers to the history and lineage of an object and recent efforts [4] have begun to standardize semantic representations of provenance. Data provenance plays a fundamental role in accessing the trustworthiness of data by tracking data origins, where data has been altered, and what processes have altered data.

We begin the integration of semantic technologies, provenance, and financial data by creating a formal ontology to assist in the integration of disparate data sources. We then explore the connection between existing provenance requirements and the emerging W3C standard for encoding semantic provenance. We look at how, and if, the current W3C standard can be used to represent financial provenance in its various forms. We also look at how provenance-aware applications would need to be built to utilize this information. Finally, we propose a conceptual model to integrate disparate financial data sources with provenance and comprehension information using semantic web technologies.

## 3 Related Research

### 3.1 XBRL

The eXtensible Business Reporting Language (XBRL) standardizes financial reporting within XML schema making corporate reports easier to consume and integrate. A large international community has developed around XBRL and is using the standard to quickly and easily integrate financial data. The XBRL International Standards Board (XSB) serves as the backbone of this community and recognizes the potential of generating an integrated financial information environment. XBRL was designed to be non-proprietary financial reporting language based around XML [5]. The Securities and Exchange Commission began with voluntary XBRL filings and has since implemented XBRL as the standard mechanism for filing financial statements. The standardization to XBRL permits financial data to be easily extracted from the filings [6]. XBRL has grown to an international standard becoming the standard format for the International Financial Reporting Standard (IFRS) which is required in the European Union (EU).

### 3.2 RDF and Ontology

The Resource Description Framework (RDF) is a standard developed to encode and exchange semantic data over the web [7, 8]. RDF, which has become the cornerstone of the semantic web, is stored as triples, which are linked as a directed graph (RDF graph). RDF statements are in the form of Subject, Predicate, and Object. Example uses of RDF include the Friend of a Friend (FOAF) project where RDF is used to describe information about people and their relationships [9-11]. In RDF we can compose a simple statement that is as follows: Subject: Susan, Predicate: Knows, Object: Sam. RDF has been extended to the Web Ontology Language [12-14] (OWL), which provides more detailed semantics than could be expressed with RDF.

RDF and OWL are used to create ontologies, which are a shared conceptualization of a domain [15] or a pre-defined taxonomy that defines a domain [16] and ontologies have been shown to support data integration [17]. Tools exist for automated ontology learning and commonly use natural language processing techniques such as [18-23]. Ontologies exist for every domain; however, domains can be modeled from multiple perspectives; hence, the need for tools to integrate ontologies. Ontology alignment and integration tools have been proposed such as

GLUE [24], ONIONS [25], FCA-Merge [26], S-Match [27], PROMPT [28], IF-Map [29], MIMapper [30], and ALIGN [31] as well as methods to employ the automated learning and integration techniques for knowledge integration [32].

### 3.3 Linked Open Data

Open government transparency initiatives have created a vast collection of so-called Open Data. SEC filings are publically available via the Security and Exchange Commission's (SEC) EDGAR [33]. Similar efforts have been undertaken in the EU [34], UK [35], as well as the International Monetary Fund (IMF) [36]. The aforementioned datasets are freely available and come in a variety of accepted formats (i.e. CSV, text, etc.); however, data integration and analysis pose challenges.

Connecting the vast amounts of Open Data in a machine understandable format has become known as Linked Open Data (LOD), or more colloquially the "Web of Data". LOD is built upon the RDF [8]. Linked data employs RDF with HTTP to publish data and interconnect the various data sources [37]. The mechanism for publishing data on the web includes 1) the URI, or Uniform Resource Identifier, to give each entity a unique identifier, 2) use HTTP so the data is available via standard web tools, 3) when a URI is accessed the returned content should be in RDF, and 4) include links to related URIs [38].

DBpedia is a publicly accessible Linked Data version of Wikipedia [39] data and has become the central point for the Web of Data [40]. Linked Data browsers have been built on top of DBpedia [41] and DBpedia has been employed in conjunction with semantic web technologies to integrate various data sources [42]. Linked data has been researched as a mechanism to integrate financial data [43] as well as linking public financial data using big data technologies [44].

### 3.4 Provenance

Provenance is the history and lineage of information. This information can be vital to a complete understanding of how a result was generated and if it should be trusted. When combined with semantic technologies, provenance can lead to efficient discovery and a complete understanding of the results [45]. According to [46], provenance must be captured [47], stored [48, 49], collected [50, 51], and secured [52, 53]. Provenance data may be sensitive; therefore,

mechanisms for securing provenance have been proposed by hiding certain provenance data [54]. Trust is a key component in data. Understanding the origins of data, such as source, accuracy, data management, etc., may increase trustworthiness of data; therefore, provenance models are well suited to increase the level of trust placed in data [55]. Data quality is another issue which provenance has been shown to increase the trustworthiness of data [56].

Over the years a number of attempts have been made to capture provenance in a semantic encoding. The most prominent of these include the Proof Markup Language [57, 58], the W7 Model [59], and the Open Provenance Model [60]. The W3C Provenance Incubator Group was tasked with uniting and standardizing provenance models and the resulting effort is known as the PROV-O ontology [4]. PROV-O forms the basis of our current research proposal. It provides us fundamental constructs for capturing basic provenance information and uses OWL [61] to express a common provenance model. It is an ontological representation of “a core data model for provenance for building representations of the entities, people and processes involved in producing a piece of data or thing in the world” [4]. This core data model is an attempt by the W3C to create a standard domain-agnostic provenance model with “well-defined extensibility points allowing further domain-specific and application-specific extensions to be defined” [4]. As a result, PROV-O can be used as the basis of financial provenance; yet, by itself PROV-O cannot capture all of the required semantics of a given application domain. PROV-O is intended to be extended for each new application area.

The authors of [56] define provenance in terms of impact values that can be combined to produce an Information Quality score. Timeliness, currency, and volatility are key values. This type of information quality is determined by querying the provenance graph, extracting provenance information, and subsequently computing a score. The computation of the score cannot be done with the W3C provenance and semantic technology standards – OWL, PROV-O, and SPARQL [62]. Thus, this type of requirement requires additional software outside of the standard.

Provenance becomes particularly vital in understanding systemic risk, which requires data from hundreds (potentially thousands) of financial firms as well as data on interest rates, equity and commodity indices, labor productivity, employment rates, and inflation [63]. These data must be integrated and transformed to meet the needs of diverse systemic risk computer simulation models. This integration and ingest into the models is mostly ad hoc, with analysts

and programmers running their own data transformation and movement tools [63]. With hundreds of analysts creating tens to thousands of simulation model runs on overlapping data sets it becomes extremely difficult for analysts to understand the inputs and assumptions behind different simulation runs as well as locate results by a variety of criteria [63].

## 4 Proposed Conceptual Architecture

The first aspect of the proposed system is critical to permitting interoperability and integration of the disparate data sources. FIO, or Financial Interoperability Ontology, is an ontology constructed based on the well accepted PROV-O [64] standard for provenance, and SUMO [65] for ontology design. The ontology is to be constructed in OWL and RDF, the standard ontology languages. Ontology development guidelines as specified in [66] will be followed. Financial ontologies have been studied in [67] and implemented in [68]. FIO will hold equivalence statements (i.e. Customer is equivalent to Client).

Second, the system will be designed to accept, as input, a variety of data sources. First, open data sources such as EDGAR, XBRL filings and documents, public finance sources (i.e. Yahoo! Finance), and the Linked Open Data cloud. Each data source will need an interface or agent that is responsible for retrieving and formatting requested data.

In order to build trust in the data, provenance will be stored as metadata. Metadata such as originating data source, date of retrieval, and any processing algorithms applied to the original data will be captured. From this information an end user will be able to assess the timeliness of the data as well as explore how the data was altered from its original source.

The term normalizer is responsible for interacting with FIO to normalize all terms in the disparate data sets. The Wiki-link integrator will take the common term from FIO and embed a link to the appropriate Wikipedia article as an RDF statement. As financial data is difficult to understand, the Wiki-link will assist in data comprehension. This step will be accomplished using the DBpedia Spotlight web service [69], which takes input terms and searches Wikipedia for articles relating to those terms. Part of this research will be to access the accuracy of automatically linking financial terms to Wikipedia.



Finally, an integrated dataset complete with provenance data and Wiki-links will be output as RDF. The user will have an RDF viewer that is capable of interacting with the Wiki-links and provenance information.

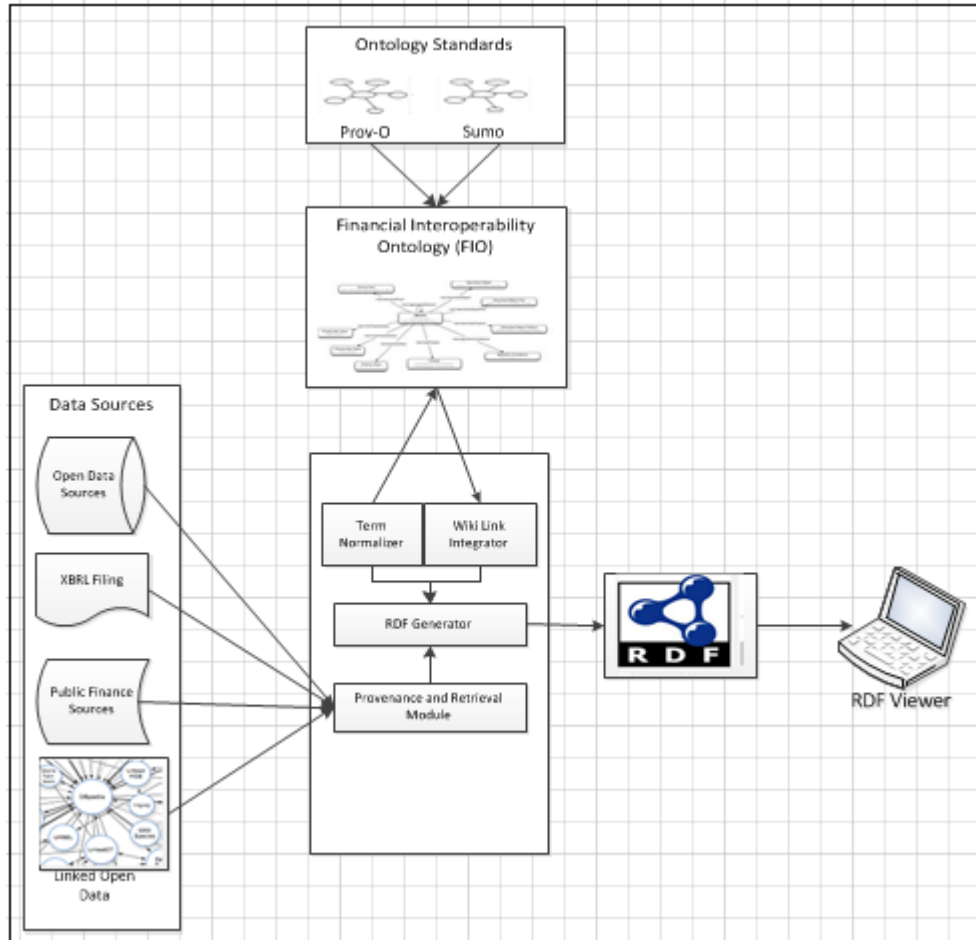


Figure 1 – Conceptual Architecture

The first step in the process is a data request initiated by the end-user. The query would consist of a request for financial data. The Provenance and Retrieval Module is responsible for connecting to the various data sources, via a specific interface or agent, to retrieve financial data. Due to different requirements for the various data sources a custom agent interface is well suited. Additionally, adding a new data source would be as simple as adding a new agent interface to the data source. During the retrieval process, the data will be paired with provenance metadata related to the source of the data, time and date accessed, etc. The financial and provenance data is sent to the RDF generator for conversion to RDF. As part of the RDF conversion process, it

will be necessary to normalize all terms in the data. For example, one data source may use the term “Client” while another utilizes “Customer.” This task will be left to the Financial Interoperability Ontology, FIO. The FIO may be conceptualized as classes (parent) with instances (children). The parent class will be the standardized term that will be used in the final output RDF. Following the aforementioned example, “Customer” would be the parent of “Client.” The SPARQL Protocol and RDF Query Language (SPARQL) will be the method employed to communicate with FIO. A sample query to return the parent class of “Client” is:

```
SELECT ?subject ?object
WHERE { :Client rdfs:subClassOf ?object }
```

DBPedia will be employed to embed comprehension links into the RDF data. Once all financial data are formatted using common terms from FIO, provenance data added, and comprehension links from DBPedia inserted, the final RDF is output. The RDF may be viewed using any RDF viewer; however, once the presented design artifact is fully implemented a customized viewer may facilitate viewing comprehension and provenance data by hiding it until requested by the end-user.

## 5 Future Directions and Implementation Scenario

Future research directions will follow the design science paradigm [70] by the creation of the design artifact detailed in Figure 1. First, the relevant data sources will be identified and an interface to each data source created. The interfaces will retrieve data and record provenance information from each source. Concurrently with the development of the data interfaces, FIO will be created following the accepted SUMO [65] and PROV-O [64] standards and the guidelines specified in [66] using the Finance Ontology [68] and the development methods employed in [67] as reference. In developing our finance ontology it will be necessary to perform financial statement analysis and XBRL document analysis in order to model relationships in the ontology. Terms in the developed financial ontology need to correspond to pages available via DBPedia or Wikipedia to make Wiki-link integration possible. The term normalizer will employ the developed financial ontology to generate a common vocabulary that may be matched with the Wiki-links. The provenance metadata, financial data, and Wiki-link comprehension data will be output as RDF. It will be necessary to develop a custom RDF

viewer for the user which has the ability to display the financial data with options for provenance and comprehension data when requested by the end user.

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# FACILITATING COLLABORATION THROUGH BIG DATA VISUALIZATION

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## ABSTRACT

Data visualization is becoming a critical component of any analytics solution. Organizations are using data visualization tools to better understand customers, internal operations and the marketplace. The purpose of this study is to find the impact of data visualization on collaboration in teamwork.

**Keywords: Big Data, data visualization, collaboration**

## INTRODUCTION

Data visualization is the presentation of data in a pictorial or graphical format. Data visualization is becoming a critical component of any analytics solution. Organizations are using data visualization tools to better understand customers, internal operations and the marketplace. According to market research firm Gartner, the "Visualization and Data Discovery" market segment is the fastest growing area of Business Intelligence and will increase 30 percent by 2015 [1]. The purpose of this study is to find the impact of data visualization on collaboration within organizations. Specifically, this study explores how data visualization can expand and facilitate collaboration in teamwork.

## BACKGROUND

As more and more data is collected and analyzed, decision makers look for data visualization tool that enables them to see analytical results presented visually, find relevance among the millions of variables, communicate concepts and hypotheses to others, and even predict the future [2]. Data visualizations help people see things that were not obvious to them before. Even when data volumes are very large, patterns can be spotted quickly and easily. Visualizations convey information in a universal manner and make it simple to share ideas with others [3]. Data visualization can also contribute to the interpretation and sharing of insight from analytics so that even nontechnical subject matter experts can perform self-directed data discovery.

GENERAL FUND	Proposed Budget	2013 Projection	2012 Actual	Variance from 2013 Projection	
Expenditures					
Operating Expenditures					
Administration & Gen'l Government	762,300	763,000	676,656	(700)	99.9%
Community Development	200,800	184,600	169,106	16,200	108.8%
Police & Municipal Court	1,454,200	1,436,400	1,314,925	17,800	101.2%
Fire	913,100	853,700	840,616	59,400	107.0%
Public Works	558,900	561,200	564,611	(2,300)	99.6%
Aquatic Center & Recreation	602,700	583,500	549,062	19,200	103.3%
Parks & Trails	255,700	284,400	218,834	(28,700)	89.9%
Other City Property & Transfers	301,000	289,600	108,745	11,400	103.9%
	<u>5,048,700</u>	<u>4,956,400</u>	<u>4,442,555</u>	<u>92,300</u>	<u>101.9%</u>
Capital Expenditures					

Figure 1. Traditional Budget Proposal  
Source: <http://www.salidadailypost.com/news/24172>

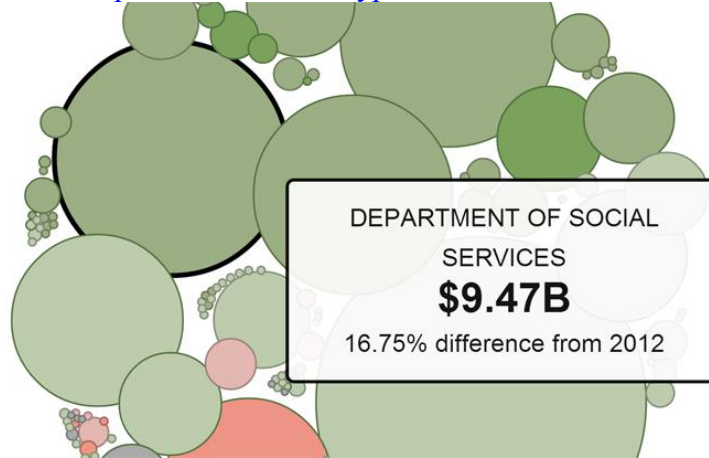


Figure 2. NYC Visualized City Budget Proposal  
Source: <https://nycopendata.socrata.com/>

## RESEARCH METHOD

To accomplish the research objective, this study deploys a qualitative study using organizations adopted data visualization tools. A case study will be conducted for exploring the factors, and semi-structured interview will be conducted for data gathering in this case study. The semi-structured interview will be conducted by asking central interview questions and other relevant questions.

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# STARBUCKS AS LATEMOVER? THE STRATEGY BEHIND STARBUCKS' ENTRY IN INDIA.

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## ABSTRACT

This paper seeks to examine whether delayed entry by a major brand can upset a well-entrenched incumbent in an established international market. The case illustrates a firm's ability to leverage latecomer strategies of free rider effects, inertia forces and enhanced information in the largely tea-drinking culture of a young café market of India. Moreover, the paper contributes to latecomer strategy research by examining the role of the intangible asset of brand equity and reputation in a purposeful follower entry position.

**Keywords:** **latemover strategy, brand equity, delayed entry, international market**

## INTRODUCTION

The effects of firm entry order on business performance, particularly in emerging economies continues to be of interest to international strategy researchers.

The theory of first mover advantage proposed by Lieberman and Montgomery (1998) asserts first movers gain pioneering benefits based on early detection of, and action upon environmental changes that point to potential market opportunities. Studies have found the pioneer's counterpart, the early follower, to also experience considerable performance gains based upon the firm's ability to develop follower capabilities and strategies that enable one to leverage advantage from the first mover (Lieberman and Montgomery, 1998).

Follower advantage can occur when a secondary market entrant is able to gain long-term competitive advantage by virtue of their late entry into a market while exploiting first mover weaknesses (Shamsie, Phelps and Kuperman, 2004). Cho, Kim and Rhee (1998) attribute the benefits of follower advantage to be a combined function of the 1) market/consumer, where the is opportunity to free-ride on the pioneer's investment in consumer education and market creation is available; 2) the competition, who leverage the inertia forces of first movers because of their earlier entry and therefore inertia roots, and 3) the firm's enhanced level of information (resourcefulness, shared experience or assets).

The purpose of the paper is to examine whether a delayed entry by a major brand can upset a well-entrenched incumbent in an established international market. Consistent with domestic market findings, market share of early entrants of foreign markets has been found to be “significantly higher than those of late entrants,” yet performance and firm survival are found to be less than later entrant counterparts, the implication being late entrants are willing to take more risks (Murray, Ju and Gao, 2012). Urban, Carter, Gaskin and Mucha (1986) assert that followers can achieve higher consumer preferences relative to first movers, as they have the distinct advantage of analyzing the early landscape to carve a relevant (and relative) position based on early market activity. This issue is examined here using the latecomer strategy framework proposed by Cho, Kim and Rhee (1998), where key decisions have been identified utilizing latecomer advantages. The paper contributes to latecomer strategy research by also examining the role of the intangible assets of brand equity and reputation in a purposeful follower entry position.

The paper is presented as follows. The first section provides an overview of entry order strategy from the first and latemover advantage literature with emphasis on latecomer strategies of free rider effects, inertia forces and enhanced information. The brand equity and halo effect on branding are then considered potential moderating roles in influencing early consumer acceptance of a product. The second section of the paper presents the case of Starbucks and its market entry process relative to the local first mover, Café Coffee Day (the incumbent brand) that enjoyed a 75 percent café market share in India. The Discussion section of the paper presents the case issues and compares them against research in the latecomer strategy and brand equity literature. Lastly, the final section discusses implications of Cho, Kim and Rhee’s (1998) follower strategies and recommends direction for future empirical research.

## **LITERATURE REVIEW**

### **Pioneer versus follower advantages**

As new market expansion into newly developing international countries continues to evolve, the relationship on entry order effects and business performance once again has gained the attention of international strategy researchers (Magnusson, Westjohn and Boggs, 2009). First mover advantage is defined “as the first firm to introduce a new product; use a new process or enter a new market” (Lieberman and Montgomery, 1990: 1). Entry order effects literature initially focused on competitive advantages of the first mover and argued that lead-time acquired by market pioneers allows them to capture consumer preferences and market share within a newly emerging market. First movers have been found to benefit from competitive advantages that include higher market share compared to later entrants, (Lambkin, 1988; Cui and Lui, 2005) better service and more differentiated products (Miller, Gartner and Wilson, 1989).

Delio and Makino (2003) confirmed the prerequisite of greater investment required by early entrants. In contrast, late entrants experienced improved chances of sustainability without need for greater investment. In Abel’s (1995) investigation of 52 product categories, few pioneers maintained their status of category leader. Shamsie, Phelps and Kuperman (2004) explored several strategic factors most likely to lead to latemover advantage. In their study of 165 late entrants within the household electrical industry, the authors found latemovers faced late entry obstacles; however, those that performed better were able to tap into a deep reservoir of internal

resources. The authors identified three primary factors that led to success of late movers: 1) dependence upon conditions at the time of entry that allowed for market opportunity; 2) organizational resources; and 3) performance of products relative to competitive offerings. Researchers have also identified and segmented entry patterns according to order of entry periods. Shankar, Carpenter and Krishnamurthi (1999) categorized market entrants as 1) pioneers, 2) growth-stage entrants or 3) mature-stage entrants. They found growth-stage entrants outperformed the other stages of the life cycle while mature-stage entrants were the most disadvantaged group. Abel (2008) found firm performance success rates highest for early followers (56.5 percent) versus first movers and pioneers (10 percent).

### **Order of entry in international (and emerging) markets**

Studies on international market entry have focused on entry mode strategies, more so than timing of entry order to uncover the extent that first mover advantages may occur with different FDI strategies (Goa and Pan, 2010; Murry, Ju and Gao, 2012). Consideration of entry order timing, with regard to the uncertainty associated with entering developing countries or newly emerging geographic markets is timely, as populous underdeveloped countries shift to free market economics. Newly emerging markets or economies are often characterized by uncertain or weak demand, resource scarcity, weak infrastructure and deficiencies in bureaucratic processes for foreign direct investors (Magnusson, Westjohn and Boggs, 2009). Optimal timing of international entry will be dependent on several external and internal factors, including market conditions, resource base and market positioning (Shamsie, Phelps and Kuperman, 2004), the strength of a firm's resources (Leiberman and Montgomery, 1998) and even the role of nonmarket political resources (Frynas, Mellahi and Pigman, 2006).

The entry decision into emerging markets requires in-depth assessment of potential obstacles. The option of late mover entry offers strategic advantages under certain situations as late entrants can leverage the effort of first movers, for example, or free-ride on pioneering efforts of others. When a pioneer expends great resources in creating a market's infrastructure, educating the consumer and encouraging consumer acceptance, it opens market opportunity to strategic followers who benefit from scale of economy and preparation of consumer preferences (Kerin, Varadarajan, & Peterson, 1992). Mitchell, Shaver and Yeung (1994) argue "the greatest opportunities for successful international expansion" reside within the narrow window behind the pioneer and just prior to the market growth phase when multiple competitors begin to enter the market.

The effectiveness of first mover versus latemover strategy perspective continues to provide insight and opportunities for strategic management applications. Cho and colleagues (1998) identify three situations wherein a market follower can strategically benefit from market pioneers. These include: 1) the potential of free rider effects based upon the market and its evolutionary trajectory, as well as changes in consumer preferences which crystallize over time; 2) the ability to leverage inertial forces that constrain a first mover to adapt and change as a market evolves; and lastly, 3) the "enhanced level of information" the late mover acquires by virtue of delaying entry to assess, respond and react to competitor strategies in the early and often uncertain phase of new market creation.

Another variable worthy of consideration is brand image and reputation. Latemovers can surpass an incumbent if the late mover brand can demonstrate superior attributes over a pioneer (Kerin, Varadarajan, & Peterson, 1992). This relationship between firm specific attributes and their influence on latemover performance demands deeper investigation. More specifically, the influence of firm attributes, such as brand equity, is examined here for its impact on a late mover. Brand equity is the “power a brand conveys to customers based on its goodwill and reputation, and the brand’s ability to capture consumer preference and loyalty” (Kotler and Armstrong, 2013: 215). Brands with powerful equity can benefit from halo effects whereby consumers view a brand favorably, especially in the case of international consumer recognition. Foreign brands’ products possessing such reputational significance will likely sell better as compared to products of a local brand (Qiu, Yao, Zheng, and Cao, 2012). In fact, in cases where latemovers have similar industry experience and strong brands, Kim and Min (2012) found that a pioneer’s lead-time advantage in a new market would be minimized.

