

JOURNAL OF INFORMATION SYSTEMS APPLIED RESEARCH

In this issue:

- 4. Driving Inside Sales Performance with Lead Management Systems: A Conceptual Model**
Alhassan Ohiomah, University of Ottawa
Morad Benyoucef, University of Ottawa
Pavel Andreev, University of Ottawa
- 16. Governance of Outsourcing: Building a Better Relationship**
Ron Babin, Ryerson University
Shane Saunderson, Ryerson University
- 26. Exploring Relationships between the Strategic Importance of IT and the Effectiveness of IT Security and Mobile Device Management A Comparison of**
James A. Sena, California Polytechnic State University
Taryn Stanko, California Polytechnic State University
Mark Sena, Xavier University
- 38. Moving Beyond Coding: Why Secure Coding Should be Implemented**
Mark Grover, IBM
Jeff Cummings, University of North Carolina Wilmington
Thomas Janicki, University of North Carolina Wilmington
- 47. Assessing Cultural Aspects of Organizations for Knowledge Management Initiatives**
Justin Fruehauf, Robert Morris University
Dwayne Lehman, Robert Morris University
- 55. An Expanded Analysis of Internet Dependencies by Demographic Variables**
Alan R. Peslak, Penn State University

The **Journal of Information Systems Applied Research** (JISAR) is a double-blind peer-reviewed academic journal published by **ISCAP**, Information Systems and Computing Academic Professionals. Publishing frequency is currently quarterly. The first date of publication was December 1, 2008.

JISAR is published online (<http://jisar.org>) in connection with CONISAR, the Conference on Information Systems Applied Research, which is also double-blind peer reviewed. Our sister publication, the Proceedings of CONISAR, features all papers, panels, workshops, and presentations from the conference. (<http://conisar.org>)

The journal acceptance review process involves a minimum of three double-blind peer reviews, where both the reviewer is not aware of the identities of the authors and the authors are not aware of the identities of the reviewers. The initial reviews happen before the conference. At that point papers are divided into award papers (top 15%), other journal papers (top 30%), unsettled papers, and non-journal papers. The unsettled papers are subjected to a second round of blind peer review to establish whether they will be accepted to the journal or not. Those papers that are deemed of sufficient quality are accepted for publication in the JISAR journal. Currently the target acceptance rate for the journal is about 40%.

Questions should be addressed to the editor at editor@jisar.org or the publisher at publisher@jisar.org. Special thanks to members of AITP-EDSIG who perform the editorial and review processes for JISAR.

2016 AITP Education Special Interest Group (EDSIG) Board of Directors

Scott Hunsinger
Appalachian State Univ
President

Leslie J. Waguespack Jr
Bentley University
Vice President

Wendy Ceccucci
Quinnipiac University
President – 2013-2014

Nita Brooks
Middle Tennessee State Univ
Director

Meg Fryling
Siena College
Director

Tom Janicki
U North Carolina Wilmington
Director

Muhammed Miah
Southern Univ New Orleans
Director

James Pomykalski
Susquehanna University
Director

Anthony Serapiglia
St. Vincent College
Director

Jason Sharp
Tarleton State University
Director

Peter Wu
Robert Morris University
Director

Lee Freeman
Univ. of Michigan - Dearborn
JISE Editor

Copyright © 2016 by the Information Systems and Computing Academic Professionals (ISCAP). Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that the copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to Scott Hunsinger, Editor, editor@jisar.org.

JOURNAL OF INFORMATION SYSTEMS APPLIED RESEARCH

Editors

Scott Hunsinger
Senior Editor
Appalachian State University

Thomas Janicki
Publisher
University of North Carolina Wilmington

JISAR Editorial Board

Ronald Babin
Ryerson University

Teko Jan Bekkering
Northeastern State University

Gerald DeHondt II

Meg Fryling
Siena College

Biswadip Ghosh
Metropolitan State University of Denver

Audrey Griffin
Chowan University

Muhammed Miah
Southern University at New Orleans

Monica Parzinger
St. Mary's University

Alan Peslak
Penn State University

Doncho Petkov
Eastern Connecticut State University

Bryan Reinicke
Rochester Institute of Technology

Karthikeyan Umapathy
University of North Florida

Leslie Waguespack
Bentley University

Peter Wu
Robert Morris University

Driving Inside Sales Performance with Lead Management Systems: A Conceptual Model