Examination of an industry’s category leader that purposefully elects to delay entry within a burgeoning geographic market is noteworthy as Tellis and Golder (1996) assert, “When a firm enters a market, the only certainty is its order of entry, whether first, second etc.” (66). The magnitude of competitive advantage gained by the latemover depends largely upon the extent it can free-ride on the first mover’s pioneering efforts with infrastructure and supply chain, leverage inertial forces sustained by the incumbent, and maximize the education and influence of consumer preferences through enhanced market knowledge, information and resources including intangible assets (i.e., strength of one’s own brand reputation). The following case provides the milieu whereby the category leader in the coffee café industry successfully leverages and implements latemover strategies according to Cho, Kim and Rhee’s (1998) late mover advantage strategy model.

The next section presents the case of Starbucks, arguably a global leader in the coffee café industry. Data gathered is based on various secondary sources including published articles and reports of interviews with key personnel. The paper serves to examine and illustrate a firm’s ability to leverage the intangible attribute of brand equity to advantage in latemover strategies illustrated vis-à-vis the Starbucks (latemover) brand versus Café Coffee Day (CCD) the first mover in the emerging economy of India, introducing a coffee café experience to a primarily tea-drinking culture of over 1 billion people.

## **METHODOLOGY**

After a review of the relevant literature, a case is developed based upon several months of data gathering using secondary resources including online documents, published articles, reports of interviews covering the Starbucks and CCD Café Coffee Day companies, as well as the emerging café industry in India. As an empirical inquiry, case study research method investigates a “contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (Yin, 1984: 23). This case study has been aimed at identifying intangible firm resources of competitive advantage. And while brand equity is not a new mechanism of competitive advantage, little research exists with regard to the effects of brand strength and late

entry effect within an emerging market environment. Thus, an exploratory case approach is an appropriate method to uncovering this phenomenon that we do not yet clearly understand to date.

### **THE CASE: STARBUCKS (FINALLY) GOES TO INDIA**

Starbucks, one of the world's largest coffee café chains had operations in 57 countries by 2007, including China, considered by some to be the most difficult market to establish a U.S. brand of coffee beverages to a predominantly tea drinking society. As one of the world's largest coffee café chains (Technopak Advisers, 2011), Starbucks had been eyeing the Indian market for years. By the mid-2000's, the confluence of India's rousing economy and concurrent growth of a local-born café culture provided Starbucks with an untapped opportunity of market demand and growth potential. Technopak Advisers, a New Delhi-based research firm, projected the café market opportunity would continue its rapid expansion at a compound annual growth rate of nearly 25 percent through 2015 (Technopak Advisers, 2011).

Starbucks originally showed interest in establishing an alliance with Kishore Biyani's Future Group, a leading Indian intermediary in 2007. Plans were apparently rejected by the Foreign Investment Promotion Board, or FIPB, the government body that regulates inflow of foreign money into India's factories, shops and mines," (ET Bureau, 2010). Subsequent discussions occurred with Foodworks, who eventually partnered with U.S. competitor Dunkin Donuts (ET Bureau, 2010) instead of Starbucks for a restaurant chain network in India. By 2010, market analysts had speculated as to why Starbucks was not moving as swiftly as other international competitors were, quickly setting up cafes to compete with local leader Café Coffee Day, the established local brand that opened its first cyber cafe in the late 1990's. Other foreign brands were staking a position in key metro areas of India including Italy's Lavazza's Barista stores and the UK-based Costa Coffee owned by RJ Corporation. By 2011, these chains were thriving due to a rising demand of India's upwardly mobile middle class and youth who were enthusiastically adopting Western-influenced interests that included increased consumption and spending on gourmet foods and beverages, dining out and indulgences in social entertainment (Technopak Advisers, 2012).

By late 2011, announcements by Dunkin Donuts and Starbucks finally indicated their anticipation of rapid and aggressive entry into the growing Indian café market. Dunkin Donuts planned 100 new outlets over the next five years. Tata Global, Starbucks' intermediary partner announced plans to open 50 stores within the first year.

#### **Order Entry – First movers versus latecomers**

India's first mover, Café Coffee Day (CCD) launched the first cyber café in India in the mid-to-late 1990s. A gathering place to drink the country's preferred tea beverages, CCD steadily took off as the rise of local cafes provided a social hub for the Indian, young adult consumer with rising aspirations based on Western cultural influences. CCD's chain of outlets first opened in mid-1990 in Mumbai and New Delhi, and grew into more than 800 stores across 100 cities in India by 2010 (Gain Report, 2010). CCD positioned themselves as the trendsetting leader, the "third place" away from home and work or college, and a message that strongly resonated with their target market of young 15 – 30 year olds.

Early market followers included overseas coffee retailers, Italy's Lavazza and the U.K.'s Costa Coffee companies. By 2010 with the top three competitors firmly established, Café Coffee Day boasted a 75 percent share of the India retail coffee market – a figure it predicted would reach 80 percent by 2013 (Landor.com).

Still, Starbucks was visibly absent from the competitive landscape. In fact, Starbucks had discussed a joint venture in 2010 with local intermediaries but withdrew its proposal after the Indian government requested amendments to its application (ET Bureau, 2010). Afterwards, Starbucks appeared content to wait and remain on the sideline, as no further plans were made public.

With increased global expansion of coffee cafes, the period of 2008-2011 witnessed another round of new entrants that included Gloria Jean's Coffee of Australia, Coffee Bean & Tea Leaf of California and Dunkin Donuts, eroding CCD's dominant share position from 75 percent to just over 60 percent by 2012 (a decline of 15 share points in just two years and 20 share points below original growth projections (Vats, 2012). However, these secondary entrants encountered local conditions proven to be constraining compared to their first mover counterpart. India's economic growth had leveled. By 2012, high real estate rates, slow infrastructure development and café saturation relative to current demand were factors affecting the fairly new café industry once considered a fast growth opportunity (Anonymous, 2012).

With India's slowing pace of development (Young, 2012) and a larger concentration of cafes established in urban cities, the café novelty had begun to wane with fewer store openings amongst competitors overall. India's GDP growth had fallen to 6.5 percent in 2012 after "near double-digit expansion for the past decade, growth in demand for premium coffee may have slowed" (Anonymous, 2012).

Enter Starbucks in 2012 with just three locations; Mumbai in Horniman Circle and two sites in New Delhi. These sites were vastly different from any Starbucks' sites. They comprised a vast, expansive space (4500 square feet), multiple floors, elegant furnishings and elaborate décor. This ultimate café environment positioning was unprecedented in India. It appeared that Starbucks was redefining the café experience for Indian consumers. Analysts reported Starbucks was poised to see significant growth. In an interview, Starbucks CEO Howard Schultz confidently confirmed, "...we think over time India will be one of the largest markets in the world for Starbucks...competition has done us a favour. They have educated the market and created lots of consumers" (Krishna, 2012). Schultz' statement supports Cho and colleagues (1998) contention that late mover strategies will lead to success depending upon conditions at the time of entry that allowed for market opportunity, organizational resources, competitive inertia and enhanced market information.

### **Leveraging free-rider effects**

According to Cho and colleagues (1998) an innovative late entrant can free-ride a first mover on category awareness and buyer education created by the pioneer and appeal to a greater pool of adopters than the pioneer if it offers greater value through superior positioning. Starbucks benefited from the free-rider opportunities created by Café Coffee Day over the past decade. Starbucks' timing allowed them to leverage the progress made with the existing development of

the country's developing infrastructure. Roadways for distribution and supply chains had all been formulated early on by CCD and other first movers. Scouting out strategic locations relative to competition, Starbucks selected highly visible, high traffic locations with the assistance of partner, Tata Global. "In India, the market has been educated in many ways for us by a lot of these competitors who are doing pretty well. What we are going to be able to do is capitalize on that, but bring them a product and experience that is going to be quite different, much more dynamic and much more satisfying." Shultz added, "When we entered China 13 years ago...they did not know what a café latte was...or the Starbucks experience...we educated the [Chinese] market over a decade" (Krishna, 2012) indicating Starbucks was investing for the long term.

As a first mover, CCD built a healthy consumer demand base among the 18-30 years of upwardly mobile target segment and paved the way with the development of infrastructure in major cities for improved supply chain efforts and capabilities reducing barriers to entry for competitors. Starbucks was able to forego distribution errors by being able to select sites and new store locations relative to current market penetration and urban versus rural demand and supply factors.

Information spillover is another latecomer advantage. Starbucks' latecomer timing allowed for reduced R&D costs relative to earlier entrants. "Firms free-ride on information obtained about other firms' research and development efforts and productivity improvements" (Haunschild and Miner, 1997). Although R&D spillover is often associated with technology, R&D is a strong contributor to product development, menu development, local menu offerings, and geographic selection. Starbucks was able to gather competitive intelligence from all market predecessors thus learning from competitors what product and pricing strategies could be most optimized.

### **Leveraging incumbent inertia**

By 2011 CCD's market share dropped to just over 60 percent, a decline of 15 share points in two years and 20 share points below original projections (Vats, 2012).

CCD is "likely to feel the pinch of increased competition" according to some analysts (Shashidhar, 2012). While CCD was working to build volume, they were locked in with firm specific assets and resources in support of their affordable, low end Lounge format (over 1200 stores). This provided Starbucks with an opportunity to enter with an aggressive capital investment of Rs400 crore, \$80 million (Vats, 2012), double what CCD was reportedly spending to simply update stores and open a new format.

Locked into their current retail locations and debt service, CCD ramped up expansion working to serve multiple markets – adding a premium store format called Square to their offering. CCD's timing was worrisome for analysts claiming CCD is doing *too much* too late. (Shashidhar, 2012) referencing CCD's overspending during a time of slowdown. CCD had solidified their café position in the value end within Indian cities. However, in response to Starbucks' and U.S competitor Dunkin Donuts' entries, CCD had begun to upgrade stores and invest in more locations in Tier 2 and Tier 3 towns, add take-away cafes and invest heavily into expansion, "Our aim is to open at least one store a day," claimed director of marketing K. Ramakrishna, bearing all of expenses of opening new outlets (based on a corporate owned operation model).

This is a reflection of a root problem market incumbents face as organizational inertia may lead firms to “continue investing in their existing asset base well beyond the point where such investments could be economically justified,” (Lieberman and Montgomery, 1987). Interestingly, CCD’s positioning emphasis was on the value end of the coffee café market and yet they intended to also compete directly in the upscale premium segment as well by expanding their core business to include a premium chain of cafes in addition to their present value chain known as their “Lounge” format. Retail consultant, Harminder Sahnid expressed his concern, “Its focus should only be at the value end, which it is good at,” (Shashidhar, 2012). Continued investment in one’s existing asset base beyond the point where such investments will realize new enough return on the investment can be problematic.

By broadening their appeal at opposing ends of the pricing/experience spectrum of the market, CCD was reacting to the uncertainty concerning which segment would prevail; thus they chose to appeal to multiple segments. This ran contrary to their long-term market position and came at a time when India’s economic growth was leveling off.

Estimates of CCD’s additional capital investment for upgrades, rural expansion and the new premium concept were projected to reach Rs200 Crore or the equivalent of \$40 million US dollars, (Shadishar, 2012). They also invested in hiring marketing firm, Landor Associates to “refresh the brand and make it modern” (Landor.com) in response to the arrival of foreign competitors and design the new premium coffee chain, “Square” to counter the Starbucks’ entry. Its format borrowed from the Starbucks’ model of large, open café space, premium setting and pricing. They opened two Square stores in Bangalore and Delhi, and indicated plans to ramp up. Admittedly, this format was difficult to implement, “Square is a tough format to expand,” as large retail space must now be added to their portfolio of existing smaller retail sites (Vats, 2012). Rental agreements for the newer, larger locales was being negotiated at the expense of cannibalizing sales at the smaller, older locations. In press reports, chief operating officer Venu Madhav A. pressed on, “It is time we offer our consumers the next level of experience.”

Not only was CCD challenged with staying relevant in the minds of Indian consumers in the face of competitors, the company had to remain relevant to its employee base. CCD invested sixteen years in developing human resource talent in the café market, and was at risk of losing their best employees through attrition as Starbucks and others offered attractive compensation packages to locals relative to CCD. “There is the potential that some of CCD’s 9,500 employees, the largest pool of trained workers in the country, would be lured away by potentially higher pay at the one of the Seattle chain’s outlets,” (Knowledge@Wharton, 2012). Consistent with their U.S. compensation model, Starbucks offered part time employees (minimum of 20 hours per week required) health benefits mostly unprecedented among businesses.

### **Enhanced level of information**

Another important characteristic of latecomer competitive advantage is the latecomer firm’s enhanced level of information acquired by either previous market entry experience or the deployment of a watch and wait approach. Starbucks benefited from both.



Starbucks maintained significant strategic advantage with its in-depth experience for local market adaptation based upon its China (among others) expansion fourteen years earlier. Starbucks entered the Chinese market with a highly localized menu of beverages and foods tailored to China's local cultural preferences and tastes. Stores selected from a "wide variety" of beverage portfolio to fit local customer desires and Starbucks Research and Development group at HQ encouraged the creation of unique blended products with local flavorings for flagship stores (Rein, 2012). Overall, Starbucks' experience from its China expansion imparted the knowledge and expertise affording them a nimble entry into another predominately tea-drinking culture already primed for the coffee café culture based on the efforts of first mover, CCD and other early entrants. Similar to China, Starbucks and their Tata Global partner focused on selecting high visibility and high traffic locations to project its brand image with minimal advertisement and promotion so as not to be perceived as threatening tea drinking loyalists. The established China/Asia Pacific Division, led by John Culver applied their new learning for hiring experienced, local talent coupled with a willingness to partner with regional intermediaries, an approach they adopted in China (3 separate joint ventures). Starbucks recognized India as a long-term commitment, investing in a marathon, not a sprint similar to their China program. It took thirteen years to open 500 stores in China and completely assimilate into the Chinese culture (Wang, 2012).

Starbucks benefited from a vast pool of resources and assets. In an unprecedented move, the firm invested in a local roasting facility in southern India to supply Starbucks with India coffee beans, sourcing and roasting the coffee directly in India, an arrangement made through Tata's Coffee Ltd. Division. This allowed Starbucks to price drinks more reasonably in the lower income Indian market rather than use the higher U.S. and European pricing standards as they understood the inability for the India market to bear \$5.00 latte concoctions.

Shultz committed a reported \$80 million dollar investment to differentiate themselves from incumbents. Rather than push the take-out of their US business model, which accounted for most of U.S. store sales, they promoted the dine-in service the Indian consumer was partial towards, and created a store atmosphere that "stunned and spellbound everyone who sees it," boasted Shultz (Rein, 2012; Krishna, 2012).

Analysts reported local competitors and foreign brands favored Starbucks' arrival to India, which had originally been skeptical about them entering the country. "A brand of the stature of Starbucks sends a very strong signal to retail and food-service companies world-wide," says Naloni Nangia, senior vice president of Technopak, the Indian research firm (Bahree, 2012). McKinsey (2012) reported Starbucks' entry into the India market would continue to generate demand in new cities and rural areas.

### **Intangible Competitive Advantage – Brand Equity and Credibility**

Of equal significance was the strength of the famous Starbucks' reputation that cemented the brand's early acceptance. Kerin, Varadarajan & Peterson, (1992) found late movers could surpass an incumbent if the late mover brand can demonstrate superior attributes over a pioneer. Starbucks' image of a veritable coffee café "rock star" global brand among Indian consumers suggests the intangible attribute of brand equity was a moderating factor in Starbucks' early success. Starbucks received an enthusiastic reception to their stores and reported high customer

traffic and sales volume. Starbucks' benefited from a shortened learning curve advantage after years of entering new global markets and adapted to a country or region's unique infrastructure, characteristics and qualities. By 2013, they'd opened 25 new stores in five major cities. A pioneer's lead-time advantage in a new market is subject to erosion when latecomers demonstrate strong brands and industry expertise (Kim and Min, 2012). Kotler and Armstrong (2013) define brand equity to be the added value endowed to products and services. Starbucks was listed #76 as one of the World's Most Valuable Brands by *Forbes* magazine (Forbes, May, 2013). Qiu and colleagues (2012) confirmed products possessing such reputational significance will likely sell better as compared to products of a local brand.

In an interview with analysts, Schultz stated, "the brand equity of Starbucks is one of the most recognized and respected of any consumer brand...the awareness for Starbucks is so large here [India] and there is so much pent-up demand that we think that over time this is going to be one of the best markets in the world for Starbucks," (Economic Times, 2012).

## DISCUSSION

Starbucks delayed entry into India was emblematic of Cho and colleagues' (1998) latecomer advantage model depicted in Table 1. By the time Starbucks entered the Indian coffee café market, several brands had preempted the industry giant including U.S.-based Dunkin Donuts, Australia's Gloria Jeans and Coffee Bean & Tea Leaf of the U.S. Starbucks' move was arguably unorthodox for a former first mover company. Instead, the firm was able leverage competitive advantage benefits from free rider effects, incumbent inertia and enhanced levels of information relative to local incumbent, Coffee Café Day and multinationals Barista and Costa Coffee franchises to formulate appropriate strategies recommended for latecomers.

**Table 1 Starbucks Delayed Entry into Indian café market – Strategies to utilize Latecomer Advantage of leading brand**

Latecomer advantages	Strategies to utilize latecomer advantages	Evidence from Starbucks
<b>Free-rider effects</b>		
Consumer education	Odd timing	-Timing decision leveraged period of slowing economic growth
	Leverage incumbent market creation/education	-Demand base built by first movers, heavy initial investment and promotion required by incumbents;
Information spillover	Leverage environmental constraints of market dynamics (size and growth)	- Leverage pent up demand
Skipping trials and errors		-Reduced R&D costs
		-Distribution, location selection relative to current market penetration
<b>Incumbent inertia</b>		
Lock-in of assets	Ultimate premium positioning; use of superior value strategy	-Aggressive capital investment of \$80 million versus CCD's \$40 million; fixed assets may be sunk costs
Organizational inertia	Leverage incumbent uncertainty	-Superior differentiation versus low-

	regarding sunk resources of incumbent act as constraints to influence	end value positioning of CCD and competitors; focused on premium niche; -Competitor CCD heavily invested plus lock in of fixed assets to keep up during economic slowing
<b>Enhanced level of information</b>		
Resourcefulness	Resource leveraging	-Starbucks deploys internal resource strengths (venture arrangements, adaptation, training, sourcing, customer service, intangible asset of brand equity) to form competitive advantage to leverage current environment.
Shared experience or assets	Learning curve effects Economy of scale effects	

Adapted from Cho, Kim and Rhee, 1998 Latecomer Advantage strategy model p. 501

An innovative late entrant can free-ride on category awareness, market creation and consumer education developed by a pioneer and appeal to a greater pool of adopters than the pioneer if it offers greater value through superior positioning (Shankar, et al. 1998; Lieberman and Montgomery, 1988). Starbucks leveraged free rider effect strategies of consumer education, information spillover and skipping trial and error by choosing a time of entry that could capitalize on a pent up demand base built by first movers, who'd invested heavily in infrastructure, promotion and market creation. Starbucks took advantage of unusual timing by selecting a period of slowing economic growth and benefited by incredible consumer priming as well as knowledge transfer from their China endeavors that also provided reduced R&D expenditures. Starbucks raised the bar of the Indian café experience by creating superior positioning, offering large, glamorous space for people to congregate, premium beverages and food all tailored to the local market preferences. CEO Howard Shultz emphasize that Starbucks would capitalize on the incumbents by bringing the Indian consumers a “product and experience that is going to be quite different, much more dynamic and more satisfying” (Economic Times, 2012).

A delay was unusual for Starbucks who'd often expanded aggressively as a first mover in other global markets, and timing was such that competitors were likely cutting back on costs in response to economic conditions. This allowed Starbucks to financially invest in the opening of grand new stores in Mumbai and two in New Delhi.

Information spillover occurred specifically in terms of reduced expenditures for R&D, as well as promotion and advertising. “Firms free-ride on information obtained about other firms’ research and development efforts and productivity improvements” (Haunschild and Miner, 1997). While often associated with technology, R&D is also a strong contributor to product, service and menu development. Starbucks used the information to better target the local desires and identify gaps not being offered by competitors. Product and pricing strategies could also be optimized, skipping any “trial and error” phase experienced by the incumbents (Cho et. al. 1998).

Starbucks’ timing and strategy implementation were unique in their contradiction of previous entry timing studies. Fernandez and Usero (2009) found that price reduction is a better approach

for followers, while differentiation is more effective for the pioneers in their study of the European mobile telecommunications industry. Starbucks' strategy was the polar opposite, relatively higher (premium) pricing and luxury experience differentiation in a follower position. As the benchmark by which most competitors compared themselves, Starbucks had just changed the rules of the game, offering an even greater and exquisite customer experience. Starbucks was in a position to carve out their unique position amidst an established market. This superior differentiation versus the low-end value positioning of CCD and competitors focused on the premium niche and allowed Starbucks to leverage some of the inertia competitors were wrangling with. Competitor CCD heavily invested in old and new stores and was locked into a specific set of fixed retail and equipment assets rendering the firm organizationally inflexible or constrained. These fixed assets and sunk costs along with CCD's \$40 million allocated upgrade investment for 1400 existing stores was only half of Starbucks' aggressive \$80 million capital investment for the grand opening of just three stores.

Starbucks leveraged its own assets and resources plus benefited from learning curve effects by drawing from its own extensive internal resource strengths (knowledge, experienced staff and management), their alliance arrangement with Tata Global Beverages, menu and environment adaptation to the local culture, training of top baristas, sourcing of coffee beans in India, and the intangible asset of brand equity) to form competitive advantage in the current environment.

Lastly, Starbucks benefited from the halo effect of their quality brand reputation and extensive brand equity. Halo effects in marketing occur when consumer judgments and perceptions are influenced by a positive experience or image of a brand. Linked closely to brand equity or the strength of one's brand favorability in a market, consumers will assign positive attributes to new products or brands introduced by the original brand (Kotler and Keller, 2009). Starbucks' global brand credibility transfers into new cultures by virtue of its association as preeminent leader in Western culture to create the coffee café experience. Starbucks was likely to receive swift acceptance provided they adapted appropriately to the local culture given their rock star brand, coupled with positive consumer perceptions of foreign brands working in their favor. In fact, Saran and Gupta (2012) found in their study examining the perception of foreign brands compared to local brands, "consumers perceive foreign brands produced domestically in a joint venture to be of better quality than local products." Indian youth were embracing the cultural attitudes and mores of Western society. O' Cass and Lim (2002) found consumers "have a higher preference and purchase intention for western brands compared to eastern brands" when they examined preferences of purchase intentions of young South Asian consumers. Starbucks entered India in Fall 2012 with its brand credibility, a significant initial investment of \$80 million, (Vats, 2012) its biggest flagship store of 4500 square feet versus the typical café size of 1500 square feet, a distinctive value proposition and differentiation of an "exceptional experience...a Starbucks experience" in a Western palatial-type site symbolizing modern lifestyle, cool hangout and trendy atmosphere in the two most populous cities (Bahree, 2012).

Ultimately, Starbucks demonstrated first in China and again in India its ability "succeed in the most unlikely-to-succeed market" (Wang 2012). Wang reported, "Starbucks has the ability to think differently, do their homework, implement the right strategies, adapt to local markets, and commit to the long term." Starbucks' benefited from a shortened learning curve advantage after

years of entering new global markets and adapting to a country or region's unique infrastructure, characteristics and qualities.

### **MANAGERIAL IMPLICATIONS**

This research offers several managerial implications. First, incumbent agility is necessary in order to overcome the propensity for inertia, particularly at times where a de facto category leader emerges onto the scene. Newly emerging markets or economies are often characterized by uncertain or weak demand, resource scarcity, weak infrastructure and deficiencies in bureaucratic processes for foreign direct investors (Magnusson, Westjohn and Boggs, 2009). The optimal timing of international entry will be dependent on several external and internal factors, including market conditions, resource base, market positioning (Shamsie, Phelps and Kuperman, 2004), the strength of a firm's resources (Leiberman and Montgomery, 1998) and even the role of nonmarket political resources (Frynas, Mellahi and Pigman, 2006). Incumbents and first movers would be well served if they were proactive in decision-making and capital investments with regard to late entrant forecasts. Starbucks had originally announced its entrance intention in 2007. At the time, CCD correctly continued to aggressively open cafes to garner market share, but at the lower end. Knowing Starbucks' premium positioning across the globe, CCD likely anticipated that Starbucks would continue with a premium position. What CCD did not anticipate was that Starbucks opened far fewer stores than original 50 announced, (just three when they first entered) creating a highly selective mystique among the premium segment that encouraged CCD to financially commit beyond what may have been required as the market was slowing. CCD's response risked diluting its own brand equity at the expense of expansion into the premium segment. Compounding the problem, CCD's capital investments and sunk resources may cost them as they work to reactively shift their strategy to add a premium café model intended to directly compete with Starbucks. In cases where late movers have similar industry experience and strong brands, Kim and Min (2012) found that a pioneer's lead-time advantage in a new market may be minimized.

It appears that latecomers, particularly entrenched MNC category leaders with strong tangible resources and intangible assets of brand equity and credibility, can successfully delay market entry timing to leverage the free rider effects of pent-up demand, unusual timing designed to assail incumbent inertia, with enhanced information to lessen learning curve effects as put forth by Cho and colleagues (1998). There are examples of category leading brands that had deferred market entry including Apple's iPad tablet, Gillete razors, Pampers diapers, Google search engine and Grey Goose vodka. On a global scale, MNCs who delay entry into emerging economies that are strongly culture bound can still benefit in terms of profit and process efficiencies by avoiding trial and error approaches to market creation.

### **LIMITATIONS AND DIRECTION FOR FUTURE RESEARCH**

This research seeks to explore the sustainability and survival of secondary entrants or latemovers and to identify the conditions leading to follower's outperformance of market pioneers. The paper examines whether follower entry strategy in an international market can be effective when the follower is best known for its reputation as the de facto category leader. Consistent with domestic market findings, market share of early entrants of foreign markets has been found to be

“significantly higher than those of late entrants” yet performance and firm survival are found to be less than later entrant counterparts, the implication being late entrants are willing to take more risks (Murray, Ju and Gao, 2012).

Within the context of the coffee café industry, this investigation illustrates a global category leader’s ability to leverage follower strategies when delay of market entry occurs. Starbucks, the coffee café category leader applied a latecomer strategy framework proposed by Cho and colleagues (1998), in order to exploit first mover disadvantages of free-rider ability, the in-agility of an entrenched incumbent and the building of an enhanced level of information. The paper expands upon latecomer strategy research by contending that the role of brand equity and reputation in a purposeful follower can enhance probability of FDI success. As of this writing, Starbucks launched 30 stores in five cities in India with goals to make India its largest global market.

This investigation is subject to limitations that provide opportunity for further refining, research and discussion. To date, it remains to be seen how Coffee Café Day will fare against Starbucks in the long term. However, there is evidence of CCD’s market share erosion as stated in the case. The study of MNCs entry timing relative to local firms can provide important insights as to how and when companies should leverage follower strategies, particularly in newly emerging economies where uncertainty of consumer product, service and brand acceptance is dubious, bureaucracy and political constraints are challenging and infrastructure is underdeveloped. Time is needed to examine long-term relational effects as the coffee café industry continues to stretch and grow. A single case is not representative for generalization. Additionally, secondary sources are opportunistic and may not capture all the facets and issues of latemover challenges. Lastly interpretation of success by journalists may be biased, depending on the nature of the situation.

Further, case research examining several firms in varied sectors, followed by empirical studies is recommended to better understand influence factors for top global brands’ entry timing relationships against first mover and latecomer strategies to assess overall performance variables. As developing countries continue to expand economically, MNC’s will want to tap into these emerging economies for profit and expansion. Understanding the boundary conditions that can foster or impede this level of expansion will continue to be of value to international practitioners and researchers.

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# **Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success**

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## **Abstract**

For the purpose of this study, we analyzed the effectiveness of various quantitative and qualitative factors with respect to Super Bowl commercials and their ability to market a given brand. We present the works of previous researchers as a starting point in determining the contributing factors that create a successful Super Bowl commercial. Our team aimed to research these previous studies and build upon their work. We conducted a survey involving 128 people with various quantitative and qualitative factors. Quantitative factors included such data as length of Super Bowl commercials and when the commercials are broadcast in respect to game time (first quarter, second quarter, etc...). We surveyed for various qualitative factors such as humor and celebrity usage. All of these factors together were used in the efforts to ascertain the factors that contribute to a successful commercial. Some key findings of this study support previous research in this area. Most notably the first half of the Super Bowl is superior to the second half and humor does play a critical role in the effectiveness of these commercials.

## **Introduction**

Commercials are an integral method for companies to advertise the goods or services they offer. Many people may see thousands of commercials throughout the year, and mostly they are at best tolerated during sponsor breaks of their favorite programs. However, the Super Bowl is one annual event viewers do not mind watching commercials, and many people even look forward to watching them. Super Bowl Sunday holds the most expensive 30-second slots for commercials every year simply because it is the most watched annual event in the United States. With the price

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companies pay for a short time to sell their product to the public, is it really worth spending all that money?

Commercials are a part of daily television. With the help of TiVo and DVR, many people have the luxury of fast forwarding through repetitive and enjoyment-prohibiting commercials that seem to interrupt our favorite television shows every few minutes. Viewer behavior, when it pertains to the Super Bowl, appears too contrary to the way people normally think about advertisements. Some set their TiVos and DVRs to record the big game just so they can watch the hyped up commercials that air during breaks in the game. The Super Bowl, a football tradition played by two teams in the National Football League (NFL), has become an American “holiday” for many. Family and friends gather around their televisions to watch the two best teams in the NFL go head to head in an intense matchup for the yearly championship. They engorge themselves in Buffalo wings, pizza, and beer all throughout the game all while catching up on social news. A star studded, electrifying halftime performance further adds to their already entertainment filled evening.

Every year, more and more viewers are tuning in to watch, not the main event, but the commercials surrounding the game for which companies pay millions of dollars for a few short moments. Super Bowl XLVI in 2012 boasted a whopping 111.3 million viewers were entertained and this particular Super Bowl holds four of the top five most watched broadcasts in history. An event with such viewership presents enormous potential for opportunity from a marketing standpoint. Last year, the average cost for a 30-second commercial to air during the Super Bowl topped out at \$3.8 million, a dramatic disparity from when the Super Bowl started back in 1967 when a commercial

only cost \$42,000 (Associated Press 2013). For some gigantic corporations, an expense of this represents a very minimal expenditure, but for many smaller companies, this is a large amount of money that can greatly affect the success of their business that fiscal year.

### Literature Review

#### Ontology:

Studies on the nature of marketing and advertisements have been conducted under many various overall theories or ontologies. Before delving extensively into research specifically on the area of Super Bowl advertisements one must first consider what is being tested and if it can truly be tested. This is ultimately based on latent assumptions concerning Super Bowl advertisements (Vakratsas & Ambler 1999).

There are models of thought with respect to marketing and advertising that concern themselves chiefly data generated through sales and costs and are considered to be *Market Response* models (Bass & Clarke 1972, Clarke 1976). An example of this approach to the study of advertising effectiveness would be the revenue earned per marketing dollar spent or any derivative of that type of study. We considered this approach, however, and decided that the scope of our project “the effectiveness of Super Bowl advertisements” was not broad enough to be encapsulated within this type of data set. The studies mentioned above that were mostly conducted by Clarke generally comprised questions that related to the effectiveness of marketing departments. Clarke also evaluated efforts as a whole as it related to an individual product/service as opposed to the general level of awareness generated by single advertisements.

Vakratsas & Ambler discuss a number of different approaches towards the study of advertising effectiveness. After review we considered the *Persuasive Hierarchy Model* to be best for our purposes (Batra & Ray 1986). This system works of the hierarchy of cognition causing an affect which is finally displayed in behavior. We are not attempting to see if an advertisement from the Super Bowl caused an increase in sales per dollar spent but rather simply attempting to see if some behavior was altered due to the advertisement being aired during the Super Bowl. Due to the more narrow scope of our project we considered this approach to best suited for our purposes.

### **Previous Research:**

Every year, when the Super Bowl concludes, companies immediately task themselves with polling viewers to see what Super Bowl commercials rank highest, and which ones completely flopped with viewers. The internet becomes inundated by these surveys and the results of public opinion.

The Nielsen Company, a global information and measuring company, has done a number of surveys pertaining to the Super Bowl and the effects the commercials have on the viewers. One of their surveys conducted this year, with respect to the immediately preceding Super Bowl, involved types of entertainment, specifically funny commercials. With regard to humor in particular, the Nielsen survey showed that 81% of viewers want to see them in Super Bowl commercials (Nielsen 2013 (4)). Another survey they had pertained to “Super Bowl Ad Effectiveness by Quarter” (Nielsen 2013 (4)). The graph they displayed for these results showed that the first quarter was the

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most effective (40%) for marketers, followed by the second quarter (34%), followed by the third quarter (31%), and lastly, the fourth quarter (25%).

The Retail Advertising and Marketing Association (RAMA) have been conducting surveys since 2005 prior to the Super Bowl in order to measure commercial advertisement effectiveness. One of the categories they measure is how many people plan to watch the Super Bowl. Their latest survey in 2013 concluded that 75.4% of Americans plan to watch the Super Bowl (Farfan, 2013 (3)).

RadiumOne, a leader in programmatic advertising, surveyed viewers and their habits on social media, product research, and cell phone usage. According to them, 45% of viewers will research a brand after viewing a Super Bowl Commercial (Tso, 2013 (2)).

From these poll results we can see that previous research has surrounded specific quantitative and qualitative factors that might contribute to the success of Super Bowl commercials. By crafting a similar survey, we plan to test their previous results and collect new data through a different avenue. Thus, it may be possible make incremental improvement on the work of researchers such as Tso, Nielsen, and Farfan.

### **Hypothesis Development**

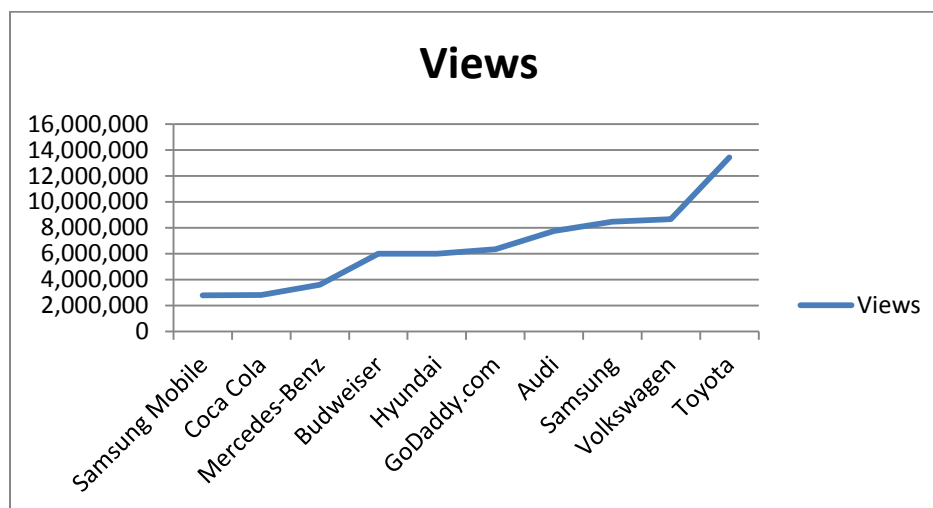
The purpose of this study is to see what viewers like to watch in their Super Bowl commercials and compare the results to previous Super Bowl studies. Studies are done every year after the Super Bowl in efforts to determine how the commercials fared with various segments of the general public. In contrast with previous studies, we polled

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the social media population and saw if they yielded the same results as some of the published statistics over the past few years.

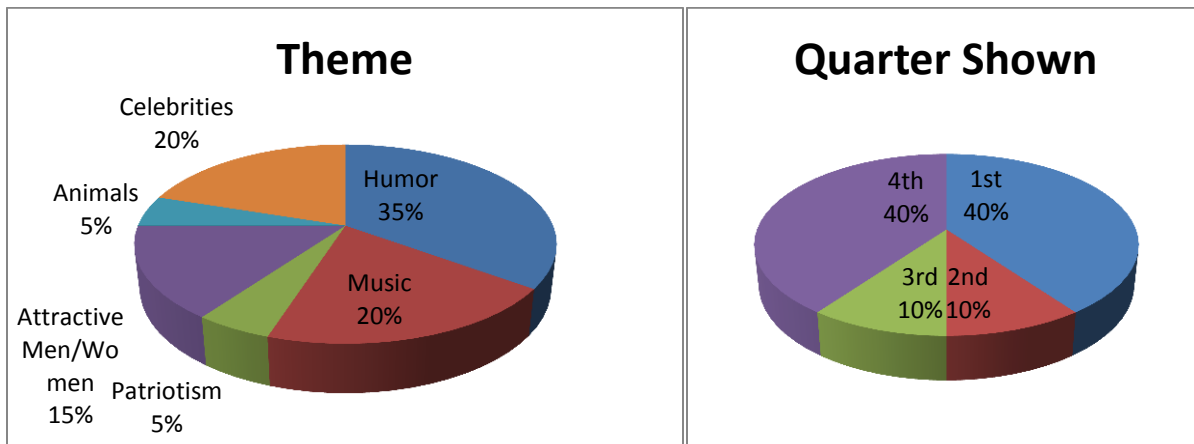
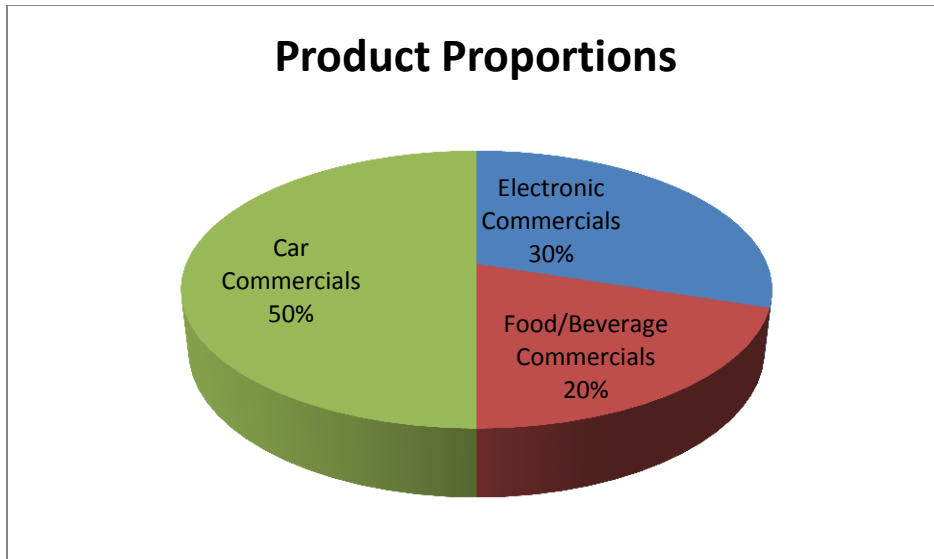
The study conducted attempts to examine the commercials that managers approve to air during their purchased slot time. Some companies buy more than one commercial slot, which increases their spending and pressure to create a memorable commercial that will be memorable to viewers. With all these resources being spent, it is critical for commercials to be effective and achieve the goals of the marketing department within the company.

In order to research our possible outcomes, we looked at data concerning the top watched commercials of Super Bowl 2013 to know what questions we should ask in our surveys. From a list of the ten most re-watched commercials on Youtube.com (TheSuperBowlTV,2013), we found that the product being sold had much to do with the commercials being viewed subsequent times:





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We found that out of the ten commercials, only three types of products/services were represented consisting of Car, Food/Beverage, and Electronics commercials with Car Commercials being most prevalent in the top ten. Furthermore, we found trends within the major themes of these commercials. We assigned two major themes to each of these ten popular commercials and found that humor was the most common theme with Music and Celebrity Appearances shortly following. We also saw that of these popular commercials, large portions of them were shown in the first and fourth quarters.

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We analyzed this data proportionally to easily see how the data fell when comparing these factors. Youtube views are by no means an indication of how effective an advertisement is in selling a product. However it is hard to deny that viewership in this case is a good thing. The more views, the better chance the commercial has to reach the potential viewer that could be moved to buy the product. One complication that must be mentioned, though, is that the commercials at some point may not function traditionally as an advertisement at this point. Instead, people may view the ad as simply a form of entertainment separated from the product it is supposed to raise awareness for. That is where our surveys can help us close the gap between the informations found in viewing results, and what the viewer actually perceives of certain commercials.

Once we were able to find the most important factors of these commercials from a previous game, we could move on and design our own survey. The focus and population our study came from was respondents who took our survey via social media (Facebook and Reddit). We had 128 responses, but took out the results that were not fully completed, so our sample consisted of 117 responses. We will use the sample data to draw conclusions about the overall social media utilizing population using both descriptive and inferential statistics. Our level of measurement will be nominal since our data consists of qualitative data.

Our results show that we have a number of independent variables that go into a commercial. Length of commercial, themes that are in the commercial, and results from watching that commercial are all independent variables we can measure. From those results, we can see what variables have a positive impact on the audience, and what

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factors have a negative impact. These positives and negatives represent our dependent variables. We will compare these results to prior year's studies and see if over time the variables have changed, or if they have stayed the same.

Based on the data previously mentioned during our literature review we have formulated the following hypothesis to test how many people watch the Super Bowl.

H0:  $\mu \leq 75\%$

Ha:  $\mu > 75\%$

We also formulated the following hypothesis to see how long a commercial ought to be from the perspective of the viewer/consumer.

H0:  $\mu \leq 30$  seconds

Ha:  $\mu > 30$  seconds

Once again, in the formulation of this hypothesis we attempted to draw from our predecessors whom have conducted research within this area.

As stated earlier, subsequent quarters in a given super bowl has been shown during previous research to contain decreasing response from audience members. We wanted to test if this was true or not based on our data. We therefore created the following hypothesis:

H0:  $\mu_{1st\ Quarter} \leq \mu_{2nd\ Quarter}$

Ha:  $\mu_{1st\ Quarter} > \mu_{2nd\ Quarter}$

And in case there proved to be no significant difference between these two quarters, we also decided to test this based on separate halves (i.e. first and second half). From this we developed the following hypothesis:

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H0:  $\mu_{1st\ Half} \leq \mu_{2nd\ Half}$

Ha:  $\mu_{1st\ Half} > \mu_{2nd\ Half}$

To further build on previous research we wanted to test more qualitative factors with respect to these commercials. We therefore developed the following hypothesis in order to determine if there was any significant difference in qualitative factors such as Humor, Celebrities, Music, Animals, Attractive Men/Women, and Patriotism.

H0:  $\mu_{Humor} = \mu_{Celebrities} = \mu_{Music} = \mu_{Animals} = \mu_{Attractiveness} = \mu_{Patriotism}$

Ha: At least one of the population means differs from the rest.

We tested the effectiveness of advertising based on industry type. This data is important due to its impact on a manager's decision to advertise in the first place. This method is also a means by which to test for latent factors that might exist external of the advertisement that might impact a viewer's perception of the advertisement. We therefore formulated the following hypothesis:

H0:  $\mu_{Food/Beverage} = \mu_{Auto} = \mu_{Movie/TV} = \mu_{Electronic/tech} = \mu_{Retail}$

Ha: At least one of the population means differs from the rest.

## **Research Methodology**

The Super Bowl is an event that many people seem to watch every year. More recently, it seems that the Super Bowl commercials become more and more of a topic of conversation among viewers every year. The prices companies pay for a 30 second advertisement is incredibly high. The attention of this huge group of viewers is at stake. With a topic so broad and well-discussed by hundreds of millions of Americans, our group thought this topic would be one that we could collect data on rather easily since Super Bowl commercials is a topic that permeates the general population.

First, it is important to see if people watch the super bowl and for what reason. If you have a decent amount of people who watch the game, then other factors that make up commercials is important. If not many people watch the game, then the study is somewhat pointless as the whole purpose of advertising is to catch an audience's attention.

From there we decided to see what factors go in to creating a commercial that viewers see as optimal. One important metric is the length of a commercial. This is mainly because most companies pay a certain amount for a 30 second commercial, which is the average air time the companies buy. However, commercial time varies as there have been commercials that are 1 second long, and some that have been 2 minutes long. One factor we wanted to know was if this time difference has any impact on the viewer. Do they care how long the time of a commercial is or does the length of it work for or against the advertising aim of the product?

Another factor that coincides with the length of a commercial is the placement of the commercial in the line-up for the Super Bowl. Do commercials that air earlier in the

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game have more of a memorable effect than commercials that air later? Does the air time even matter to viewers? The results of this would be able to tell us if it is more beneficial for companies to have their commercials play earlier in the game rather than later in the game.

Some of the other factors we wanted to measure were entertainment that is in commercials (ex: humor, celebrities, music, etc.) and what kind of commercials viewers like the most (ex: car, retail, electronics commercials, etc.). This data would provide us with results that which would help us decide if viewers even care to see certain types of commercials, or if the companies who have the least liked genres need to improve their advertising to attract the viewers.

An additional factor that we decided to measure is if commercials prompted actions from viewers/consumers after seeing them during the Super Bowl. Do they research the products offered, look the commercial up online to watch it again, or use social media to talk to others about the commercials? These factors have an important role in this study because it can help managers and companies buying these commercial slots to know what course of action to take in making a successful commercial for the Super Bowl.

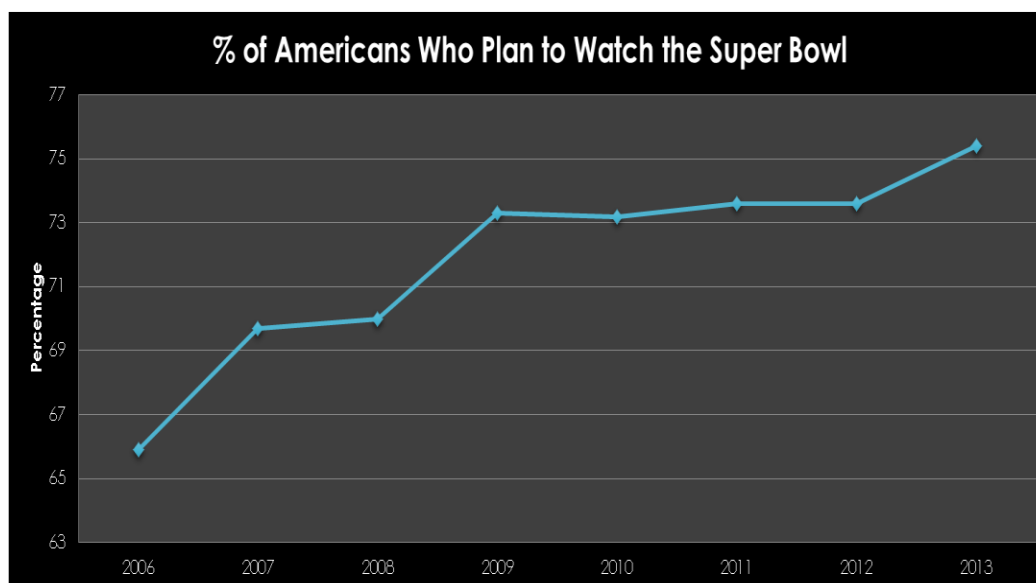
Based on those factors, we created a survey that consisted of 10 questions which would give us a way to analyze those factors and compare them with previous research that has been done in recent years about the Super Bowl and the commercials that air during the game. We would be able to analyze if the audience's general attitude had changed over time and what actually matters in a commercial according to viewers (or our sampled population).

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The survey was posted and distributed during the course of two weeks. It was posted online with a link for people to participate. The audience was those using social media outlets such as Facebook and Reddit. After two weeks starting shortly after Thanksgiving weekend 2013 our survey was taken down and we proceed to conduct statistical analysis on our data sets. The resulting data was then compared with previous data and research to form our subsequent conclusion.

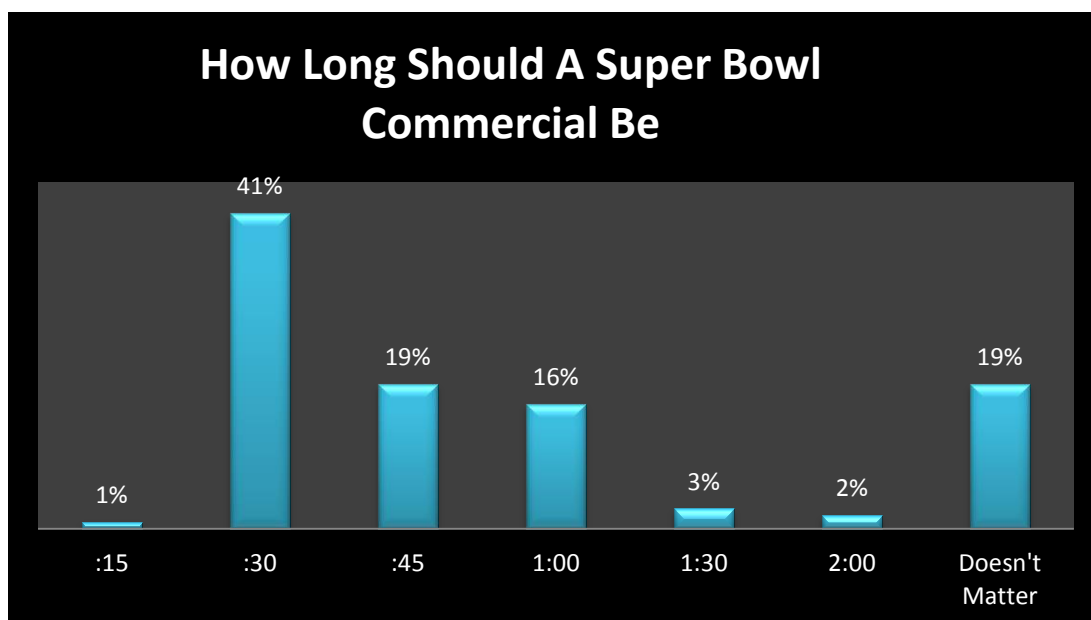
### Results

After closing our survey, we formatted the data for use, eliminated incomplete/unusable surveys so that they would not contaminate the data, and started analyzing the results. Our first factor that we decided to analyze, as noted above, was how many people watch the Super Bowl (for whatever reason, ie. Commercials, football, half-time show, etc...) versus how many people don't watch the Super Bowl. We conducted a one sample mean hypothesis test to see if at least 75% of people watch the Super Bowl, which they did (Exhibit A). More specifically, 91% of our population watches the Super Bowl. This is significantly higher than RAMA's results of only 75.4%.



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Another factor we decided to analyze was the length of time the commercial airs. Some commercials may be too long for viewers to divide their attention into, while others may be over in the proverbial “blink of an eye.” Using our data, and conducting a frequency chart, we can see that 41% of our survey respondents preferred 30 second commercials, which was more than double the next response of 45 seconds (19%). Conducting a one sample mean hypothesis test (Exhibit B) shows slightly different results. With an alpha level of 0.05 (used for all our tests), we can narrow down the exact seconds that people wouldn't mind watching a commercial for. Our results stated that viewers want to watch a Super Bowl commercial that is between 39 and 47 seconds long.