Alhassan Ohiomah
aohio100@uOttawa.ca

Morad Benyoucef
benyoucef@Telfer.uOttawa.ca

Pavel Andreev
andreev@Telfer.uOttawa.ca

Telfer School of Management
University of Ottawa
Ottawa, ON K1N 6N5, Canada

Abstract

Inside sales are remote sales that are performed using different communication technologies. Since there is no traditional face-to-face interaction between the salesperson and the lead (i.e., the potential customer), it is vital that the leads, which are costly to obtain, are managed properly. Leads management is usually operationalized using information technology tools called lead management systems. There is a need to understand the impact of lead management systems on inside sales performance as well as to identify key drivers and enablers of inside sales performance. This research develops a conceptual model to investigate the impact of lead management systems on inside sales performance through mediating mechanisms of task characteristics (call productivity and lead follow-up), selling behaviour (adaptive selling) and salesperson characteristics (salesperson's competency). The findings of this research contributes to the inside sales literature, and educates practitioners in the inside sales industry on sales technology approaches and factors that enhance sales performance.

Keywords: Inside Sales, Lead Management Systems, Sales Performance, Conceptual Model.

1. INTRODUCTION

There is currently a shortage of research studies on inside sales in general, and in particularly on sales-technology approaches to the inside sales process that can help shape future development decisions and enhance sales performance. Despite the fact that the field of inside sales is known to be an early adopter of Customer Relationship Management (CRM) technology, little has been done to study it (Dickie & Trailer, 2006). The term "inside sales" is defined as remote sales or professional sales done remotely (Krogue, 2013). They enable individuals or

groups to advocate for their products and services to prospective customers via the telephone or the Internet rather than via traditional in-person interaction (Seley & Holloway, 2008). In contrast, outside sales (aka field sales) refer to the selling of products and services away from a company's place of business, usually at a customer's place of business or their home. Most inside sales are conducted in business-to-business (B2B) environments (Davis, 2013; Krogue, 2013). The fact that this is a rapidly evolving trend in the business world means that it requires in-depth exploration. A trends study conducted in 2009

found that inside sales were consistently growing as an industry (Oldroyd, 2009), and in 2013 the growth rate of inside sales was found to be 5% greater than that of outside sales (Warner, 2013).

A crucial success factor in any inside sales setting is the efficacy with which leads and contacts are managed. A lead is a documented interest in an organization's product or service, irrespective of whether that interest is from a new prospect or from an existing customer (Monat, 2011). A lead usually contains the basic information a salesperson needs to make that first contact with a potential customer (Griggs, 1997). Lead management incorporates a set of organized processes and procedures to make certain that all generated and qualified leads are pursued by sales.

The diligent follow-up of sales leads is a crucial part of the customer-acquisition process in B2B firms (Sabnis, Chatterjee, Grewal, & Lilien, 2013). B2B organizations spend an estimated \$30 to \$200 on each marketing lead generated, while B2C (business-to-consumer) organizations spend an estimated \$2 to \$25 per lead generated through advertising, web campaigns and trade-show efforts (Olenski, 2012). Notwithstanding the substantial investments that are made, statistics show that the majority of these leads are ignored and never contacted (Griggs, 1997; MarketingSherpa, 2011) because of a poor work ethic among sales personnel (Sabnis et al., 2013) and because of inefficient lead management systems (Griggs, 1997; Vanillasoft, 2014). Well-organized lead management is an important part of marketing effectiveness. Failure to efficiently manage leads diminishes sales results and increases costs, which ultimately hinders the ability of sales and marketing programs to achieve financial and organizational objectives. Nevertheless, few academic studies have attempted to research the best lead management practices in order to address this problem and thereby improve the customer-acquisition process (Elkington & Oldroyd, 2007; Sabnis et al., 2013).