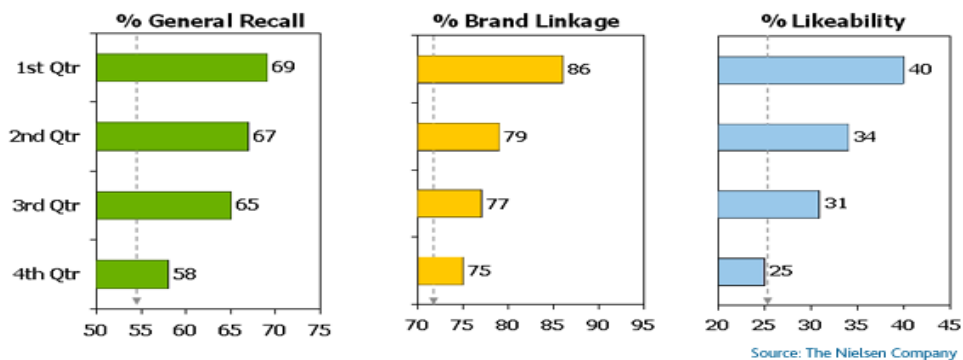
Are there specific quarters that show commercials that viewers enjoy over other quarters? We tested this against the Nielsen Company's results (Exhibit C) that likability of Super Bowl commercials steadily decrease as the game progresses. Our results from a two sample mean hypothesis test (Exhibit D) could not conclude that the



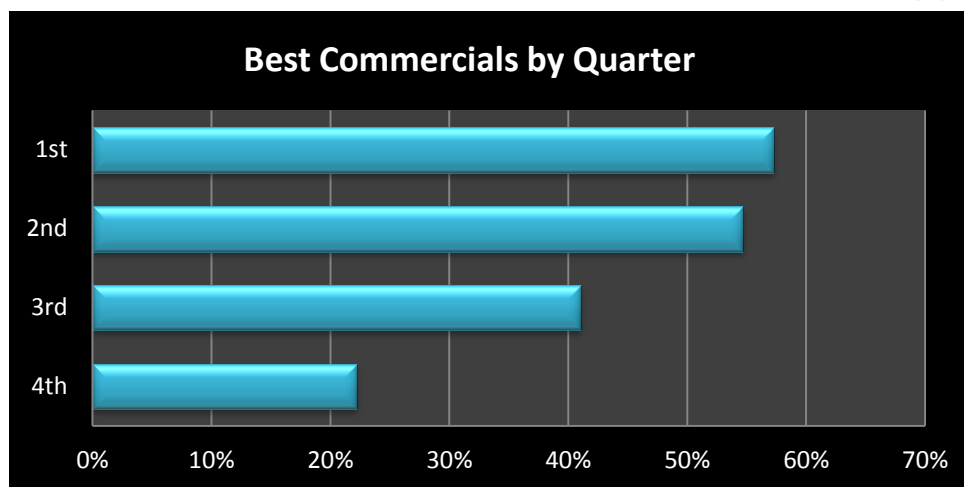
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first quarter had better commercials than the second quarter; however, we can conclude that the first half of the game has commercials that are more memorable to viewers than the second half of commercials.

Super Bowl Ad Effectiveness by Quarter



Best Commercials by Quarter



The content of a commercial is very critical in the eyes of viewers, and according to the Nielsen Company, 81% of viewers want to watch funny commercials during the Super Bowl (Nielsen 2013 (5)). Our results from the ANOVA test (Exhibit E and Exhibit F contained within the Appendix) yielded slightly higher, with 92% of viewers wanting to see humor in the commercials they were watching. The next runner up in types of entertainment that viewers like to see in commercials is animals. Celebrities, music,

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attractive men and women, and patriotism were not significant enough to matter to the viewers.

Genre is another factor that we analyzed to see if there are different types of commercials that viewers like to see over other commercials. We used the ANOVA test to see if certain genres were better than others (Exhibit G). Food and beverage, movie trailers and TV shows, and electronics commercials all were favored among viewers as commercials they prefer to see. The genres that were not liked so much were car and retail commercials.

Finally, how much research is done by viewers after a product is shown during a Super Bowl commercial? According to RadiumOne, 45% of viewers will research a brand after seeing it on a super bowl commercial. Our results were slightly higher, with 55% of viewers researching the products they saw. We broke this down even further to see if gender had an impact on researching products, but it did not as they both were roughly 55%.

What is your gender?	After seeing a product you like during the Super Bowl, do you research it?	Total
F	No	32
	Yes	38
F Total		70
M	No	21
	Yes	26
M Total		47
Grand Total		117

### **Discussion and Implication**

Analyzing the data from our survey helped us better to understand what viewers look at and remember when they watch Super Bowl commercials. From our results, we found that many people prefer different things. A consensus was hard to determine. The strongest factor that people enjoy in these commercials was humor. This factor had the highest percentage of all types of entertainment in that specific survey question. Another factor that was impactful as humor was whether or not people actually watch the Super Bowl at all. Again, 91% of people watch the Super Bowl either for the football, the commercials, the halftime show, or a combination of everything. 9% of our surveyed group said they do not watch the Super Bowl at all. This statistic is something that companies need to know especially since they will eventually need to find a way to reach out to the portion of the audience that does not see their expensive big-game commercial.

Even though we had usable results from our survey, all types of analysis have room for variance. There can be a number of determining factors that can cause results to not be ideal. Comparing our results to the data of other surveys showed us that our results were slightly higher than the other companies' results. One reason behind this variance could be that our population size was rather small. We received 128 results, 117 of them usable data. That number is way too small to be representing a whole population of Super Bowl viewers. These companies that we are comparing results to are well-known for their surveys and reliable information, which leads us to believe they had thousands of responses that helped them have a more specific response to each survey questions.

## **Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success**

Another possible reason for our skewed results could be that our questions could have varied from how the other companies worded their survey questions. Their questions may have been targeting a different factor than what our questions were trying to target, thus resulting in different responses. Our survey was conducted through social media outlets, which is where we obtained our results. This could also be another contributing factor that might have led us to different results from the companies we are comparing our results to. Their surveys could have been conducted a number of different ways and not have been limited to the social circles of people who are by and large similar to us in age and disposition.

### **Conclusion**

From our research we have developed some key criteria for a successful commercial. We have shown through our survey that about 90% of people surveyed watched the Super Bowl (Greater than previous research which was 75%). Clearly this shows that due to our respondents coming from the social media space that this group might represent a subset that watches the Super Bowl more than other groups existing in the viewership of the Super Bowl. However it also shows that there are enough people not reached through these commercials and that companies should certainly attempt to find alternative means to communicate their products benefits.

Some key qualitative factors include the commercial length that we found to be optimal at roughly 30 – 45 seconds long. Previous research showed that 30 seconds was optimal however 45 seconds is not much longer than this and since a fair number of people chose 30 seconds this can be considered to be consistent with prior research as well.

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Commercials in the first half are more impactful than commercials in second half (different from other research which indicated that each quarter became progressively worse). We can see by this that perhaps people's attention span declines as the game proceeds. It is possible that other activities that the general audience engages in might impact their general ability to focus on the various commercials during the Super Bowl towards the end of the game. If the price for a 30 second slot is the same in the first half as it is in the second, then a manager ought to attempt to have their commercial aired during the first half of the game.

What do people want to see in a commercial? The only standout categories in this regard were humor at 92% and animals at 27%. The other categories were not statistically significant and should therefore not be considered relevant. These categories included celebrities as a group. If people do not find celebrities to be a strong feature of commercials then it is most likely that a manager is better off spending his resources on the humors component of the commercial as opposed to spending the money on a "big name" for the commercial.

People like to see beverage and food commercials, Movie Trailers, and electronics. While a given company cannot change what content they are advertising this question on our survey mostly pointed at what might be beneficial to advertise in the first place. There is clearly a certain ontology required in this research and we must consider the following; A) a commercial's effectiveness is based on latent factors not subject to manipulation by manager's such as product/service being offered, pricing etc... B) it's possible that a commercial is doomed from the start to be poor simply

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because of the product/service being offered – the corollary indicating the potential for success might not be contingent on the commercial at all applies as well.

It is very important for a strong marketing plan to exist for people to conduct research on given products and services after they view a commercial. We found that 55% of people will do further research in the form of YouTube searching, etc. if they liked a commercial (higher than 45% as indicated in previous research). Gender did not matter with respect to this statistic. If manager's spend more money on the commercial and not enough on the subsequent components that enable a viewer to research the given product or service then it's possible that resources were wasted. It's therefore very important for manager's to have strong "back-end" systems to convert new audience members to "buyers" at their websites through engaging content.

It is our hope that by following these simple guidelines as outlined above that future managers might be able to construct commercials for the Super Bowl that will be successful and result in higher earnings for their companies so that they might better serve the community, their stakeholders, shareholders, employees and themselves. Super Bowl commercials are a great form of advertising when used properly and in conjunction with proper length, placement, humor, and for the right product/service.

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### Appendix

#### Historical Data Used for Proportions Charts

Commercial	Views	Product	Genre 1	Genre 2	Quarter Shown
Samsung Mobile	2,781,457	Electronic Commercials	Humor	Celebrities	4th
Coca Cola	2,802,526	Food/Beverage Commercials	Humor	Attractive Men/Women	4th
Mercedes-Benz	3,595,299	Car Commercials	Music	Celebrities	4th
Budweiser	6,004,196	Food/Beverage Commercials	Patriotism	Animals	3rd
Hyundai	5,990,254	Car Commercials	Humor	Music	1st
GoDaddy.com	6,329,031	Electronic Commercials	Humor	Attractive Men/Women	1st
Audi	7,755,171	Car Commercials	Music	Attractive Men/Women	1st
Samsung	8,459,360	Electronic Commercials	Humor	Celebrities	4th
Volkswagen	8,653,115	Car Commercials	Humor	Music	2nd
Toyota	13,422,896	Car Commercials	Humor	Celebrities	1st





# Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success

## Exhibit B

Average length a Super Bowl commercial should be:

Formulate and test a hypothesis to determine if statistical evidence suggests that the average time people want a SB commercial to be greater than 30 seconds. Test to see if the average is less than 45 seconds											
<b>Step 1 Hypothesis</b>						<b>Step 1 Hypothesis</b>					
Ho: $\mu \leq 30$						Ho: $\mu \geq 45$					
Ha: $\mu > 30$						Ha: $\mu < 45$					
<b>Step 2 Significance Level</b>						<b>Step 2 Significance Level</b>					
Alpha 0.05						Alpha 0.05					
<b>Step 3 Statistics</b>						<b>Step 3 Statistics</b>					
Mu 43.11						Mu 43.11					
X 30						X 45					
Z = $\frac{(X - \mu)}{\sigma / (\text{SQRT}(n))}$						Z = $\frac{(X - \mu)}{\sigma / (\text{SQRT}(n))}$					
Sigma 18.725						Sigma 18.725					
N 95						N 95					
<b>Step 4 Calculate P-Value and Compare to Significance Level</b>						<b>Step 4 Calculate P-Value and Compare to Significance Level</b>					
Z Value -6.82158						Z Value 0.986252					
Right Tail 4.5E-12						Right Tail 0.837995					
Left Tail 1						Left Tail 0.162005					
Two Tail 9E-12						Two Tail 0.324009					
<b>Step 5 Conclusion:</b>						<b>Step 5 Conclusion:</b>					
reject the null hypothesis						Fail to reject the null hypothesis					
There is sufficient evidence to state the average time people want a super bowl commercial to greater than 30 seconds						There is insufficient evidence to state the average time people want a super bowl commercial to be is less than 45 seconds					
By plugging different numbers into X, we can see that the average length of time people would watch a commercial is between 39 and 47 seconds											

# Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success

## Exhibit C

Super Bowl commercials by quarter and half:

Test the null hypothesis that the better super bowl commercials are in the 1st quarter over the 2nd quarter.				Test the null hypothesis that the better super bowl commercials are in the 1st half over the 2nd half.			
<b>Step 1</b>	<b>Define Hypothesis</b>			<b>Step 1</b>	<b>Define Hypothesis</b>		
	Ho: MU1stQt <= MU2ndQt				Ho: MU1stHalf <= MU2ndHalf		
	Ha: MU1stQt > MU2ndQt				Ha: MU1stHalf > MU2ndHalf		
<b>Step 2</b>	<b>Define the Significance Level</b>			<b>Step 2</b>	<b>Define the Significance Level</b>		
	Alpha	0.05			Alpha	0.05	
<b>Step 3</b>	<b>Define the Statistics</b>			<b>Step 3</b>	<b>Define the Statistics</b>		
	Z =	$\frac{\bar{X}_{1st} - \bar{X}_{2nd}}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$			Z =	$\frac{\bar{X}_{1st} - \bar{X}_{2nd}}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$	
<b>Step 4</b>	<b>Calculate the P-Value and Compare the Significance Level</b>			<b>Step 4</b>	<b>Calculate the P-Value and Compare the Significance Level</b>		
		<b>1st</b>	<b>2nd</b>			<b>1st</b>	<b>2nd</b>
	X	0.573	0.547		X	0.560	0.316
	$\sigma$	0.497	0.500		$\sigma$	0.497	0.466
	N	117	117		N	234	234
	Z Value	0.39351			Z Value	5.466502	
	Right Tail	0.65303			Right Tail	1	
	Left Tail	0.34697			Left Tail	2.3E-08	
	Two Tail	0.69394			Two Tail	4.6E-08	
<b>Step 5</b>	<b>State the Conclusion</b>			<b>Step 5</b>	<b>State the Conclusion</b>		
	Fail to reject the null hypothesis				Reject the null hypothesis		
	There is insufficient evidence to state that the better super bowl commercials are in the first quarter over the second quarter				There is sufficient evidence to state that the better super bowl commercials are in the first half than in the second half		

## Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success

### Exhibit D

Super Bowl commercials by types of entertainment:

<b>Step 1 Hypothesis</b>							
	Ho: $\mu_{\text{Humor}} = \mu_{\text{Celebrities}} = \mu_{\text{Music}} = \mu_{\text{Animals}} = \mu_{\text{Attractive Men/Women}} = \mu_{\text{Patriotism}}$						
	Ha: At least one of the population means differs from the rest						
<b>Step 2</b>	Alpha = 0.05						
	Anova: Single Factor						
<b>Step 3</b>	SUMMARY						
	<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
	Humor	117	112	0.957265	0.041261421		
	Celebrities	117	24	0.205128	0.164456233		
	Music	117	38	0.324786	0.221190687		
	Animals	117	41	0.350427	0.229590333		
	Attractive Men/Wo	117	24	0.205128	0.164456233		
	Patriotism	117	25	0.213675	0.169466549		
<b>Step 4</b>	ANOVA						
	<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
	Between Groups	49.82906	5	9.965812	60.37315876	2.93352E-52	2.226974539
	Within Groups	114.8889	696	0.16507			
	Total	164.7179	701				
	Since P-Value is < alpha, reject Ho.						
<b>Step 5</b>	There is sufficient evidence to state that at least one of the population means differs from the rest Based on the averages, we can eliminate humor and animals to see if the rest of the categories differ from each other.						
	Ho: $\mu_{\text{Celebrities}} = \mu_{\text{Music}} = \mu_{\text{Attractive Men/Women}} = \mu_{\text{Patriotism}}$						
	Ha: At least one of the population means differs from the rest						

Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success

Exhibit E

Super Bowl commercials by types of entertainment:

<b>Step 1</b>	Ho: $\mu_{\text{Celebrities}} = \mu_{\text{Music}} = \mu_{\text{Attractive Men/Women}} = \mu_{\text{Patriotism}}$						
	Ha: At least one of the population means differs from the rest						
<b>Step 2</b>							
	Alpha	0.05					
	Anova: Single Factor						
<b>Step 3</b>	SUMMARY						
	<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
	Celebrities	117	24	0.205128	0.164456233		
	Music	117	38	0.324786	0.221190687		
	Attractive Men/Wo	117	24	0.205128	0.164456233		
	Patriotism	117	25	0.213675	0.169466549		
	ANOVA						
	<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
<b>Step 4</b>	Between Groups	1.202991	3	0.400997	2.229094136	0.084053472	2.624124
	Within Groups	83.47009	464	0.179892			
	Total	84.67308	467				
	Since P-Value is > alpha, fail to reject Ho.						
<b>Step 5</b>	There is insufficient evidence to state that at least one of population means differ from the rest. These types of entertainment are the least popular according to our population						

## Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success

### Exhibit F

Super Bowl commercials by genre:

<b>Step 1</b>	Ho: $\mu_{\text{Food/Beverage}} = \mu_{\text{Car}} = \mu_{\text{Movie/TV}} = \mu_{\text{Electronic}} = \mu_{\text{Retail}}$ Ha: At least one of the population means differs from the rest.						
<b>Step 2</b>	Alpha = 0.05						
	Anova: Single Factor						
<b>Step 3</b>	SUMMARY						
	<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
	Food/Beverage	117	472	4.034188034	0.533303861		
	Car	117	350	2.991452991	1.111995284		
	Movie/TV	117	444	3.794871795	1.026525199		
	Electronic	117	409	3.495726496	0.786619511		
	Retail	117	358	3.05982906	0.970527557		
<b>Step 4</b>	ANOVA						
	<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
	Between Groups	96.12991453	4	24.03247863	27.13099318	1.16679E-20	2.387298123
	Within Groups	513.7606838	580	0.885794282			
	Total	609.8905983	584				
	P < Alpha, reject Ho.						
<b>Step 5</b>	At least one of the population means differs from the rest.						

## Contributing Factors for a Successful Super Bowl Commercial - A Recipe for Success

<b>Step 1</b>	Ho: $\mu_{Car} = \mu_{Retail}$						
	Ha: At least one of the population means differs from the rest.						
<b>Step 2</b>	Alpha = 0.05						
<b>Step 3</b>	Anova: Single Factor						
	SUMMARY						
	<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
	Car	117	350	2.991452991	1.111995284		
	Retail	117	358	3.05982906	0.970527557		
<b>Step 4</b>	ANOVA						
	<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
	Between Groups	0.273504274	1	0.273504274	0.262666289	0.608781854	3.881853287
	Within Groups	241.5726496	232	1.041261421			
	Total	241.8461538	233				
	Total	350.3304843	350				
	Total	502.3311966	467				
	Since $p > \alpha$ , fail to reject Ho.						
<b>Step 5</b>	There is insufficient evidence to state that one of the population means differs from the rest.						
	Car commercials and Retail commercials are they types of commercials viewers like to see the least						

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## **THE ONLINE SALESFORCE: CREATING VIRTUAL RELATIONSHIPS**

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### **ABSTRACT**

Budget cuts along with the preponderance and rate of progress of social media tools are revolutionizing businesses and the way their employees interact with customers. Today's salesforce are being forced to utilize the social media tools to establish and maintain virtual relationships with their customers without truly understanding how to effectively use the tools to gain the virtual trust of their customers. Currently, researchers argue that salespeople are currently piecemeal social media usage. As a result, they are not as effective in building online trust with their customers. This presentation elaborates upon some of the ways salespeople can gain their client's virtual trust. The presentation will cover the existing literature on how businesses and salespeople build trust online. Specifically, the literature framework builds upon some of the most cited buyer-seller relationship research that proposed a framework for how buyer-seller relationships developed. Our goal is to use existing relationship frameworks and draw on the literature in information technology (IT), sales, communications, sociology and psychology to suggest how salespeople can use technology to establish virtual or nearly virtual relationships with customers.

We will also expand upon popular research analogy between buyer-seller relationships and interpersonal relationships between men and women, specifically leading to marriage providing the relationship framework. Finally, we will present a framework for an online salesforce to build online trust via some of the same tools that build trust in online dating.

**Keywords: Online trust, social media, salesforce, virtual relationships, e-marketing, information technology.**

# **Gender Training's Contribution to Developing Microfinance Support Staff's Awareness of HUMO & Partners-Tajikistan: The Opportunities and Limitations**

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## **Abstract**

**Purpose:** Microfinance service and client success stories could not be possible without the work of support staff, a key success factor in women entrepreneurship achievement. This paper presents the case of the microfinance institution (MFI) HUMO & Partners in Tajikistan whose strategy requires gender-aware staff to attract more women clients, as women are the most affected by poverty. Upon the request of the CEO, the author carried out gender awareness training with the aim of sensitizing MFI managers about stereotypes. This study argues for the necessity to implement gender training within MFIs as powerful tools to foster a culture of diversity and overcome the risk of stereotyping. Based on a literature review of gender training in the microfinance field in different parts of the world, economic and social characteristics of the Tajikistan context, followed by the author's own on-the-field gender training methodology and findings, this paper identifies opportunities and limitations at the end that can help enhance the effectiveness of MFI staff as relays of gender awareness.

**Design/methodology/approach:** The methodology used was group workshops and discussion in order to create an interactive and participatory atmosphere, to deeply question a dozen managers within HUMO & Partners and encourage them to reflect on gender bias within their organization.

**Findings:** The results revealed that most of the managers, both male and female, were gender blind, however there was evidence of real awareness-building by the managers about the work to be done in this area.

**Key findings:** By implementing change management to integrate more women within HUMO & Partners, gender awareness training is key to achieving strategic policy implementation and

challenging managers about their own stereotypes and discrimination practices in daily operations.

**Research limitations:** This is a study of a dozen managers in Tajikistan, however findings should be useful for microfinance employers considering implementing gender policy while taking into stock context-specific characteristics such as culture. Language barrier when translating the results was also a limitation.

**Originality/value:** This paper is one of the rare works to address how gender awareness training can contribute to integrating more women in microfinance institutions. It explores notions such as glass ceiling and gender blindness within a specific cultural context and how this kind of training can benefit not just managers and future employees but also the whole organization including clients.

**Keywords:** Gender awareness, staff training, microfinance, stereotypes, Tajikistan

**Paper type:** Research paper

## Introduction

Among the 1.3 billion people who live in absolute poverty around the globe, 70% are women according to the United Nations (UN). Indeed, in most countries women have little control over money because gender bias is rooted in every society and it limits women as resources and women's opportunities for personal achievement. To fight against these obstacles, a glimmer of hope has emerged through microfinance for women, who represent 82% of the clients (Microcredit Summit 2012 report). Trusting the poor so that they can get out of poverty on their own, through micro-loans, was the crazy bet of Muhammad Yunus, a Bangladeshi economist nicknamed "the banker of the poor", who won the Nobel Peace Prize in 2006 thanks to this revolutionary concept. Indeed, microfinance is increasingly considered as a tool for women empowerment insofar as its objectives are to give them the opportunity to be financially independent, to increase their incomes and release their entrepreneurial spirit. However, microfinance service and client success stories could not be possible without the work of support staff which is a key success factor in women entrepreneurship achievement.

The goal of this paper is to investigate the role gender training in MFIs plays in developing gender awareness among staff. This paper is organized as follows: first the author will conduct a literature review on gender training in MFIs, followed by a discussion on the economic

and social factors of Tajikistan which can explain current challenges. Then, the gender awareness training methodology will be explained, as applied to the case of HUMO & Partners in Tajikistan. Lastly, research findings will be analyzed and recommendations made, based on identified opportunities and limitations.

## **Literature review**

### ***Gender training in microfinance***

Research carried out by the UNDP, UNIFEM and the World Bank, indicate that gender inequalities in developing societies inhibit economic growth and development. For example, a 2001 World Bank report confirms that societies that discriminate on the basis of gender, pay the cost of greater poverty, slower economic growth, weaker governance and a lower living standard for their people<sup>1</sup>.

Most of the documents dealing with microfinance gender training are centered on women client empowerment. Researchers such as Cheston and Kuhn (2002) deal with women empowerment from a client's perspective, pointing out that gender equality is a critical component of any development strategy. The researchers note that women clients are more cooperative than male clients and prefer to work with women staff, resulting in positive women's repayment records.

While the experience of male loan officers resulted in women empowerment and the treatment of women as equals with respect and dignity, some women clients stated that they could relate more easily to female loan officers, because they provide a role model of achievement (Cheston and Kuhn, 2002).

Guérin (1997) addresses the importance of sensitizing loan officers to constraints felt by Senegalese women but does not dedicate a complete study on this topic. The identification process in Senegal was investigated, whereby women clients projected themselves on the social and economic success represented by the instructor, responsible for overseeing loan groups.

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<sup>1</sup> World Bank, *Engendering Gender Equality in Rights, Resources, and Voice-Summary* (Washington, D.C.: World Bank, 2001) ; [www.worldbank.org/gender/prr/engendersummary.pdf](http://www.worldbank.org/gender/prr/engendersummary.pdf).

In a later study, Guérin (2009) discusses the results of studies in Indian MFIs which reveal that most MFIs do not have a gender policy. This author shows that, generally speaking, there is a clear absence of gender strategy in financial and non-financial services, evaluation criteria and staff training. Most MFIs simply target women assuming that gender inequalities questions will be automatically resolved (Guérin, 2009).

Concerning Guérin's contribution to women and MFIs, there is no literature on women in microfinance in the Tajikistan context. Indeed most of studies were mainly carried out in Asia or Africa. However even if there are little cultural similarities between Tajikistan and Africa or Asia, this paper can build up on the results of past studies insofar as they concern developing economies and the status of women. As there is less literature on Central Asia and particularly on Tajikistan, this paper aims to shed new light on the role gender training plays in building gender awareness among MFI staff.

As for Mayoux (1999), MFIs need real changes in wider gender inequalities in their daily operations (goals, operations, team and product design). Indeed, Mayoux develops capacity building materials for gender mainstreaming in value chain development including development of an innovative participatory Gender Action Learning System (GALS) methodology for developing win-win strategies with women and men at different levels of a chain. Real changes in service delivery have been illustrated in MFIs and programs thanks to a gender aware staff, where empowerment issues were raised as a routine part of interactions between staff and clients (Mayoux, 1999).

Cheston and Kuhn (2002), also briefly tackle not only the importance of women in leadership in the microfinance field to initiate and ensure the implementation of programs and activities, but also to encourage greater participation in national development and women as field officers. The two authors explain that having women as loan officers when most of the clients of microfinance are women can offer great women's staff perspectives, but also client's perspectives, illustrating their words through the Grameen Bank. On the other side, organisms such as WWB or Catalyst publish extensively about a strong correlation between gender diversity and superior financial performance across a variety of industries.

Nevertheless there is little documentation on the importance of building awareness among MFI support staff about gender, whereas women entrepreneurs' success depends mainly on how well they are supported by the MFI staff, the messages sent by the MFI staff and the messages received by the women clients. One interesting guide (Murray and Boros, 2002) dealing with a subpart on "Gender and MFI staffing", clearly states that women entrepreneurs success depends on the quality of the support provided by the MFI staff.

Thus, according to the existing literature, gender awareness is mostly promoted from the client's perspective, particularly for women so as to educate them on family peace building and self-confidence, however communication on gender equality and fighting against stereotypes are little developed for MFI staff. One explanation may be that field staff and managers are already sensitive to such issues, as demonstrated by their attraction to this work area, and it is assumed that their motivations to work in such a field predispose them from any specific awareness-building training. However for other MFIs such as HUMO & Partners which has 46% of women in their clients' portfolio, gender awareness training is essential so as to convince managers and staff of the benefits of integrating more women in their staff team and as clients.

Of course some women leadership and gender awareness manuals exist (Afkhami *et al.*, 2001, Ahmad *et al.*, 2002, Azarbaijani-Moghaddam, 2007) and were used in the framework of the author's work in Tajikistan but they are more operational in nature than academic.

### ***Tajikistan economic and social factors***

It is important to take into account documents directly dealing with Tajikistan, so as to better understand the local context, following the war (Falkingam, 2000), especially gender identities in the Tajik culture through the example of gender-based violence (Harris, 2012) and state statistics (Muhammadieva *et al.*, 2007) to support the author's analysis.

**Table 1** Number of men and women in the labor force in 2004, according to economic sector

	Thousand people		Ratio, in %	
	Men	Women	Men	Women
Employed in the economy - total	1441.7	1010.8	58.8	41.2
Agriculture, hunting and forestry	602.3	758.7	44.3	55.7
Mining	10.2	1.4	87.6	12.4
Processing industry	80.1	34.4	70.0	30.0
Hydropower production, gas and water	15.9	1.4	92.1	7.9
Construction	285.0	11.0	96.3	3.7
Wholesale trade of motor vehicles and commodities	153.8	48.3	76.1	23.9
Hotels and restaurants	12.2	11.6	51.1	48.9
Transport and communication	59.7	4.8	92.6	7.4
Financial activity	14.7	4.2	77.6	22.4
Operations with fixed property, renting and provision of services	14.4	2.1	87.1	12.9
Public administration and security	59.2	11.5	83.8	16.2
Healthcare and provision of social services	21.1	41.6	33.7	66.3
Education	59.0	63.8	48.0	52.0
Provision of other communal social services	46.8	10.4	81.9	18.1
Provision of housework services	2.4	1.0	70.7	29.3
Gathering	4.9	4.6	51.6	48.4

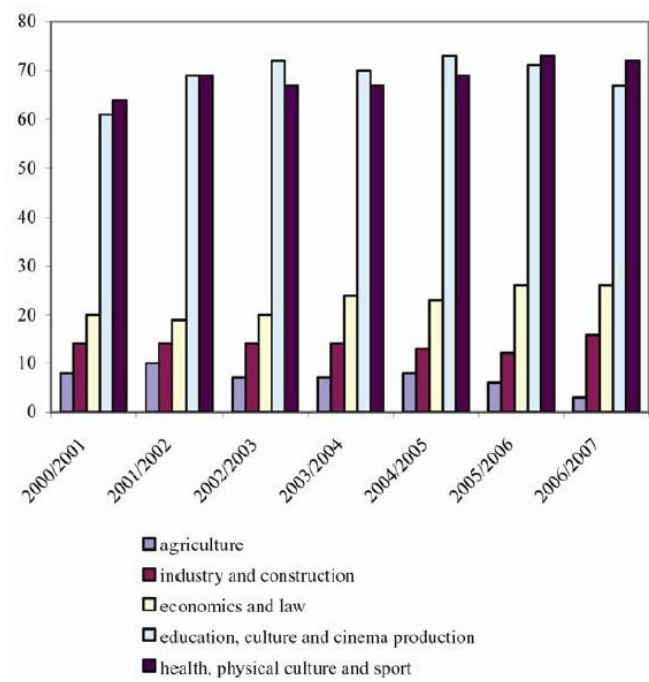
Source: Muhammadieva *et al.*, (2007), State Statistics Committee of the Republic of Tajikistan

As we can see in Table 1, Tajik women are mostly found in low paid occupations while Tajik men are in higher paid occupations. Women represent 66.3% of the total number of people employed in healthcare, 52% in education and 55.7% in agriculture. Male employment is mainly in the production, transport and communication industries and counts for over 90% in public management, 77.6% in the financial sphere. At HUMO 22% of branch directors are women and 17% of senior management positions are held by women, indicating that women are underrepresented in middle and senior management positions. Cheston and Kuhn (2002) observe that in most countries, men predominate positions on boards of directors of MFIs, in senior management, in program design and sometimes as loan officers.

Falkingham (2000) notes the low representation of women in senior economic positions in Tajikistan, as the result of discrimination, both direct and indirect, combined with traditional views about the appropriate roles for men and women in society. However, it is not just the "establishment" that works against women. The views of women themselves may also act as a barrier to their own advancement.

Falkingham (2000) also studies the lack of woman in high positions in Tajikistan observing a strong gender-based occupational segregation. Indeed, Falkingham explains that women are concentrated in low paid sectors such as agriculture, education and health, because of less access to technical and vocational education. Over four times as many males and females are studying economics, and just one in five studying subjects related to industry are female. Men are over-represented among the higher skill occupations, while women are over-represented among the lower skill occupations.

**Figure 1 Proportion of women in secondary professional education institutes by sector specialization (at the beginning of the academic year, in %)**



Source: Muhammadijeva *et al.*, (2007), State Statistics Committee of the Republic of Tajikistan

In 2006/2007, women counted for 57% of the total number of students in institutes of secondary professional education. The highest proportions are in the fields of healthcare and sports (72%) and education (67%). The proportions studying agriculture (3%) and industry and construction (16%) are very low but women studying economics (27%) is increasing, indicating that women are gaining interest in this field and that there is a growing pool of women talent to be tapped for the microfinance field.



**Table 2 Working women's desire to work in a higher position in Tajikistan**

	Total	Urban	Rural
Desired to work in a higher position	21	26	13
Did not desire to work in a higher position	53	54	52
Don't know	26	20	34
Of those that did not desire to work in a higher position, reasons why:			
Too great a responsibility	19	20	18
Insufficient experience for such a position	22	21	23
Uncertainty in self	12	10	15
Health condition	9	11	4
Salary too low	13	15	10
Family circumstances	14	12	16
Satisfied with present position	27	26	30

Source: SSA, *Gender Statistics in the Republic of Tajikistan 1999*.

Table 2 presents findings from the 1999 State Statistical Agency (SSA) and Women In Development (WID) survey of women's socioeconomic position in Tajikistan. Of the working women interviewed, 21% desired to work in a higher position but the majority (53%) did not want a higher position. Of the working women who did not express a desire for promotion, over a quarter (27%) reported that they were satisfied with their present jobs, while nearly a quarter (22%) felt that they did not have sufficient experience and 19% that it represented too many responsibilities. Thus, a major barrier to women's advancement in the work place is women's insecurity about their own ability to do the job. With few women in positions of leadership, it is not surprising that many women feel senior jobs are beyond their reach and capability.

**Table 3 Opinion of Tajik women on whether women have equal rights equal with men**

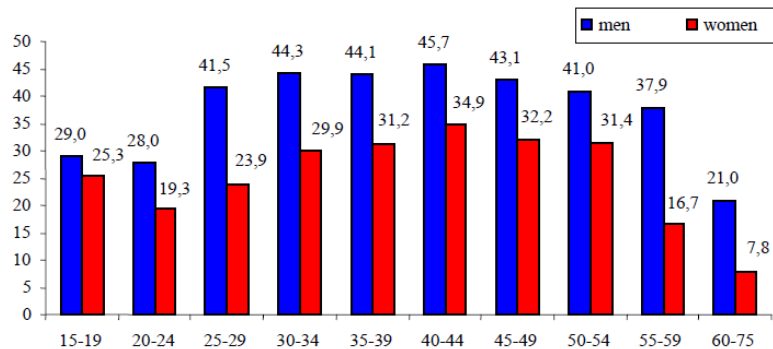
	Total	Urban	Rural
Have equal rights	29	26	33
Have only some equality of rights	27	31	21
Unequal rights	24	21	27
Don't know	21	22	19
Total	100	100	100

Source: SSA, *Gender Statistics in the Republic of Tajikistan 1999*.

The same survey also collected data on women's opinion as to whether they felt that women have equal rights with men (Table 3).

Less than a third (29%) of women felt that women have equal rights with men, a similar proportion (27%) felt that they had equality of some rights and a quarter (24%) felt that there was no equality between the sexes.

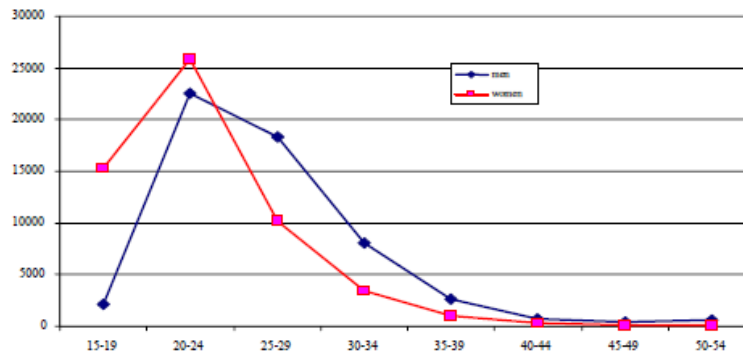
**Figure 2 Employment by gender and age group in 2004 in Tajikistan**  
(in percentage of the corresponding age group)



Source: Muhammadieva *et al.*, (2007), State Statistics Committee of the Republic of Tajikistan

Furthermore, the level of employment among men of all groups is higher than that of women. The widest gap in the level of employment among men and women is in the 25-39 age group. Women most often quit work at that age due to childbirth (Figure 3 and Table 4). During the ages of 40 and 44 the level of employment of men and women is much closer because women of this age are returning to work after having raised their children.

**Figure 3 Number of first marriages in Tajikistan in 2006**



Source: Muhammadieva *et al.*, (2007), State Statistics Committee of the Republic of Tajikistan

In Figure 3 we can observe that the peak point for marriages occurs between the ages of 20 and 29 for both men and women counting for 60-70% of the total number of marriages.

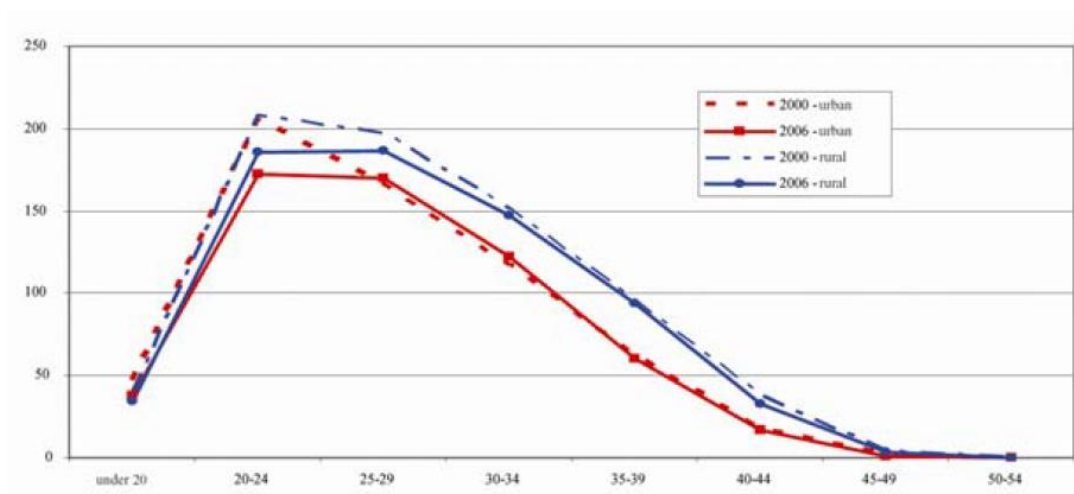
**Table 4** Desired number of children and age of woman

	1	2	3	4	5	6 and more	Total
Urban settlements							
17-24	4	46	11	26	12	2	100 (57)
25-29	2	15	15	29	11	29	100 (66)
30-39	4	19	24	29	15	9	100 (96)
40-49	5	21	21	28	12	13	100 (92)
50-54	2	16	29	18	20	16	100 (101)
Rural settlements							
17-24	-	15	15	35	11	25	100 (55)
25-29	1	4	13	38	18	25	100 (99)
30-39	-	6	13	25	30	27	100 (101)
40-49	-	3	5	29	15	50	100 (102)
50-54	-	-	12	27	22	39	100 (95)

Source: SSA, *Gender Statistics in the Republic of Tajikistan 1999*.

Concerning the desired number of children and age of woman trend in Tajikistan (Table 4), younger women and urban women want smaller families than rural women. Furthermore, younger women and urban women want smaller families than their mothers' and grandmothers'. Such findings may impact HUMO & Partners because women have family aspirations and may aspire to different career paths. Gender awareness training can even reveal a real potential among women employees who may dare to seize more professional opportunities in the future.

**Figure 4** Age of giving birth ratio in urban and rural areas in 2000 and 2006 (per 1,000 women)



Source: Muhammadieva *et al.*, (2007), State Statistics Committee of the Republic of Tajikistan

In Figure 4, we see that the main period for Tajik women to give birth is from 20 to 29 years of age.

The average age of delivery of the first child is 22. Figure 3, Table 4 and Figure 4 are key to understanding the analysis to follow as they situate the field study in the Tajikistan context allowing to take into account gender barriers of managers. Indeed, Tajik women are likely to share common characteristics (ex: age of marriage, age of the first child, etc), which can better explain the current situation of women's limited professional ambition.

This literature review indicates that research on gender training in MFIs, until now, has primarily addressed women clients' sensitivity. Moreover, we can note that thanks to data from Tajikistan, culture is a factor which explains the low number of women in management positions and internal challenges to retain young women. From now, the author will present the methodology of the training following the recommendations from the 2012 WWB report and the expectations from managers. This methodology could be adapted to these challenges.

## **Methodology**

Upon the request of the CEO of HUMO & Partners, the 2012 Women World Banking Organizational Gender Assessment was adopted by the author. The mission was "To conduct gender sensitization training to enable staff to develop a conceptual understanding of gender roles and identities, examine the impact of gender stereotypes on practices within HUMO & Partners, reflect on their own attitudes and practices with a gender lens and identify opportunities and limitations for promoting gender diversity among HUMO staff and clients." The author decided to divide the training for staff in 3 sessions: 1) Introduction to the workshop 2) Why gender matters? 3) HUMO & Partners values and gender sensitivity. The author was the facilitator in charge of running and organizing the workshops, listening and stimulating debates, taking notes and taking into account the participants' expectations.

The methodology used was group workshops and discussion in order to create an interactive and participatory atmosphere, to deeply question the dozen managers and encourage them to reflect on the topic. It is important to note that this operating mode starkly contrasts to previous management training at HUMO, where managers listen to a speaker and are not invited to engage in an interactive and participative exercise.

The first session, “Introduction to the workshop” addresses the importance of building managers’ gender awareness during their daily work. For this session, the author chose the “Hopes & Fears” exercise of Azarbaijani-Moghaddam (2007). The idea was to encourage the sharing of expectations and apprehensions about this workshop, using two cards and asking each participant to write down one hope and one fear. This tool was used at the beginning of the training to better understand managers’ expectations, by way of brainstorming and clustering similar hopes and fears.

The second session: “Why gender matters?” examines the gender concept and incites participants to assess and qualify gender stereotypes, discrimination and prejudices. To introduce this second part, the author adapted the exercise “My organization is a male/female organization” (Williams *et al.*, 1994) to the context of HUMO & Partners. The goal was to allow participants to express their points of view and to be exposed to opposing points of view. The exercise also helped emphasize that the organization shares both masculine and feminine values.

The methodology consisted of dividing the group into two teams. One team has to hold the view that 'My organization is a male organization' and the other 'My organization is a female organization'. Two chairs were placed in the center of the room facing each other so as to create conditions for a real debate. Each team chose one representative to start the debate.

Following this exercise, it was necessary to introduce the notions of stereotypes, prejudices and discrimination, so as to approach the terms of gender and sex at the end, with their own examples. Here, the author used brainstorming methodology, where each notion is written on the flip chart and everyone has to give examples or definitions. Next, three questions were asked to the audience: Who can have stereotypes (expected answer: everybody)?; Who can be prejudiced (expected answer: everybody)?; What do you need to be able to discriminate (expected answer: power)?; How do people get power in society (expected answer: money, authority, gender, size, education, etc.)? Then, the idea is to collect all the answers, to see if there are divergences or convergences and to define each term properly at the end so as for the audience to think about it.

Other exercises used in this second part is the “Characteristics or Attributes” and the “I can I could” (Ahmad *et al.*, 2002). The first exercise is a brainstorming where every participant is invited to describe women, men, and child in words or symbols and the second one is about answering to male participants: I am a man, I can and if I were a woman, I could, and to female participants, I am a woman I can and if I were a man I could.

After these last exercises for the second session, it is crucial to take back the brainstormed ideas (ex: Men do not cry, women are too weak to play football etc.) from the previous exercises (notions of stereotypes, prejudices and discrimination, Characteristics or Attributes and I can I could) and to confront them with the notions of gender and sex. At this point, distinction between sex and gender has to be explained so as to make the audience fully aware of their daily misinterpretations, notably re-using their previous answers, as well as giving contrary examples.

Indeed, here is the core of the training because the audience must realize that associating certain characteristics or roles with men and women, as natural, determined by the biological differences are wrong assumptions. Thereby, the author must insist on the fact that gender roles and attributes are created by societies. They are not biological and they vary from society to society, from time to time, from place to place, and from age to age (UNDP). At this stage, participants are asked to put an S for sex and a G for gender to all the answers that were given and brainstormed together so as to be sure that every participant well understood the difference between these two concepts.

Last but not least, the third session has to be delivered some days after the two sessions so as for managers to reflect on these notions and to prepare their strategies for HUMO & Partners. Here the objective is to identify which means can be used to mitigate the impact of stereotypes and optimize HUMO’s gender equality policies, using the same process of dialogue and debate. The methodology of this session is to capitalize on the list of common stereotypes in HUMO & Partners from HUMO and Partners Final Report – Organizational Gender Assessment September 2012 by WWB. All participants are invited to review each stereotype and to think together how to tackle them. For each stereotype, the author uses the same methodology, that is to say, confronting the stereotype to managers, presenting context and information, listening to solutions and setting in situation managers to contradict or corroborate their words.

Indeed, one of the workshops used in this session was “labelling on the workplace” (Azarbaijani-Moghaddam, 2007). Participants reflect on “labelling” and the effect of labelling on an individual’s self-esteem and effectiveness. Here the whole managers sit around a table, as if they were holding a meeting. The author places the name tents in front of them, they should not look at their own name tents, but should look at the name tents of all other volunteers.

Then, a scenario is presented: at HUMO & Partners there is a growing concern within the organization concerning the lack of promotion of women. They have to discuss on how to improve this situation. Volunteers should behave towards each other as directed by the name tents, but should not read aloud what is written on anybody’s name tent. Once more, the goal is to get feedback from managers about how they feel when labelled based upon false assumptions and how it can affect an individual’s ability to perform his or her work effectively.

At the end of the exercise, the team is asked to advance solutions to following stereotypes mentioned in the WWB 2012 report. Before finishing on the gender-equitable plan (Azarbaijani-Moghaddam, 2007), the author questions the audience about the ideal manager, what are three essential qualities to be a good manager? (Chevalier *et al.*, 2012). To conclude, three commitments to improve current gender awareness situation is asked to each participant and a round of reflection is done to get fresh key learning from the whole workshop.

Once the methodology was validated by the CEO, the author presented it to managers, animated the debate and collected the answers with the aim of analyzing the results and feedback from the managers and the CEO.

## **Training Results**

The main goal of the author was first to test the training methodology on managers and to improve it after the presentation and feedback, so as in the second time to deliver it to the whole agencies in order to impact the largest audience.

## ***Data collection***

The gender awareness training was conducted with a group consisting of 7 male managers (64% of the participants), and 4 female managers including the CEO, the marketing assistant, the secretary and the Kiva's fellow<sup>2</sup> (36% of participants).

The introduction of this new module, gender awareness training, surprised most of the managers, who never really thought about the notion of gender and stereotypes within HUMO & Partners. Managers' hopes from this session were mainly to maintain or even improve the relationships among staff, implement a collaborative responsibility towards HUMO's gender policy, reflect together on better ways to integrate women at work and make them evolve on different and higher positions. Managers also kept in mind social goals from the social performance standards concerning women empowerment (staff and clients sides) and were willing to be enrolled in an effective gender policy.

### **Box 1 The CEO's comments, hopes and fears**

“Our social goals are to keep women clients. For this we would like to increase the number of our women loan officers so as to increase our women clients. The fact to have more male managers is a specificity of Tajikistan (cf Table 1), however the most successful MFIs in Tajikistan are governed by women (IMON, ARVAND, HUMO) and IMON was created by women. Moreover, it seems that female HR managers have more empathy. But, currently we focus on women employees that are more than 35 year-old because they stay longer and it will be more effective and productive for the organization.”

As far as fears are concerned, managers indicated their suspicion concerning the impact on job quality, because including more women can mean closer relationships among staff and temptations to create couples within the organization. Moreover, an interesting point was to mention their apprehensions not to find mobile women, who “prefer taking care of their husbands and children rather than travelling among agencies and staying after working hours”. Also maternity leave is a real gender issue within the organization. Indeed, the WWB 2012 report, already related failures concerning past solutions (ex: part time jobs). Another observation from male managers was that “women are more emotional and leave easily when conflicts arise”.

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<sup>2</sup> Non-profit organization with a mission to connect people through lending to alleviate poverty. Leveraging the internet and a worldwide network of microfinance institutions, Kiva lets individuals lend as little as \$25 to help create opportunity around the world (<http://www.kiva.org/>).



Then, came the first exercise “HUMO is a male/female organization”, Table 5 presents the results of this exercise:

**Table 5 HUMO is a male/female organization**

<b>HUMO is a female organization</b>	<b>HUMO is a male organization</b>
<i>HUMO &amp; Partners origin (CARE International) was to create an MFI to empower women.</i>	<i>The majority of our clients are male (54%)</i>
<i>HUMO takes care of its clients as a mother does with her children</i>	<i>The majority of HUMO staff is male</i>
<i>Best MFIs are mostly led by women in Tajikistan and most effective HUMO branches are led by women; they are more convenient with a better atmosphere</i>	<i>Loan officers have a better physical capacity to travel to agencies; They are not limited by family obligations.</i>
<i>If HUMO had more women staff, it could have partnerships and awards from auditors and NGOs</i>	<i>When men get sick, they do not take holidays or maternity leave so it is a gain for the organization</i>
<i>Women clients are spending money intelligently (ex: for home or children. They are more accountable for money</i>	

At this point, there are more female criteria than male, and it was interesting to see that the female’s team was much more persuasive than the male’s one. The female arguments are less aggressive and it shows a real potential within HUMO to develop it so as in the future to establish a gender-equitable organization and to be similar to CARE’s time when 100% of their clients were women.

Afterwards, managers had to brainstorm on the notions of stereotypes, prejudices and discrimination and to give precise examples within HUMO. The given definitions by the author were that stereotypes reflect ideas about people, a set of beliefs on a group’s characteristics and attributes. It is natural, positive or negative, not necessarily false and may be held by an individual and/or group (Chevalier *et al.*, 2012). Prejudices refer to negative feelings and attitudes, while discrimination is negative behavior towards a group or its members (The McGraw-Hill Companies, Inc, 2012)

Then, real anecdotes were given by managers and were quite relevant of the actual climate within HUMO & Partners. For discrimination, they were a clear policy against women in some agencies.

Indeed, some directors of agencies were establishing a clear gender stereotype policy, refusing to hire women applicants, sometimes especially young women, even with the right profile on the pretext that they would not be able to do the job or would quit for their maternity leave. One manager also related another issue when women are applying for a job only to have benefits (payments) during maternity leaves.

Another women's discrimination exists concerning young women, who are more likely to get married soon and may not be hired now because they may prefer to stay at home to take care of the family. In Tajikistan, husbands can ask their wife to sacrifice their job for their family, sometimes women cannot make decisions on their own. That is why, some agencies, prefer hiring women from 30 year old, who seem more focused on their job and stay longer within the organization. As a result, men have more professional opportunities than women, but in the same time, there were some stereotypes concerning men managers who seem to be less efficient than women in terms of workplace relationships.

Next, managers had to illustrate the notions of stereotypes through two exercises: 'Characteristic or attributes' (Table 6) and 'I can I could' (Table 7).

**Table 6 Characteristics or Attributes exercise**

<b>Women</b>	<b>Men</b>	<b>Boy</b>	<b>Girl</b>
Tears/Weak/Fragile (Gender)	Power (Gender)	Game (Gender)	Dolls (Gender)
Beauty (Gender)	Brain (Gender)	Sports (Gender)	Studying good (Gender)
Cooking (Gender)	Sports (Gender)	Daredevil (Gender)	Clothes/Braids (Gender)
Kindness (Gender)	Defender/support (Gender)	Fighter (Gender)	Baby sitter/Love more parents (Gender)
Emotions (Gender)	Logic/Rational (Gender)	Cigarette/Wine/Kiss (Gender)	Help mother/Chatting on phone (Gender)
Cleanness (Gender)	Hunter (Gender)		More curious (Gender)
Mother (Sexe)	Breadwinner (Gender)		Flexible (Gender)
Gossips (Gender)	Team worker (Gender)		
Love/Joy (Gender)	Modesty (Gender)		

Table 6 clearly shows the stereotypes tendency from managers, remembering that they are only men around the table for the first session, except the CEO. Indeed, most of the characteristics and attributes to women/girls are linked with sweetness (Love, beauty, joy, braids, dolls, kindness, emotions, etc.), housewife and motherhood aspects (cleanness, cooking, mother,

love more parents, etc.) and negative judgments such as women like “gossips” and “they are weaker than men”. However when the author mentioned the name of a 20 year-old Tajikistani female boxer who won a bronze medal at the 2012 Summer Olympics becoming the first woman to win an Olympic medal for Tajikistan, such a figure contrasted so starkly with the “tear, weak and fragile” image of a woman, that the participants reflected on their words. At this point, managers admitted the existence of “exceptions”. Another example to contradict managers’ perceptions of women, was when the author took the example of the CEO who was a woman and did not share the previously listed characteristics, the participants explained that she behaved like men. For these male managers, because she had a high ranking position of responsibility, she adopted masculine attitudes to adapt to her colleagues.

On the other side, we can note that men/boys are linked with the notions of strength and competition (power, fighter, daredevil, sports, defender/support, hunter etc.), intelligence (brain, logic, more rational) and a notion of superiority (breadwinner and team worker), along with an interesting term: “modesty”.

What is significant in the results of this exercise is that all the characteristics and attributes mentioned were clearly gender-oriented. At this stage, the participants began to become aware of their own gender-based stereotypes.

**Table 7 I am, I can, if I were, I could exercise (only male participants)**

<b>I am a man, I can...</b>	<b>If I were a woman, I could...</b>
Come home late	Take a maternity leave
Make decisions on my own	Engage in gossiping and chatting
Do man jobs	Clean clothes, iron, cook food
Work late at HUMO, during holidays and weekends	Relax and do nothing
Choose the education I want	Apply for job with specific privileges
Have another woman	Have another man, find a rich man and spend all his money
Drive a car, drink as much as I want	

Table 7 also illustrated a clear perception of “superiority” from male views, with more freedom (come home late, make decisions, drink, drive a car, choose own education, have another woman) and virility (do man jobs and work late) while women are clearly ranked in housewife roles (maternity leave, cook food, clean clothes) or even seen as more lazy (to relax and to find a rich man).

At this point, it was really interesting to listen to managers and note the gender bias within HUMO insofar as hiring women seem only to bring troubles. However when implementing the short brainstorming to define the difference between gender and sex, managers realized that most of them were not gender-aware and were making misinterpretations and wrong assumptions concerning women employees because of a lack of information and training on the topic. Thus, at the end of the two first sessions, it was crucial to remind managers about the future perspectives of HUMO and to begin to think about a gender awareness action plan with the third session.

The objective of the last session “HUMO & Partners values and gender sensitivity” was to review together the stereotypes listed in the WWB 2012 report and to find solutions to tackle them. For each stereotype an argument is brought and will have to be confronted with the participants so as to maximize the impact of this training and overcome reluctances concerning women employment.

To start with, “*women are not interested in working at HUMO & Partners*”, one of the observations to tackle this stereotype is to announce that in general, in other MFIs, women are really present in the employees’ number and that this stereotype is unfounded. Indeed, the two main competitors of HUMO: IMON and ARVAND, have respectively 40% women employees and 24% women managers for IMON, 31% women employees and 50% women managers for ARVAND. Moreover the top 3 MFIs in Tajikistan have female CEO and the biggest HUMO’s branches (Yavan, Tursunzoda & Kurgan Tyube) are managed by women managers.

Second, “*women do not like working with money*”, however both men and women desire financial security and our emotions make us uncomfortable when we do not have it. So this stereotype is unfounded too because everyone needs money. Women especially need to know that they will have access to sufficient resources for themselves and their children to thrive.

Third, “*women get married and leave*”. This stereotype is very difficult to tackle insofar as in the Tajik society, women have to take care of their family to the detriment of their work. Indeed, women attach special importance to their role of mother and tend to develop a guilt complex when faced with the difficulty of reconciling their professional life with their family life (cf Table 2). HUMO & Partners did experiment with a part-time cadre of community women as marketing agents for loans, but this experiment was not successful: women agents started

collecting money from clients and engaged in fraud (WWB 2012 report). At this stage it was asked to participants, what can be done to improve the situation? To illustrate the scope of the question, the author asked directly to managers: Who is married? For those who are married, who have a wife who is working? No surprise when 6 male managers out of 7 rise their hands for the first question, and 2 out of 7 for the second question. Knowing that among the 2 managers whose wives are working, 1 of them works at home.

At this point it was interesting to debate with them about the fact that leaving home to go to work is a second socialization place and allows women to have a position in the society. In the Tajik culture, women stay at home to take care of the family and men are breadwinners. Moreover, women do not need to work because one salary is enough and education is more often invested in sons than in daughters.

Furthermore, security is worse and worse every year since the end of Soviet time. For instance, in the Khodjand branch, the current manager is looking only for men because women are not able to manage as for him. This can be an issue in years to come, as decreasing women staff could mean decreasing women clients. An additional challenge relates to security concerns travels to remote villages. Each branch has a radius of nearly 30 km and women feel insecure going to and coming back alone from remote villages. In some villages, men belonging to the village can act aggressively towards women when it is clear that they are traveling alone. Some managers at HUMO have responded to this issue by providing women with their own vehicles whenever possible but sensitivity to this issue is variable (WWB 2012 report).

Fourth, “*women do not want promotions*”, this is a widespread perception to think that women do not want promotions because they do not want more responsibility and longer hours. Some HUMO women employees confirm, others say this is not true. So once again, this stereotype is unfounded; it became a generality whereas it depends from one person to another, and from the personality of the person. The main cause identified at that time was the lack of clarity on how to access professional development opportunities. However, women refusing promotions seem to be a trend in Tajikistan (Cf Table 2 and Box 1).

At this stage, the author found it interesting to explore the notion of glass ceiling, an invisible but real barrier which prevents some employees to reach a level of advancement in their career due to implicit prejudice (age, sex, ethnicity, etc.) (Scharnitzky, 2012). This concept was unknown for the audience but well established within the organization. To explain the glass ceiling effect within HUMO & Partners, male managers declared that women face difficulty to adapt (too far from their family) and manage different things at a time (afraid of responsibilities because of family obligations binding on them). Managers also mentioned the fact that sometimes women need to get permission from their husband. All these factors (family obligations, hierarchical superiors who favor men, self-censorship, etc.) prejudice indirectly women to reach higher positions and are typical to illustrate glass ceiling practices.

The glass ceiling effect definition allowed managers to understand reasons of the lack of women representation within HUMO & Partners. To break these barriers, managers thought about taking elder women, more mature, with experience and to take time to discuss with the family of 18-28 women so as to be sure that they will continue to work at HUMO. Thanks to this debate, a new idea emerged: To organize a wife/husband day during a special event, like new year, so as to get together many people at the same time, where husbands and wives are invited to come to HUMO & Partners and be informed of the benefits of a new position, career opportunities to maximize the chances not to have conflicts of interest among the couple.

Before finishing the stereotypes review, an interesting exercise was proposed to managers: “labelling at the workplace”. On the tents was written “Male”, “Pretty face: humor me”, “Boss: obey me”, “Stupid female: put me in my place”, “Male expert: seek my advice”, “Insignificant male: ignore me”, “Comedian: laugh at me”, Blank name tag, “Incompetent female: do not let me do anything” and one new “President’s son”. The purpose was to make participants reflect on “labelling” and the effect of labelling on an individual’s self-esteem and effectiveness. What was quite interesting was the fact that the current secretary played the role of “Boss: obey me” and during the game was able to express her feelings to be better considered during the game. On the other side, the operations manager, who was well respected by his peers had the “Stupid female: put me in my place” name tent, which created real frustration for him not to be taken into account during the debate.

Last stereotype from the WWB 2012 report: “*HUMO staff must have higher education, preferably economics*”. However, the share of female students in universities for 2008/2009 is 29% (UNIFEM, 2007), so there is not so many women enrolled in these studies and the financial sphere is mainly occupied by men (cf Table 1). There is a real issue linked with a societal fact but women studying economics are increasing (cf Figure 1), so HUMO could reflect on specific training to develop programs to attract women and offer them the possibility to be trained on microfinance.

To conclude with this stereotype, the author asked participants: What can be done to attract more higher education employees to HUMO? The idea was to develop more marketing tools to attract women staff, to reflect on ratios to analyze retention rates and to train the most HUMO’s current charismatic female employees to inform students at universities.

Before drawing conclusions from this gender awareness training, a brainstorming on the ideal managers’ qualities was proposed so as to demonstrate to participants the fact that the ideal manager must combine skills associated with men and women, proving that, as Scharnitzky (2012) points out, both masculine and feminine competencies are necessary and that employees should be treated equally. Participants to the gender awareness training gave 5 qualities for the ideal manager: Responsibility (androgynous skills), Professionalism (androgynous skills), Management skills (associated with men), Leadership (associated with men) and Ambition (androgynous skills) which prove to the audience that their own answers were reflecting a reality: there is no a so-called perfect profile to be a good manager, it combines various skills that can be found in women and men. But it also caused a real awareness among participants and a deep wish to make things change within the organization, to benefit the whole Tajik society.

### ***Feedback from the staff***

At the end of the gender awareness training, it was asked to participants to give their first impression and fresh key learnings. One of the impacts of this module on the participants was to realize the scope of the work to be done concerning the dominant masculine position within HUMO & Partners and in general in Tajikistan.

Another feedback from HUMO & Partners managers was their wish to be involved to fight against glass ceiling. Indeed, managers discovered the name of the concept of what was happening within their organization which was generating self-censorship in women, supporting by negative stereotypes on women's ability to reach higher positions from male managers and it puts into light unconscious discrimination, as seen in examples gave during the training. It also induced two other phenomena: "Sticky Floor and Gender Blindness" (Shambaugh, 2007). Sticky Floor refers to a self-imposed position in the everyday reality which let the employee in the same position because of his/her lack of confidence (ex: I cannot do it, mother role, etc.). It particularly concerns women, who are stuck in the middle management position at work. Gender Blindness is a concept to explain than men live the situation of women discrimination to reach specific position but do not want to accept it or pretend not to see it. The two concepts, even if they were not presented with these terms, were expressed by managers. They also really appreciated knowing the difference between sex and gender, which was never tackled before.

Thus, this gender awareness training spotlights internal gender bias and succeeded in provoking a reflection on gender issues within HUMO & Partners and in the way participants act in their daily life. At this stage, gender policy monitoring on the long run is crucial to achieve a clear strategy to obtain global well trained staff among HUMO & Partners, who will be more prone to hire women staff and to be sensitized to women clients' daily conditions. Starting from the very basis of what is a stereotype, discrimination, gender and sex and to confront these concepts to HUMO's daily operations and employees' assumptions was a first step to make HUMO's workforce aware of all opportunities available for them to attain a sustainable gender policy in the future.

The 6-month feedback collected from the CEO and from the managers is quite positive. First of all, anti-discrimination and sexual harassment policy has been well established and there is a real wish from the CEO to implement a step by step gender policy. Thereby, an action plan has already been initiated following the Planet Rating's recommendations for 2014. Next, the marketing assistant was designated as the gender liaison officer and already conducted the gender awareness training to the whole team in all branches; the reception was pretty good even if, as mentioned in a manager feedback, "Roma was not founded in a day".



Indeed, the evolution of mentalities concerning gender stereotypes has a long way to go before reaching internal gender policy actions, especially concerning maternity leave and weddings' facilities. However, the CEO believes in the future and appreciated the fact that a first step passed and that the message to greet female staff and encourage women to join HUMO was communicated to all staff.

The CEO is convinced that “women can be good managers” but extremely limited in their work by personal family obligations (eg. no agreement from family for taking high position, public opinion, women' fear of responsibility etc.). To the question “As CEO of HUMO & Partners, what challenges did you meet to get to this position? (Obstacles and Levers)”, the author noted the cultural and tradition burden that weigh on Tajik women: *“A lot of challenges, particularly learning a lot of new things, to pay more attention to the job rather than family. But maybe my case is an exception because I am alone.”* So clearly, answers from the CEO illustrate sacrifices that have to do women to reach high position. The CEO also declared that *“to be woman in Tajikistan means different things: for modern women, a lot of learnings, and responsibilities. However, public opinion is not greeting women who are working, and appreciate more women who are not working and following a husband”*.

Concerning managers' feedback, two questions were asked: 6 months after your first gender awareness training, what feedback/changes did you observe from other managers (or field staff)? And what did you personally learn from this training? All male managers who took part in the training gave feedback. The first results from the HR manager show the same gender balance within the organization (30%), which is normal due to the short period of time since the training. It would be more relevant to measure both qualitative and quantitative impact, some years after the training and after new implemented gender policies.

A global feedback from managers is that they learned about the potential that represent women staff as competitive advantage, they are ready to make efforts towards gender issues but they know that it will be extremely complicated to remove preconceptions and stereotypes concerning their competencies and the fear from branches' managers as far as maternity leave is concerned.

One of the managers, gave a real glimmer of hope concerning the future of HUMO on gender issues *“The more we talk about a problem, the more people pay attention to. We need to keep discussing it to overcome the whole range of gender issues and the notion of sex equality. I believe gender awareness in HUMO gradually increases”*. It was particularly interesting for the author to read this precious feedback as it was the only one to perceive *“that women do not have the same equal rights and opportunities than men because of Tajik established traditions. So we need to provide equal opportunities for both men and women. It does not mean at all that we should increase the number of female clients and employees at all costs. I claim for equal rights, equal opportunities”*. Of course, the aim of the gender awareness training is not to reach parity but to provide a beneficial environment in terms of equality. Another interesting point was that one manager already knew the notion of gender balance when he cooperated with a nongovernmental organization that provided training on gender in 1999 (CARE) but seems powerless to the current situation.

### **Collateral benefits: opportunities**

Addressing gender issues within HUMO & Partners through gender awareness training brought two main collateral benefits, seen as future opportunities to be seized by HUMO.

#### ***Become the employer of choice for women***

There is a real potential to increase HUMO’s women staff by capitalizing on past experiences and the new marketing team to focus on young women, who represent the most disadvantaged in term of unemployment (cf Figure 2). HUMO can make the difference by targeting this segment of the population, being creative in their advertisements and communicating a lot with families so as to offer adapted opportunities and be the first women employer among MFIs in Tajikistan. For example, a talented female employee or a female manager who had access to a senior position can share her testimony in universities, or even in conferences to raise awareness. It can also be possible to ask a female employee who works on a traditionally male job, or the contrary, to prove that professional abilities do not have sex and they depend on the environment in which the person evolves.

Concerning HUMO & Partners fair wage policy, it can also try to reduce the wage gap. In December 2006, the average monthly salary of women was 116.2 Somoni (17.8 €), an increase of 8.6 times since 2000 while the average monthly salary of men was 208.9 Somoni (32.06 €), an increase of 6.7 times in the same time period. The smallest gap in the salary among men and women is in the capital of the country, Dushanbe (Muhammadiyeva *et al.*, 2007). By working on this issue, HUMO can demonstrate its commitment in equal pay policy and initiate a real change in the Tajik society.

### ***Implement innovative concept to address maternity leave***

HUMO can implement innovative structures to attract women staff before, during and after their maternity leave. The author suggested the idea of a workplace nursery, a concept which does not exist in Tajikistan. Indeed, it could implement a pilot project to facilitate employees' re-entry into professional life after their parental leave. It would concern only HUMO's employees, mainly women, who will have the possibility to benefit from child care service during a determined period of time. This is an excellent way to retain employees on the long term, to attract women staff and to improve wholesome balance between private and professional life.

Before carrying out such as project HUMO should survey their employees' interest in this project, and it could later organize meeting information to give valuable advice and tips to enable them to ease their way back into work again once the time comes for them to return. Unfortunately, this kind of project is very costly and a real market research must be conducted to know the feasibility. Otherwise, a simple way to reduce the maternity leave effects on the organization is to implement "babies and bosses" training to sensitize employees and employers about reconciling family and work. It would be on the same format as the husband/wife day mentioned earlier to communicate on women promotion opportunities, knowing that HUMO has to improve its communication tools so as to become the employer of choice of women on the long term.

## **Limitations of gender awareness training**

As far as limitations of this gender awareness training conducted within HUMO & Partners are concerned, three main limitations had been analyzed by the author, which can distort the results and the future success of HUMO's gender policy.

### ***Language barrier***

The biggest limitation in this work was the language barrier between the author and participants which prevented the author from analyzing the original form of the answers, which were translated from Tajik, to Russian to English. This is a real challenge when trying to analyze the gender bias within the organization knowing that it was the CEO who was the interpret.

Thus, the results may be altered by the translation because it was native speakers and not professional translators to help communicate with respondents. Indeed only 2 managers out of 7 do speak English. For researchers, such as Birbili (2000) "collecting data in one language and presenting the findings in another involves researchers taking translation-related decisions that have a direct impact on the validity of the research and its report". Indeed, this was a real limitation in the author's work because the quality of translation was distorted by the lack of competence in the Tajik or Russian language, knowing that the author is French and was already using English as workplace language.

However, as mentioned by Phillips (1960), the quality of translation depends on a number of factors, some of which may be beyond the researcher's control. Thereby, in this case the author and the translator were not the same person, thus, the quality of translation can be influenced by the CEO willingness to translate word by word the managers' (literal translation) answers or to do omission. For Birbili (2000), literal translation could perhaps be seen as doing more justice to what participants have said and 'make one's readers understand the foreign mentality better' (Honig, 1997).

All along the training, the author took time with 3 young employees to try to eliminate as much as possible translation-related problems. To do so, the author worked with the best English-spoken HUMO's employees, to pre-test the training tool but also to explain some new concepts such as glass ceiling or gender blind; which have no equivalent in Tajik language, so it was crucial to take time to define them so as to be as close as possible to the original sense.

### ***Cultural context and religious weight***

Another limitation in this work was the fact to approach a change management topic, where the author tried to challenge managers about women roles in Tajikistan, which are still deeply rooted in the traditions, and impede women to escape from the family sphere. Frequent discrepancies between gender stereotypes and women roles play a significant factor in impeding changes in social relations between men and women. These discrepancies are largely influence by society's cultural and religious traditions. This influence is especially strong on rural women who form the biggest proposition of the country's female population (Murray and Boros, 2002). Taking into account managers' answers to exercises and feedback show their gender bias awareness present within HUMO & Partners, including self-censorship, explained by a too sexist cultural environment. But in the same time a kind of powerlessness in front of the situation which will take time and implement an incremental change in the Tajik society.

At the first session, when the CEO was not in the room, one the managers asked the author the usefulness to address gender issues. The author explained that he only had to look around him to see that they were only male managers around the table. It shows a real paradox between the hope from the CEO to make things change concerning HUMO's gender policy and the managers who are gender blind. So, on the long run we can wonder whether this gender awareness training could change their vision and if the message was really listened. Coaching, mentoring, training, etc. could be key success factors for the future so as help enhance the effectiveness of MFI staff as relays of gender awareness.

These workshops and discussions were an opportunity for Tajik managers to question the distinction between sex and gender and take into account the evolution of society. It was also a mean to demonstrate to managers that within their own organization, the most important agencies in terms of customers were managed by women and achieved the best results. However Islam traditions and Tajik history still have a long way to go before recognizing women position within the society. Through the different answers from the exercise, a phenomenon of sexism arise, that is to say an individual's prejudicial attitudes and discriminatory behavior toward people of a given sex, here women, but also institutional practices (even if not motivated by prejudice) that subordinate people of a given sex (The McGraw-Hill Companies, Inc, 2012).

In microfinance, choice of men and women for credit officers depends largely on local conditions and it is crucial to have female loan officers in conservative Islamic countries such as Pakistan, Afghanistan, parts of the Middle East and African enclaves, but also in Tajikistan where traditions are well rooted and women stay at home. However, security is increasingly worse for women and MFIs must take into account the safety of women loan officers because they often have to visit borrowers in the evening. If some MFIs have concerns about motherhood and the possible inability of women to work in certain places or at certain times, it remains that female staff can have a dramatic effect on increasing customer an institution to women. To advance on stereotype issues in this cultural context, it could be interesting for HUMO & Partners to create media tool to communicate on the internal gender policy principles, such as promotional leaflets, calendars and advertising materials to represent new models and overcoming stereotypes.

### ***Lack of women representation in right studies to work in the microfinance field***

In the opportunities, the author mentioned the possibility for HUMO & Partners to focus on young women, who represent the most disadvantaged in term of unemployment. However there is a real gap concerning possibility to find women in the right study field (Figure 1). To improve the situation, HUMO & Partners could enter in contact with women networks, such as Simo, an NGO which focuses on health and environment education but also on promotion of women's employment. It has conducted a number of seminars for women on obtaining employment and has developed a database of employment opportunities (Falkingham, 2000). Also the 'Lady Leader Business Women's Club in Kurgan-Tube city, which goal is to advocate for women's rights and offer training for business women. They also have a radio program "For Women and Families" and it offers informal management training and free business consultations to women. It could be the occasion to promote HUMO's gender policy through these channels.

## **CONCLUSION**

An organization which wants to expand its women customers should definitely rely more of women in the workforce. Such a policy is costly for HUMO & Partners because it induces training and retention strategies (eg, maternity leave, better transport for employees to improve their security, etc.) but costs achieved through a gender policy are likely to be offset by the commitment and increased staff efficiency and by increasing the rate retention.

This study was done for a short-term impact, it was the objective of the author to analyze the possibility that offers gender awareness training to make MFI managers aware of the gender bias within the organization, in order to quickly react and implement adapted policies to empower women staff and attract more women staff and clients. However, the real impact is difficult to measure, due to strong cultural barriers and persistent stereotypes on women skills and potential.

Yet, staff who are unhappy and unsatisfied (eg, harassment victim, lack of employment opportunities, underestimate, etc.) are not effective and can even change employer. Thus HUMO & Partners has a real interest to invest in this strategy to become the employer of choice for women and capitalize on its gender-aware staff, to benefit the whole organization, the clients' treatment and the society. Indeed, a real virtuous circle can emerge: if gender equality or sensitivity is reached within MFIs, staff can better communicate this social progress to its clients, both men and women, to maximize economic and social output. Following this gender awareness training, it could be interesting to offer transversal career development, workshops on managerial models or leadership for all employees so as to develop their potential and encourage them to apply for higher positions, with a particular interest for women employees. It could also create a real value chain and provide women clients the possibility to expand their daughters, sisters, neighbors... opportunities to gain respect, increase esteem and so, to modify gender norms for future generations.

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## **SECOND GENERATION GENDER BIAS - AN INVISIBLE ISSUE**

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### **ABSTRACT**

The purpose of this research is to examine the social institution of gender and how its role has evolved in the workplace over the last forty years. Findings conclude that a second generation of gender discrimination does exist. This second generation discrimination translates into invisible bias against women in the workplace. Conclusions are drawn from contemporary findings on this subject from scholarly journals and business periodicals,

Keywords: Second Generation, Gender Bias, Discrimination

### **INTRODUCTION**

There has been discrimination in the workplace since the beginning of free enterprise in the United States of America. This discrimination has taken on many different forms throughout history. Gender bias has historically been one of the more frequently occurring biases shown in the workplace and it continues today. According to Alpert [2], 15% of women report experiencing workplace bias and 13% thought they were denied a raise at some point because they were women. First generation gender bias was experienced as discriminatory acts or other outward displays of disapproval based on gender. These were tangible circumstances that could be pinpointed and addressed because they yielded a direct impact on women in the workplace. These biases were said to have largely subsided after the Women's Liberation Movement's efforts in the 1960s and 1970s. Today, a second wave of gender bias has permeated the workplace in the United States.

Second Generation gender bias is generally invisible and based on the common stereotypes that put women in a theoretical "box". It is formed from expectations based on societal gender norms – norms such as women being expected to be more compassionate and naturally lesser or weaker leaders than men. For example, if women

are compassionate and flexible with co-workers and subordinates they are considered to be weak or soft, not suitable for strong leadership. On the other hand, if women are confident and assertive in their professional roles they are considered heartless or too aggressive, also not suitable for leadership. This is a double standard that only applies to women and the manner in which a woman „should“ lead. It is expected for a man to be strong and assertive in his professional role, and if he gets results he is considered to be a good leader and his methods are rarely questioned. This Second Generation Gender Bias differs greatly from First Generation Gender Bias because it is no longer linked with tangible evidence of discrimination. Instead these invisible biases are difficult to prove or directly address because they are not concrete or tangible. It is argued that this bias creates difficulty for women as they work towards reaching their full potential in the workplace. The Second Generation issue encompasses how society“s gender norms translate into invisible bias against women in the workplace.

### **MASCULINE VS. FEMININE LEADERSHIP**

Masculine traits are naturally preferred in leadership positions [4]. Theoretically, a good leader is considered to be strong, self confident, and definitive in their decisions. A male comes to mind when those traits are mentioned because of gender stereotypes. However, women also possess those „masculine“ traits and can assert them in the same way a man can. The difference lies in the way these traits are perceived coming from a woman verses when coming from a man. “Women ARE poorer leaders relative to men because female biological preferences run counter to (overt) leadership performance,” [3]. The idea that masculine leadership traits are preferred is countered by the growing definition of a good or effective leader being one who is able to form and lead a team to work toward a common goal and yield quality results. It is commonly found that women will lead people in a more effective way than men by creating supportive, team environments [6]. Women tend to be more compassionate towards their subordinates, which ultimately helps them form strong relationships and build strong teams in the workplace. “[Women] possess the ability to read and deal with people to a higher degree than men do, making them more effective leaders in many situations,” [5]. Women have been found to be largely concerned with the success of their team as a whole unit while men are consumed by producing tangible results, regardless of the team“s process. There is a tendency for professionals and companies to look at the hard results rather than the intangible processes. However, a woman who has the ability to build and lead a team to yield results will more likely maintain a longer track record of performance that will help a company on a long-term basis. A man who is solely results-driven may yield faster solutions in the short-term, but they may lack the ability to create a team environment that will keep people motivated to perform at a high level.

### **EXPECTATIONS IN INTERVIEWING**

Literature on attribution and sex role stereotypes suggests that female candidates may be evaluated differently than their male counterparts during the interview process. [1]. When

interviewing and considering candidates for key leadership positions, interviewers have pre-conceived notions of what they can expect from female candidates and male candidates [7]. These expectations are rarely the same for both sexes. The interviewer may not even be aware that he/she is forming an opinion based on gender – contributing to the idea that this bias is largely invisible. That being said, expectations for women are generally not set as high as they are for men. When society, including those in crucial hiring positions, thinks of a good, strong leader they largely envision a male. The idea of ideal male leadership can be boiled down to gender stereotyping that has always existed, but today permeates differently than it did decades ago.

### **THE PREFERRED EMPLOYEE**

Today, companies look for workers who put their job above all else, perform well, and produce results. This is only natural because companies stand to gain more from a worker who is solely dedicated to his or her work for the company. It's „normal“ for companies to prefer workers who do not take time off and workers that are able to perform and lead. Its relevance to gender bias is the fact that women are traditionally the child-rearing gender and most commonly are the partner who takes time off from work - obviously for pregnancy, but also for other family-related issues. There are laws protecting employees who wish to have a family, limiting the amount of discrimination that exists in this area of the workplace. However, many employers who allow these concerns to affect hiring decisions will cite unrelated reasons for their decisions that will not result in a lawsuit. [7]. Skirting this issue contributes to continued gender bias in the workplace today because its invisibility allows it to continue.

### **THE STEREOTYPE OF THE WEAKER SEX**

Women are largely perceived as the „weaker sex“. “History shows that women have always been the Coddled „Gender“” [3]. This stereotype translates to the notion that women are not capable or motivated to work long hours and make work a priority at the level that a man is. Long hours at work take a toll on anyone's personal life, both males and females. “Whether it's a man or woman pushing for positions of high power they're going to have to make selfish decisions that put their career interests in front of their families, spouses and friendships. Regardless of whether you provide flexible working hours or not, an 18 hour day is going to mean enormous sacrifice,” [3]. When being compared to men, women are categorized as caring more about personal matters than they do about excelling and advancing at work. Women are seen as being more likely to take personal time off and not being able to handle the pressures of work to the same degree a man could. These gender norms permeate in both professional men and women's minds. These norms are so commonly thought of to the extent many times, women do not believe that they are suitable or meant to be fully engulfed in their work life to the same degree men are. Women comprise only fourteen percent of top positions in Fortune 500 companies [6]. Some rationalize this statistic by generalizing that women are not assertive enough at work to ask for higher positions that they are perfectly eligible

for, while men will apply for positions that they are not even qualified to hold. This idea echoes to women that, if they are successful and have succeeded they are the exception. At the same time this idea tells women who have not made it to the top that they failed in some way. It is argued that, due to these perceptions and the invisible bias that is derived from them, women largely fail to meet their full potential in the workplace.

### **COMPOSITION AND IMPACT OF WORKPLACE CLIQUES**

Another invisible bias that occurs in the workplace is the tendency for men to “clique-off, that is seek to create in-groups that separate themselves from others. In these cliques, they spend time outside of work bonding and forming an invisible fence around their “group”. It is difficult for women to penetrate these groups because they are different from the other members for the simple fact they are women, not men. They are considered “outsiders”. For example, men may form an “open” golfing group at work, theoretically inviting any and all members of the organization to join. This golfing group provides its members with an opportunity for networking, bonding, and spreading ideas. Most men would not hesitate to join such a group, regardless of their level of play. On the other hand, women would be reserved in joining unless they are absolutely confident in their golfing abilities. This is because the women would think themselves more likely to be compared to the men’s play and judged more negatively than a male colleague would be [5]. This situation and situations like it put women at a severe disadvantage in the business world. This type of informal networking and forming of relationships provides many professional opportunities. If men are exposed more often to these intimate networking settings than their female peers, they stand to have an advantage when it comes time for promotions and special projects.

### **THE “MYTH” OF SECOND GENERATION GENDER BIAS**

When the issue of Second Generation Gender Bias is brought up among professionals, it is disappointing to read what the conversations entail. Many male professionals take this bias to be a made-up issue that is, at its core, it just consists of women complaining about and attempting to justify their lack of ability to outperform men and rise to the top in the business world. One example of this perspective is seen in this blog comment, ““Gender” is how feminist Gender Bigots rape reason to conflate sex and gender to further the vile Valley Girl like-like-like lie.” [3]. The quote is stating that women use “gender” as an excuse for why they are not promoted, but the real reason is that they are less effective leaders. This erroneous belief contributes to the misconception that there is no longer gender bias within the workplace. That is, the reason women do not advance in organizations because they are not qualified.

## **RESEARCH QUESTIONS**

Based on the existing literature and investigatory interviews, we conducted a survey to attempt to determine results for the following research questions:

1. Is there a perception that Second Generation Gender bias exists?
2. To what extent is gender bias occurring?

## **METHODOLOGY**

This study used a survey distributed via email and paper. One hundred male and female students between the ages of twenty and twenty-two, 50% of whom were female, responded.

## **RESULTS**

Results for Research Question 1 were that one hundred percent of participants believed that Second Generation Gender Bias does exist and that something should be done about the issue. However, when asked to elaborate on what could be done, only 23 participants gave responses. These respondents provided the following recommendations:

- Find a way to strictly focus on credentials in the hiring process.
- The issue will sort itself out as new, educated, younger professionals come to power
- Females need to be more vocal about incidents of gender bias
- As our cultural beliefs change as a society, it will become a more bias free environment
- Create awareness surrounding the issue and encourage people to be open to changing stereotypical views
- Ensure company policy is in line with gender acceptance and that there are effective leaders in all areas of companies who promote gender equality

For Research Question 2, nearly all participants, 92 percent, had witnessed gender bias of some kind, but only fifty percent had personally experienced it. Of those who personally experienced gender discrimination, only one was male.

## **CONCLUSION AND DISCUSSION**

In order to move forward and evolve as a society, Second Generation Gender Bias must be addressed. Raising awareness about the issue is a good place to start. If the public and professionals in the business world become more aware of the growing statistics that favor women as leaders and managers, stereotypes regarding gender will slowly but surely begin to change for the positive. Women are more frequently becoming leaders at all ages, in many different areas and subjects. Publication of statistics regarding positive trends about women, such as, more women achieving leadership positions will allow

word to spread. Of course, it is easier to produce hard numbers and results than it is for mindsets to shift. That being said, supportive evidence of hard numbers and results will prove to have a great impact on changing existing gender stereotypes going forward.

Young professionals entering the business world, both males and females, are aware of the progressively more even playing field among genders. These young professionals will prove to be strong advocates for breaking stereotypes. “As a future business professional, I plan on removing „gender“ from job applications altogether. I have seen many examples in my personal life of strong and effective female leaders; I do not see a difference in candidates based on gender. If someone fits the company and meets the required credentials, they will get the job,” [5]. This generation has become more competitive between the sexes than any other. Both males and females understand that they are competing against other emerging business professionals. That fact pushes them to work harder and try to gain a personal competitive edge in some way. The most important factor in that new trend is that the young men and women entering the business world are competing against other “emerging business professionals”, not of a particular gender.

## **RECOMMENDATIONS**

### **Break Gender Stereotyping**

Men and women currently established in the workplace can actively work to break gender stereotyping, thus minimizing or eliminating Second Generation Gender Bias. Established business professionals, particularly those in positions of power, would do well to monitor their internal dialogue and thoughts in regards to gender stereotyping.

However, many of these individuals fall victim to the personal handicap of believing in gender stereotyping and letting it impact their decisions. Hopefully, new leaders will make efforts to eliminate gender bias and be innovative in their efforts so as to spread gender equality throughout all levels of their respective organization.

### **The Power of Influence**

To be successful in business today, leaders are required to be able to manage others effectively. The leaders filling this role will need to consist of the best qualified, regardless of gender. When women are given the opportunity to prove themselves as strong, effective leaders they will shatter any and all doubt that still exists about the abilities of the female gender. Invisible bias against women in the workplace is a large and increasing concern. It is affecting women at all levels of organizations and, in some cases, preventing them from reaching their full potential professionally. If professionals in the business world commit to ending stereotyping and gender discrimination of all kinds, Second Generation Gender Bias will soon become obsolete. Organizations will benefit from having effective leaders of both genders to their benefit. The hoped that soon, characteristics such as strong or weak will not be associated with being „masculine“ or „feminine“. Instead, leadership characteristics will simply be considered important for every leader, regardless of gender.

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**Is there a female career?**  
**Unmasking perceptions of women's careers**

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## **Is there a female career? Unmasking perceptions of women's careers**

### **Abstract :**

This study responds to the call for more research on the under-studied topic of women's careers (White, 1995, 2000; Sullivan, 1999; Gallos, 1996; Belghiti-Mahut, 2004; Laufer, 2004, Yarnall, 2008) and the growing interest for developing new perspectives on careers and career development (Arthur *et al.* 1996; Dyke and Murphy, 2006). This call for research corresponds to the needs of enterprises today to attract, retain and develop female talent notably in typically male dominant industries (Fielden *et al.* 2001; Cromer and Lemaire, 2007). Responding to these calls, we explore the three following major research questions on women's careers, career advancement today, and new approaches to investigating careers: Is there a female career? How has the notion of career development evolved in recent years? If so, how do women today picture their careers? We conducted a research using a questionnaire with 98 French managers participating in a women's networking event. The first results show that there are multiple perceptions of women's careers as well as several dominant families. Moreover, certain perceptions of women's careers concord with emerging notions of career advancement shared by both women and men. Inciting women and men to capture and describe their career by way of pictures may offer an answer to going beyond gender stereotypes in the workplace and creating a dialogue between key stakeholders.

**Key-words:** women's careers; career development, gender stereotypes, perceptions, metaphors

## **Is there a female career? Unmasking perceptions of women's careers**

### **Introduction**

This study responds to the call for more research on the under-studied topic of women's careers (White, 1995, 2000; Sullivan, 1999; Gallos, 1996; Belghiti-Mahut, 2004; Laufer, 2004, Yarnall, 2008) and the growing interest for developing new perspectives on careers and career development (Arthur *et al.*, 1996; Dyke and Murphy, 2006). This call for research corresponds to the needs of enterprises today to attract, retain and develop female talent notably in typically male dominant industries (Fielden *et al.*, 2001; Cromer and Lemaire, 2007). It is also aligned with new legislation driven by the French government (Report of the Ministry of Solidarity and Social Cohesion, 2012) to encourage greater male/female professional equality in the workplace. Finally, our study responds to the growing interest for capturing careers by way of dominant images or metaphors (Kram *et al.*, 2012,) and especially those of women (Eagly and Carli, 2007; Naschberger *et al.*, 2012). Responding to these calls, we explore the three following major research questions on women's careers, career advancement today, and new approaches to investigating careers: Is there a female career? If so, using symbols, how do women today perceive their careers? How may the use of symbols or metaphors enhance our understanding of women's careers?

In order to answer such questions, research based on questionnaires from managers participating in a French women's networking event was carried out. The first results show that there are multiple perceptions of women's careers as well as several dominant families. Moreover, certain perceptions of women's careers concord with emerging notions of career advancement shared by both women and men. The symbols chosen by the women reflect the multiple shapes of women's careers today as well the co-existence of traditional and more complex images with traditional male and female characteristics. Inciting women and men to capture and describe their career by way of symbols may offer an answer to going beyond gender stereotypes in the workplace and creating a dialogue between key stakeholders.

### **1. Survey of the literature**

#### **1.1. From 'rigid' traditional masculine career models**

Most research on careers and career development is based on a traditional linear model to progress in a firm: access to positions with higher status, higher prestige, higher levels of responsibility, and higher salaries (Williams, 2000). Probably one of the most cited career development stage models was developed by Super (1957) who identified four career stages:

trial, establishment, maintenance, and decline. Later, Levinson (1978) elaborated a model of life development: a comprehensive eight phase model associated with one's biological age. Both models and the majority of work written on career stages results from studies of men, and much of that research was done prior to 1990.

## 1.2 Towards 'flexible' feminine career models

Twenty years after the appearance of the first career models, research has started to include or focus on women's career advancement (Kanter, 1977; Morgan and Foster, 1999; Belghiti-Mahut, 2004; Davidson and Burke, 2004; Dyke and Duxbury, 2011). Some argue while the career development of women has been explored, the concept of career stage as uniquely experienced by women is still not very comprehensive (Yarnall, 2008). Women progress through careers at different rates and in varied succession depending on a number of unique factors, such as, for example, family status and family responsibilities (Yarnall, 2008; Mayrhofer *et al.* 2008). Whereas men typically enter and exit the career exploration stage during adolescence, women may experience the career exploration stage in mid-life for the first time, or they may re-enter exploration as childcare responsibilities decrease (Morgan and Foster, 1999). Similarly, the retirement stage is based on the premise that a man has a lifelong career while women may "retire" or intermittently leave the workforce as pregnancy or other family obligations arise. The same factors, such as parenthood and increasing number of children, have a negative impact on women's career progression, whereas they have a positive impact on men's career progression (Ferro-Vallé, 2009). Finally women's decision-making about career development is contextual and embedded in relationships (Eagly and Carli, 2007). The following table summarizes the characteristics of traditional men's and women's career development pathways.

	<b>Men's careers</b>	<b>Women's careers</b>
<b>Direction</b>	linear	flexible
<b>Individual choice</b>	self-determined	dependent on relationships with others embedded in context
<b>Purpose</b>	aimed at higher status, high prestige, higher levels of responsibility, higher level of salary.	

<b>Career exploration stage</b>	begin at adolescence	could begin not until mid-life
<b>Retreat from the labour market</b>	retirement	pregnancy, family obligations years (children, handicapped or elderly members of the family)

**Table 1 Characteristics of traditional men’s and women’s career paths**

Increasingly, men are also adapting their careers to participate more fully in the parenting role and family demands are also likely to impact their career development and career stages (Yarnall, 2008). Some authors argue that the protean career concept (Hall, 1976) may be more appropriate to study women’s careers, and could be well adapted to more modern career aspirations in societies where individual aspirations increasingly impact career choices. Protean careers are determined by the individual’s values and influenced by our personal identity. Other authors study women’s career by gaining a better understanding of levers and obstacles for career development (Naschberger *et al.*, 2012). Today, changing professional expectations with respect to careers of both of men and women are shaping the concepts and ideas of careers in the 21<sup>st</sup> century. In our paper we investigate how metaphors or symbols have been used to understand career development and more particularly career development of women. We are also interested in understanding how women picture and perceive their own careers.

### **1.3. Picturing women’s careers**

Pictures, images or symbols, as elements of thought, provide a rich source of information about how people make sense of their lives. The use of symbols for career metaphors can capture certain strong feelings such as frustration or perplexity (Eagly and Caroli, 2007). Images are not just descriptors of reality; they reflect cognitive frameworks within which people make sense of their own actions in interaction with others. The work on pictures can be likened to the work on metaphors, which are in essence images conjured by words or groups of words. Images or metaphors can be used to help change mentalities, by identifying the predominant images in place, questioning their meaning, and inciting, when useful, the replacement of images which could be an obstacle to self or professional development. Metaphors are useful for developmental counselling approaches as they encourage clients to clarify meaning of their experience through a focus on cognitive structures (Morgan and Foster, 1999).

The use of images in gender and career literature is significant although largely used to capture invisible or ordinary obstacles which prevent women from accessing higher level responsibilities in the work place: glass ceiling, glass walls, sticky floor, and asbestos are common examples (Landrieux-Kartochian, 2003; Laufer, 2004; Ferro-Vallé, 2007). The labyrinth image has more recently been identified as an appropriate image of what women confront in their professional endeavors as the metaphor acknowledges obstacles, but is not ultimately discouraging as other common images of women's careers, such as the glass ceiling, tend to be (Eagly and Carli, 2007; Nacshberger *et al.* 2012).

White (1995) remarks the predominance of masculine images in career models, and raises the need to conceptualize the careers of especially successful women over time and space to capture patterns of adjustment in order to identify patterns of issues associated with certain ages and stages in life characteristic of women. Several images or schematic representations of women's career development have been developed over time. Larwood and Gutek (1987) use the tree of possible alternatives, with branches symbolizing combinations of alternatives leading to potentially different outcomes. Rapoport and Rapoport (1980) offer the triple helix image to capture how transitions in life mark the career choices of women. This model portrays regular interactions throughout a woman's life, between the occupational helix, the family helix and the leisure helix. The image of the helix conveys dynamics such as turning points or critical impacts of events in the developmental process and balancing of steady states between transitions.

A useful starting point for career development is to create greater understanding for the individual as to how he or she perceives the notion of career and to assist the individual in projecting him or herself into the future and/or looking back over his or her career history. Common career development metaphors, including the vertical ladder, roller-coaster or more recently the horizontal career ladder, can help individuals explore some of the patterns. Drawing pictures of one's career can be another way of capturing key themes as suggested by Yarnall (2008).

## **2. Methodology**

Our goal was to discover women's perceptions of what is a female career, as well as to understand how they respond to visual images of female career development. To discover these perceptions, the authors co-animating an hour session built around nine research questions on network membership and careers in an auditorium during a women's networking

event. Each member of the primarily female audience received and was invited to fill out a questionnaire, at the same time as the questions were raised. As each question was raised, care was taken by the authors not to bias the respondents' answers by choosing not to divulge previous research findings. For the final questions on perceptions of careers, images were projected on a screen in the amphitheater (see Appendix 1) and the participants were asked to choose the image which mostly closely resembled their own career, as they picture it.

The questionnaires were collected at the exit of the conference room. Not at all attending participants returned the questionnaire, however judging by the total number of attendees to the women's day (150 throughout the day), and the observed rate of occupancy of the session on women's careers (approximately 110), the reception of 98 completed questionnaires signifies a high return rate. Out of the 98 returned questionnaires, 93 were completed by women. In this study only the women's responses will be discussed.

The collected data was analyzed in an Excel spread sheet file. Key themes emerged from answers to the relevant questions. To allow readers to access the evidence themselves, direct quotes from respondents have been used throughout the analysis to follow. The number of the respondent, as well as the sex, age and number of children are mentioned after each quote mentioned in the following tables.

### 3. Sample Description

The respondents represented a range of industries, functional areas, organizational levels and ages (see Table 2). Industries ranged from primarily the following sectors: energy, construction, banking, education, communications and marketing.

- The most represented age brackets in order of importance: 41-50 years (43%), 31-40 years (26%), 51-60 years (18%), under 30 years (12%)
- The respondents had an average of 2 children
- The most represented level of studies is the high school *baccalaureat* degree + 5 years (77%)
- 93% of the respondents were working and 86% were managers « cadre »
- The number of years of professional activity: 11-20 years 38%, 21-30 years 30%, 10 years and under 18 %

**Table 2. Sample characteristics**

The following five career images were given with brief explanations both written in the questionnaire and verbally reiterated : vertical ladder (characterized by vertical progression) ;

horizontal ladder (characterized by horizontal progression); mountain (characterized by different phases: exploration, profession, stabilization and retreat); roller coaster (characterized by a succession of ups and downs); and labyrinth (characterized by obstacles which must be overcome to find the right pathway). The participants were informed that if none of the given symbols fit with their career perception they were to draw their own image.

## 4. Results and discussion

### 4.1. Personal definition of a female career

The authors asked an open question in order to understand the women's perceptions of what is a female career: "According to you, what is a female career?" The different perspectives are described below using illustrative quotes. A summary of key differences belonging to different age categories and family status may be found in Table 3.

29% of the respondents described a female career as a challenge of balancing work-life and family life. 14% said that there are no differences between men and women thus a female career does not exist. 11% mentioned that a female career is about choosing family or career. For 10% of the respondents a female career is fulfillment. 8% consider that there are more obstacles for women than for men. 8% respond that a career is a personal project built over time. 3% consider that men's and women's careers are equal except women bear children. 3% describe a female career as a battle. For 3% a female career is constant adaptation and 2% think that it is a privilege not to have a straight career. Another 2% consider that a female career is more flexible than a man's career and another 2% answered "I do not know". 5% of the respondents did not answer the question at all.

Table 3 provides examples of each category which figure by order of importance.

Category	Is there a female career? If so what is a female career? (Examples)
<b>Work-Life balance</b>	« It is great willingness to conciliate private-professional life. It is a constant calling into question, to know which goals one wants to achieve professionally and in what time frame. » (20F 39 yrs. 2 children)
<b>No difference</b>	« There is no female career. It is up to each person to find his/her definition of career and success. » (6F 54 yrs. 1 child)
<b>Dual career</b>	« It's often a choice between family and profession. » (30F 40 yrs. 2 children)
<b>Fulfillment</b>	« Achievement and self-fulfillment in a professional career. » (33F 21 yrs. 0 children)
<b>More obstacles for women</b>	« I don't know. I wouldn't know either how to answer for men. I only know that for women to make a career it is harder to climb, to be paid as much men for an equivalent



	position. You get tired and stop wanting to fight to climb. » (12F 54 yrs. 3 children)
<b>A personal career built over time</b>	« A chosen, mature career. A female career is built over time with patience, determination and a bit of abnegation...with often the necessity of taking secondary pathways, climbing over mountains, which makes women's careers all the more rich. The taste for adventure and a little bit of « provoc[ation]. » (14F 47 yrs. more than 3 children)
<b>Equal except women bear children</b>	« It's undeniable that a woman's career today is different from that of a man's. But in my opinion there should not be any difference in career between the two sexes (apart from "physiological" differences such as those related to pregnancy, etc. » (23F 41 yrs. 2 children)
<b>Battle</b>	« Today, it is an everyday battle, to show that we can do as much as a man, or even more. To be incredibly strong in character and question oneself in order to advance. To not doubt one's value and capacities. To be able to face adversity, especially macho statements, to leave aside demeaning remarks. » (67F 28 yrs. 0 children)
<b>Constant adaptation</b>	« A constant adaptation between personal desire, following the career pathway of the husband and educating the children. I alternated between periods of training and professional experience. » (29F 64 yrs. 2 children)
<b>Non linear</b>	« Women have the privilege to not be obligated to engage along a straight career pathway. We must make use of this privilege, and extend it to men. » (16F 57 yrs. 1 child)
<b>More flexible than man's careers</b>	« A career which leaves the choice between private and professional life priorities and the choice of rhythm. In reality it's a career which is more flexible, but also for the benefit of men. » (25F 29 yrs. 0 children)

**Table 3. Women's descriptions of what is a female career**

#### 4. 2. Dominant images of women's careers

Table 4 presents the results to the question: "Which symbol best corresponds to your own career?" respecting the order of importance for the respondents.

<b>Image</b>	<b>Number of respondents</b>	<b>%</b>
mountain	22	23,66
labyrinth	18	19,35
vertical ladder	16	17,20
roller coaster	10	10,75
horizontal ladder	3	3,23
others	22	23,66
blank answer	2	2,15
<b>Total</b>	<b>93</b>	<b>100%</b>

**Table 4. Images corresponding to own career**

The most commonly chosen image was the mountain, followed by the labyrinth, the vertical ladder, the roller coaster and the horizontal ladder. Almost one quarter of the respondents did

not choose one of the suggested images, preferring either a combination of the suggested images or different images or explanations of personal approaches to career development. These other images included a multiplicity of occupations, projects, changing occupations and directions. One woman stated that although the activities were in appearance very different, the progression over time, with hindsight, was logical. Explanations of personal approaches include: “vertical progression compared to myself and not within the company”. Another woman observed that because she had first accepted the horizontal ladder she was able to climb very quickly up the management ladder. Another woman could not sufficiently see an image corresponding to a career where one alternates family and professional life priorities. Still another respondent chose a tree, and underlined how much more a woman’s career requires greater energy and organization than a man’s. Finally, one other woman offered the image of the career is avoiding traps and jumping over obstacles. It is significant to note that only 2 out of the 93 women did not answer the question. This seems to signify that thinking about careers as images was stimulating for the respondents.

## **Discussion**

The purpose of our study was to better understand how women perceive women’s careers by inciting them to answer the question “Is there a female career ?” followed by asking them to choose an image which best resembles their own career. With regards to the age, level of education, and number of years of experience, the women in our sample could be considered as having a certain experience with the notion of career. Across the different age categories and no matter the number of children, women chose both traditional images of male careers such as mountains and vertical ladders as well more recent images of female careers such as the labyrinth. However when choosing traditional images of a mountain or a vertical ladder the women commonly added typical feminine values such as the need to take the necessary time to “advance-pause-advance” in order to “seek family and professional life balance” when moving up a mountain. Furthermore personal “conviction” overrides “power” on the way to the summit. Likewise moving up the vertical ladder requires “character” and “energy” in order to obtain “authority” and “legitimacy” in the quest for “self-fulfillment” all the while balancing family and professional priorities. Finally the explanation for the labyrinth image

resonates Eagly and Carli's (2007) observation that although labyrinths represent complexity they are less a source of discouragement than an opportunity to manifest one's "determination".

If the traditional masculine career pathway is inflexible, planned and organized it contrasts starkly with the more flexible, less planned, chaotic feminine career pathway. Masculine values such as being the bread winner, having job security, and conforming to career development norms contrast to feminine values such as putting others' interests before one's own, engaging along a jagged pathway full of surprises, finding order in the complexity and making weighed choices along the way. While some women lament the extra energy expended in their dual career life or over their span of their working life, others see the continuous balancing act and significant psychological efforts of a career as a unique opportunity for personal and professional fulfillment to be marketed in a different ways.

Table 5 plots the explanations for the choice of the four dominant images according to the masculine and feminine values previously explained in the literature survey.

<b>Image</b>	<b>Masculine values</b>	<b>Feminine values</b>
<b>mountain</b>	<p>chosen, thought-out and assumed (F7 40 yrs. 2 children)</p> <p>Chosen, desired, consciously decided, enthusiastic allying pleasure and reward. (F63 52 yrs. 2 children)</p>	<p>Adapt progression to choices one makes with progression being characterized by "advancement-pause-advancement" so as to seek professional and private fulfillment. (F3 43 yrs. 3 children)</p> <p>In the direction of the summit. A career is based on conviction more than on the need for power. The "plus" [power] is not exclusive. (F55 42 yrs. 0 children)</p>
<b>labyrinth</b>	<p>A woman's career is the same as a man's with maybe greater determination. (F53 63 yrs. 2 children)</p> <p>I don't know if there is such thing as a woman's career. (F57 51 yrs. 2 children)</p>	<p>Dual career (F2 45 yrs. 2 children)</p> <p>A career that allows us to assume a balance between our professional and family life - we still have a long way to go! (F92 36 yrs. 2 children)</p>
<b>vertical ladder</b>	<p>[need to] have character because one expends a lot of energy to obtain authority, gain legitimacy. (F99 41 yrs. 2 children)</p> <p>Why distinguish between a male and a female career? The expectations and possibilities are the same. Ideally, a career allows self-fulfillment both professional and personal. (F52 31 yrs. 0 children)</p>	<p>Conciliate family and career (advance in an interesting job)</p> <p>Ally family life and career advancement (F48 49 yrs. 1 child)</p>

**Table 5. Summary of the three predominant images of women's careers and their male and female dimensions**

Our study has several limits. Possible bias is due to a feminine point of view of the topic as the sample is composed entirely of women. Another factor might be age and work experience: the sample is relatively “mature”: 87% of the respondents are between 41 and 60 years old and 68% have between 11 and 30 years of work experience. Mature women with work experience may adopt more personalized expectations of career. Just as Dyke and Murphy (2006) point out that women differ from men in their definition of success, Yarnall (2008) remarks that as workers age they are likely to redefine what is meant by career success.

The administration of the questionnaire without direct face-to-face interaction, as would be the case in one-on-one interviews might also influence and result in difficulties for some of the event attendees to make deliberate choices between the images. Indeed, some images may not have been clear for all and could have been perceived as complex.

## **Conclusion**

The purpose of this study was to better understand women’s perceptions of their own career and to gain greater understanding as to how women picture their careers. We compared previous findings in the literature to data gathered “in situ” during a women’s networking event. If careers should be accommodated around the reality of women’s lives, allowing them to make a meaningful contribution in both occupational and family roles as proposed by White (1995), should not the same opportunities be open to men as well? The predominant images chosen by women have both traditional masculine and feminine characteristics. In sum, images offer references for understanding the complexities of women’s careers, and the challenges women face. They provide a medium for discussion and solution-finding useful at both an individual level as well as on an organizational level. For Eagly and Carli (2007) metaphors matter because they are part of the storytelling that can compel change. Is not the constant adaptation and taking into consideration the needs of different stakeholders characteristic of a more sustainable approach to career development in an unpredictable business environment? To what extent are women’s careers, more boundaryless, and in phase with individual choices, increasingly becoming the model for men’s and women’s changing careers in the 21<sup>st</sup> century?

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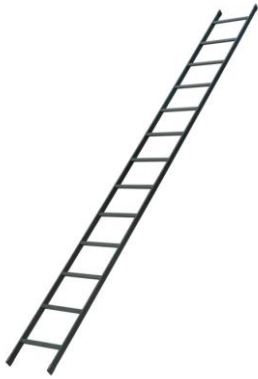
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## Appendix 1. Pictures

Selection of pictures as appeared on slide presentation and to which respondents referred to in the questionnaire.

Which picture best corresponds to your career?



A. Vertical ladder



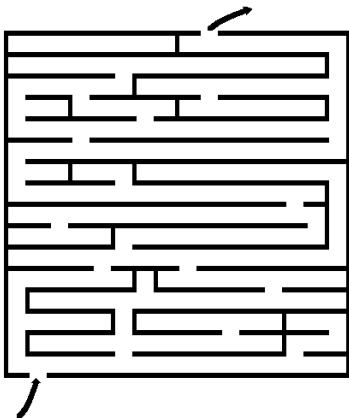
B. Horizontal ladder



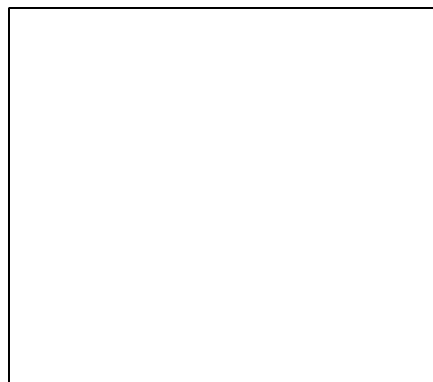
C. Mountain



D. Roller coaster



D. Labyrinth



E. Draw your own picture.

## **DOES COURSE CONVENIENCE EQUAL LEARNING? THAT'S WHAT OUR STUDENTS THINK**

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### **ABSTRACT**

We investigate the relationship between students' perceived course convenience and its association with perceived learning. Course convenience offers students flexibility among other benefits, however, real learning requires effort, interaction, time on task, and motivation. Thus we expected that perceived learning would be negatively associated with course convenience. Our analysis of 500+ student survey responses shows that course convenience associates with perceived learning. This robust finding holds regardless of course format and across a variety of model specifications.

**Perceived learning, Course convenience**



Our experience suggests that convenience or its surrogate (flexibility or access) is often embedded in higher education administrative and student decision making. Administrators' selection of off-campus locations for course delivery, for example, are usually attempts to get closer to their market. The closer the off-campus site is to the target market, the more "convenient" it is for students. Course scheduling also involves "convenience," because students have time and day-of-week preferences, especially when jobs and families are involved. The step from off-campus to online/e-learning liberates course delivery from the physical constraint of place. Because they no longer have to be physically on campus on a specific day and time, online learning helps students to manage and balance work, family, and other personal needs with school demands. It is no surprise, then, that course convenience is invariably noted as an important student motivation for enrolling in online courses (Bocchi, Eastman, & Swift, 2004; Benbunan-Fich & Hiltz, 2003; Eom & Arbaugh, 2011; Marks, Sibley, & Arbaugh, 2005; Offir, Lev & Bezalel, 2008; Sonner, 1999). The rise of interest in blended learning (Seamen & Allen, 2013), also includes convenience considerations. Because there are times when the course meets face-to-face, and times when the course meets online, blended courses increasingly are perceived as offering dual benefits in terms of both convenience and student engagement (Ross & Rosenbloom, 2011).

With regard to perceived learning, however, the value of course convenience is unclear. Perceived learning may be enhanced by the extra motivation that students gain from course convenience, and the lower costs in time and effort associated with higher levels of convenience could allow extra time for students to study. However, we also think that perceived learning will associate with students' efforts to learn. These efforts suggest that students will endure more costs associated with learning such as making extra time to study, reading the course materials,

taking practice tests, meeting with professors outside of class. These efforts go beyond the minimum level of effort expected of students, and are not “convenient.” In this paper, we investigate this perceived relationship between course convenience and perceived learning.

## **THE VALUE OF CONVENIENCE**

Convenience is the term given to the idea that individuals, when engaged in decision making, include estimates of how much time and effort is involved to achieve a goal (Yale & Venkatesh, 1986). Indeed, convenience may be innate to individual decision making because individuals naturally seek and value products and services that save time (Berry, Seiders, & Grewal, 2002; Farquhar & Rowley, 2009; Gehrt and Yale, 1993; Kelley, 1958). As currently understood, convenience is a multidimensional concept and captures an individual’s ability to reduce psychological and physical costs associated with time, space and the physical and mental effort involved with decision making (Anderson, 1972; Gehrt and Yale, 1993; Kelly, 1958). Berry, Seiders and Grewal (2002) assert that “convenience” is a shorthand term for the holistic judgments individuals make when they evaluate how much time and effort is required to complete an entire transaction -- including decision, access, benefit and post benefit components. Seiders, Voss, Godfrey and Grewal (2007) empirically tested and validated this conceptualization of convenience.

Farquhar & Rowley (2009) extended our understanding of convenience by noting that individuals “are not in fact convenience-oriented *per se*” (p. 427) but vary according to the importance or weight given to each specific dimension of convenience. Thus, “understanding convenience requires understanding of consumer decision-making or consumption and achievement of goals” (Farquhar & Rowley, 2009, p. 434).

## **PERCEIVED STUDENT LEARNING AND CONVENIENCE**

Student engagement remains at the heart of the academic enterprise. The NSSE Survey on Student Engagement (2012) may be the most fully developed and tested instrument measuring the concept. NSSE identified five core areas of student engagement: level of academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, and supportive campus environment (Kuh, 2001). “The premise is deceptively simple, perhaps self-evident: The more students study or practice a subject, the more they tend to learn about it” (Carini, Kuh & Klien, 2006, p.2).

Yet students’ motivation to learn varies (Kuh, 2009) and the level of effort is students’ choice. Research indicates that learning should associate with student intrinsic motivation and action learning (McEvoy, 2011; Revans, 1982), which are, in turn, a function of the degree and quality of faculty-student interaction (Umbach, Padgett, & Pascarella, 2010).), interactions with other students (Rovai & Barnum, 2007), perceived relevance (Klein, Noe & Wang, 2006), and the overall quality of instruction (Bain, 2004; Clayson, 2013) . In light of this, we would not expect learning to associate with convenience. Thus we hypothesize that:

H1. There will be a negative correlation between course convenience and perceived learning

As noted above, individuals weigh different dimensions of convenience during their decision making. We would expect students to differ in their appreciation for convenience across different course formats. The online format offers the most convenience, and students who choose that format may weight this attribute higher in their decision making. They may find that perceived course convenience has the highest correlation with perceived learning relative to the other course formats. On the other hand, students in a face-to-face format should

perceive that learning will associate not with perceived convenience but with interaction, time on task, and spontaneous interaction with professors.

We expect that students' perceived learning will be affected by the level of interaction between students and faculty offered by the course. Black (2002) found that students who took blended courses awarded statistically significant higher values for course flexibility, perceived learning and perceived overall satisfaction relative to face-to-face and online formats. The blended format also yields significant learning. Large scale institutional level studies appear to confirm that positive student self-assessment of their learning in blended courses can be significant (Castle & McGuire, 2010; Moskal, Dzuiban & Hartman, 2013; Owston, York & Murtha, 2013). These findings suggest that interaction as well as convenience affect perceived learning. These findings, however, are not unanimous. Benbunan-Fich & Hiltz (2003) found no statistically significant differences for perceived student learning in a three-year study of an undergraduate information systems course involving face-to-face, blended and online sections.

These findings suggest that perceived learning will result from a combination of convenience and interaction between students and faculty. In an analysis that controls for the level of interaction in a course, we should find that the most convenient course format would associate with the greatest perceived learning.

H2. The partial correlation between course convenience and perceived learning will be more positive for online students than for students taking the course in blended format, when interaction and other control variables are introduced into the model.

H3. The partial correlation between course convenience and perceived learning will be more positive for online students than for students taking the course in face-to-face format, when interaction and other control variables are introduced into the model.

H4. The partial correlation between course convenience and perceived learning will be more positive for students taking the course in blended format than for students taking the course in face-to-face format, when interaction and other control variables are introduced into the model.

## **METHODOLOGY**

Data were collected from students during four semesters from Spring 2011 to Spring 2012. All students were taking an undergraduate capstone strategic management course, yet students were in three different course formats: face-to-face, blended and online. We based our analysis on 504 responses, of which 32% were from blended format courses, 31% were from face-to-face, and 37% were from online. The questionnaire was distributed late in the semester. The response rate was over 90% for all sections, as instructors offered incentives for completing the instrument. The questionnaire was consistently administered to all students online.

In contrast to the majority of assessment instruments that focused on the technologies involved in learning, for example, with questions on the frequency and ease-of-use of the course management learning system (videos, discussion boards, email, online exams, blogs, etc.), our questionnaire emphasized teaching. For example, our questionnaire asked students to evaluate class pedagogy: lectures (in-class and online), short and long video clips and cases, active learning exercises, discussion forums, exams and, for blended and online course sections, a simulation. The questionnaire included balanced Likert scaled items measuring perceptions (1=strongly disagree to 5=strongly agree). Additionally, the questionnaire included descriptors, such as major and previous course experiences with course formats, and demographic items. We aimed to develop measures for control variables that Arbaugh, Hwang and Pollack (2011)

suggest are needed to account for background effects “which may or may not be of primary interest to a study but nevertheless could impact on learning outcomes” (p. 47).

## **Variables**

Perceptual measures in the questionnaire included perceived learning, convenience, interaction, and importance of the professor. We created the variable “perceived learning” using principle component analysis. These composite variables will best capture the variance of the individual items (Wang & Li, 2010) and are in standardized form (mean of 0, standard deviation of 1). We used six items. Sample items include, “Taking this course increased my skill in critical thinking” and “In this course, I gained the ability to critically analyze issues.”

Cronbach’s alpha for this measure is .92.

For convenience, we used a four item scale. Sample items include “Taking this class in this format allowed me to arrange my work for the class more effectively” and “Taking this class saved me a lot of time commuting to class.” The Cronbach’s alpha for these combined items was 0.80.

For interaction, we used a seven item scale that measured the level of interaction between students and faculty. Sample items included “I felt that the quality of class discussions was high throughout the course” and “Class discussions in this class were more difficult to participate in than in other business courses” (reverse scaled). The Cronbach’s alpha for these combined items is 0.71.

Researchers have found that student perceptions of individual professors, such as likeability, organization of the course and clarity of presentation, have affected students perceived learning and overall course evaluations (Abrantes, Seabra, & Lages, 2007; Marks,

2000). To control for the effect of student perceptions of the professor on their overall course evaluations, we include in our models student responses to the item, “What matters most is the professor.”

Table 1 demonstrates convergent and discriminant validity of our perceptual items. The reliability coefficients are all greater than any of the correlations between variables, which indicates the uniqueness of each construct (Gregory, 2007). From this we concluded that our perceptual variables were not overly driven by method variance.

**Table 1.**  
**Descriptive Statistics and Correlations for Perceptual Variables\***

	Variable	Mean	Standard Deviation	1	2	3	4
1	Perceived learning	0	1	.92			
2	Convenience	0	1	.42	.80		
3	Interaction	0	1	.38	.13	.71	
4	Importance of the professor	3.4**	1.0	.26	.13	.42	1

\*Reliabilities (Cronbach’s alpha) are on the diagonal.

\*\* Likert scale used, range is from 1 (strongly disagree) to 5 (strongly agree).

We also developed twelve objective and demographic measures for other control variables. These are set out in the Appendix.

Analysis of hypotheses. Preliminary analysis of means differences across formats is consistent with expectations: Online, undergraduate students are more likely to be (a) about to graduate, (b) older, and (c) female (Arbaugh, 2000; Friday et al., 2006). We also found differences across formats in terms of expected grade, international student status, major, experience with online

course and blended course formats, hours worked per week, semester, and course pedagogy. By introducing these control variables, we reduced the possibility that our results might stem from spurious effects (Arbaugh, Hwang, & Pollack, 2011).

Finally, we tested our hypotheses by using correlation and partial correlation analysis. Partial correlation is appropriate for analyses where no causality is hypothesized (Neter, Kutner, Nachtsheim, & Wasserman, 1996). To test H1, we conducted a bivariate correlation between perceived learning and course convenience, as shown in Table 1. To control for possible endogenous effects and method variance, we conducted a partial correlation between course convenience and perceived learning while controlling for first exogenous effects and then other perceptual variables. The partial correlation analysis is shown in Table 2.

To test H2, H3, and H4, we repeated the correlation analysis on the subsamples of students taking the course in the online, blended, and face-to-face formats. We compared the partial correlations for students in each of the formats using a Fisher  $z$  transformation (Neter, Kutner, Nachtsheim, & Wasserman, 1996). We used the  $z$  statistic to test for differences in the correlation coefficient between samples of students taking the course in different formats. The results of these analyses are shown on Tables 3 and 4.



**Table 2****Partial correlations between Course Convenience and Perceived Learning**

Correlation variables	Control variables	Partial Correlation value	Degrees of Freedom
Perceived learning and Convenience		.42**	502
Perceived learning and Convenience	Graduating now Expected grade Female Log of age Number of courses this semester English as first language Foreign student Accounting major Finance major Human Resources major International Business major Management major Marketing major Past blended format classes (at least 2) Past online format classes (at least 2) Past online format classts (at least 5) Hours worked per week Exam scores as a percent for total grade Semester dummy for Spring11 Semester dummy for fall11 Dummy for blended format Dummy for online format	.35**	481
Perceived learning and Convenience	Same as above plus: Interaction between individuals What mattered most was the professor.	.24**	479

\*\* p &lt; .000

## FINDINGS

Table 2 shows a robust and positive relationship between convenience and perceived learning, which we did not expect: There no support for H1. Surprisingly, there *is* support for the opposite relationship: That convenience associates positively with all course formats.

**Table 3**

**Partial correlations between Convenience and Perceived Learning across Course Formats**

Subgroup	Partial Correlation between Perceived Learning and Convenience*	Degrees of Freedom	Significance level (p value)
Online	.28	159	.000
Blended	.10	139	.242
Face-to-face	.29	133	.001

\* Same control variables as for the bottom row of Table 2.

Our tests for these H2, H3, H4 are shown in Tables 3 and 4.

**Table 4**

**Test of Significant Differences between Partial Correlations for Each Course Format**

Course formats compared	Z score	Significance level (p value)
Online and face-to-face	1.60	p > .10
Online and Blended	-.10	p > .10
Blended and face-to-face	-1.62	p > .10

Our research finds that the correlations between convenience and perceived learning are positive for students in all formats. The strongest relationships are for students in the online and

face-to-face formats. Our test for significance between the formats showed no significant differences between the convenience-perceived learning relationship. The results suggest a robust relationship between course convenience and perceived learning that holds across students in all three course formats.

There are limitations to these findings. Our sample focused on senior, undergraduate students in a capstone course in strategic management. Extension of our results to other contexts, such as introductory courses or other discipline's courses, remains a matter of conjecture. Further research into student perception of learning and convenience will be needed to give our findings more general application.

## **DISCUSSION**

We found through a variety of robust model specifications that students associated perceived learning with course convenience. Noteworthy is that students in all course formats associated course convenience with their perceived learning. The strength of this relationship holds for our model across 13 control variables (see Appendix A). That said, what do our results tell us about perceived student learning? We note three possibilities: First, greater learning occurs with greater course convenience; second, a halo effect exists in which students' overall experience with a course affects their perceptions of both convenience and learning; or third, students' greater perceived learning for blended and online format courses stems from the greater self-discipline required to complete work in these formats.

First, greater learning may come from greater overall convenience. Convenience in the delivery of education-as- service may translate into fewer hassles for students with getting the work done for their courses. They may have more available time to do required work and may

be better able to control distractions. In addition, to the extent that a course is in an online format, students likely experience more control over their learning activities (Karim & Behrend, 2013). Thus, scheduling conflicts or imbalances between personal and educational life activities, may represent a disadvantage for learning. The ability to control timing could increase their intrinsic motivation, as students experience more leeway in dealing with externally imposed structure (Zimmerman, 1990). Consequently, student study time becomes focused and meaningful because of this greater sense of control (Nonis & Hudson, 2010).

To the extent that different convenience factors carry different weights in students' overall "convenience calculus," our findings hold across all course formats. For online courses, and to some extent blended courses, students may greatly value their ability to work at a time and location of their choosing. For courses that require students to attend classes, though, convenience still may associate with learning. These students may learn more, when they live near campus, can schedule classes around work and other life activities, and have access to efficient transportation infrastructure.

Second, a halo effect may invite students to think that are learning in a course and therefore also rate it as convenient even if that were not the case. Perceptions are not always true to reality (Falchikov & Boud, 1989; Kahneman, 2011), and emotions can affect the way students responded to our survey. This is a remote possibility, as the effect would have to hold more so than students' ratings for "importance of the professor" and "interpersonal interaction." Including these effects in our model did depress the association between convenience and perceived learning, but the association remained strong, positive and significant.

A third possibility is a connection by students between perceived learning and self-discipline. Students may learn best in the face-to-face format, so these students are accurately

assessing their learning level. Students in the online format, however, may experience more of a burden in terms of time management and self-discipline that leads to their higher perceived learning (Zimmerman, 2002). Students in the online format may perceive that effort is equivalent to learning, and survey responses reflect that perception.

To more fully explore our findings, we need a more complete model that includes objective measures of actual learning and controls for students' biases when responding to surveys. Our research could benefit from utilizing measures of self-efficacy (Bandura, 1994). Additionally, qualitative research would add depth and nuance to faculty and administrator understanding of the current student cohort views and perspectives. Our research supports a robust and significant finding of a positive correlation between course convenience and perceived student learning.

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## APPENDIX

### Descriptions of Objective and Demographic Control Variables

- Course format – Allows for testing of hypotheses 2, 3, and 4. There are three dummy variables (online, blended, and face-to-face) with a value of 1 for students taking the course in the respective format, and 0 otherwise.
- Graduating this semester - Controls for the possible effect of exit behaviors on student responses.
- Expected grade - Controls for attitudes associated with academic performance in the class. Our measure of expected grade was highly correlated with actual grade for the subset of about 400 students for whom we have the data for grades ( $r=.58$ ,  $p<.000$ ).
- Sex - Controls for possible different attitudes towards satisfaction and perceived learning.
- Number of courses this semester - Controls for the effect of a stress of academic workload on satisfaction and perceived learning.
- Age - Controls for the possible differences in maturity levels among typical undergraduate students. We used a log transformation of age to reduce skewness.
- English-first-language - Controls for the effect of language barriers on satisfaction and perceived learning. All professors taught in English.
- International student - Controls for the effect of cultural barriers on satisfaction and perceived learning.
- Fields of study (6 variables) - Control for field-specific attitudes, cognitions, and values on perceived learning and satisfaction.

- Previous experience taking blended and online courses (3 variables) - Control for the effect of familiarity with taking course format on perceived learning and satisfaction.
- Hours worked per week - Controls for students' level of work-study balance. We transformed a categorical response variable that asked, "How many hours per week do you work?" and used midpoints within the range associated with each response.
- Exam-based pedagogy (the percent of the grade derived from tests (as opposed to grades based on written assignments, simulations, or participation) - Controls for the effect of teaching method on students perceived learning and satisfaction.
- Semester dummy variables (2 variables) - Controls for time-specific influences on perceived learning and satisfaction.

## **DEVELOPING AND IMPLEMENTING A RESEARCH STUDY IN THE LONG-TERM CARE SETTING**

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### **ABSTRACT**

Long-term care has become an essential part of medicine today. As the population continues to age, increased research is necessary in the long-term care setting. Communication gaps are of increased concern between patients and caregivers with further research necessary to research social gaps as a whole [1]. Research has been increasingly needed in the area of patient nutrition and mealtime interventions for proper patient nutritional intake [2]. Eska 2013 speaks of the significant increase in institutionalization of older patients and refers to long term care placement as one of the major milestones in care of patients with dementia [3]. The growing demand for long-term care and the increased complexity observed with current disease states warrants the need for further research in these care settings. The topics presented above include only a few of the areas which are unmet in current long-term care research. However, starting a research program within the long-term care setting may pose obstacles and hence deter researchers from further investigating.

Structuring a research study in the long-term care setting can be quite challenging due to the following reasons:

1. Shortage of research staff
2. Increased need for structured visits with patients
3. Complex study protocols
4. Data retrieval
5. Strict protocol guidelines
6. Training

As a panel the authors will discuss:

1. Determining viable techniques for long-term care research studies e.g., Timeslips®, Agitation/Anxiety Instruments Assessment

2. Statistical Analysis Plan
3. Protocol development
4. IRB submission/approval - risk vs benefit surrounding such research studies
5. Outcome of such research
6. Increased need for research in the long-term care setting
7. Overcoming study set up challenges
8. Study introduction, ways of improvement
9. Training

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## **Online Learning Best Practices**

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Higher learning institutions are adopting online education more and more as they try to meet the expectations of the digital era. Learning institutions are driven externally and internally to be more agile in academic offerings with regard to delivery. How do you meet the needs of your online students?

It is expected that higher learning institutions will continue to offer more online classes in either the full or hybrid format. Naturally, some subjects lend themselves more readily adaptable to new methods of delivery, such as abstract, quantitative subjects. Over the past thirty years computer based learning has evolved to a level which allows tailoring to the individual level. With the use of learning management systems, such as Blackboard, courses can be supplemented with individualized lessons which students and instructors can check on their own time outside of the time specified for lectures. This reliance on computer technology is what opponents dislike. Opponents argue that online education restricts human-to-human interaction and, thus, limits the educational experience. Both sides have valid arguments.

I would like to propose a symposium that will focus on online learning best practices. Here are a few sample topics that will be discussed:

- Online learning likes and dislikes
- Adapting teaching styles to accommodate the online platform
- Effective online tools/resources
- Lessons learned
- Effective online testing methods

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