Technology plays a vital role in inside sales but many inside sales programs fail to achieve their goals because of the inefficiencies introduced by technologies that support the inside sales function (Marketo, 2008). It is evident that not much effort has been made to study how technology supports inside sales. Most studies have focused on the outside sales domain. There is a need to understand how technology is used in inside sales and how it supports their process.

Most importantly, no study has yet addressed the role of lead management systems and specifically how well organized practices within lead management can help to drive sales performance in the inside sales industry. We see a strong potential in addressing the challenges faced by sales organizations in terms of lead management by means of carefully designed lead management systems. The processes and systems involved in resourcefully managing these leads are prerequisites for sales success, hence we need lead management systems built on best practices.

In this research, we look at the practices that enable information systems to leverage and strengthen key aspects of sales performance in the inside sales industry. We focus on the consequences of lead management systems usage by *developing a conceptual model to explore their impact of key drivers and inhibitors on sales performance*. In order to achieve this objective, we seek to answer the following questions:

1. What are the drivers and enablers of inside sales performance?
2. How does the use of lead management systems influence inside sales performance?

The rest of this paper is organized as follows. First, we review the theoretical background and related work on Information Technology (IT) impacts on sales performance. We then detail our hypotheses, and develop a conceptual model to explore lead management systems' impacts on inside sales performance. Finally, we discuss the theoretical and practical implications of our research.

2. THEORETICAL BACKGROUND

Numerous studies have acknowledged the significance of IT in optimizing sales performance (e.g., Ahearne, Hughes, & Schillewaert, 2007; Ahearne, Jones, Rapp, & Mathieu, 2008; Hunter & Perreault Jr, 2006; Rapp, Beitelspacher, Schillewaert, & Baker, 2012). For instance, the impact of IT on sales performance can be seen through the Task-Technology-Fit (TTF) theory by Goodhue and Thompson (1995). This theory claims that individuals' use of IT affects their performance and that the performance benefits will be greater if the IT fits the task (Goodhue & Thompson, 1995).

While some studies extending the TTF theory in sales have been conducted, they have mostly focused on outside sales. Ahearne, Hughes, & Schillewaert (2007) suggest that IT influences sales performance through mediating processes of knowledge, call productivity, presentation and targeting skills. Rapp, Agnihotri, and Forbes (2008) argue that IT use for analytical purposes (i.e., CRM) positively influences adaptive selling, and that IT use for operational purposes (i.e., SFA) reduces the number of hours worked by salespeople (Effort). Ultimately, both adaptive selling and effort influence sales performance. Ahearne et al. (2008) advocate that IT does not influence performance directly but rather through a variety of mediating factors, namely selling behaviour (customer service), and salesperson characteristics (adaptability), which are demonstrated during salesperson-customer exchanges. Relatedly, Park, Kim, Dubinsky, & Lee (2011) suggest that SFA usage influences performance through adaptive selling, marketing information processing and relationship quality.

None of the models introduced by these studies can fully be applied to an inside sales domain because they all lack one or more variables important for completing the inside sales task of lead management. The literature calls for an extension on the TTF theory to develop a technology-to-performance chain model for inside sales. The TTF theory emphasizes the use of technology to achieve distinctive strategic goals (Goodhue & Thompson, 1995). Thus, we extend this theory to help understand how the use of technology (i.e., Lead management systems) to effectively support the lead management task influences performance in the inside sales industry.

To begin with, it is important that we identify and categorize, from the literature, the drivers of inside sales performance, and subsequently pinpoint those that are crucial for achieving the lead management objectives. Weitz (1981) suggests that a salesperson's performance is impacted by their selling behaviour (i.e., adaptive selling), which is moderated by a salesperson's characteristics (i.e., knowledge, motivation, skills, etc.), selling relationship characteristics and task characteristics. Churchill Jr, Ford, Hartley, and Walker Jr (1985) propose six elements that determine the performance of a salesperson and ultimately sales performance: role variables, skill, motivation, personal factors, aptitude, and organizational or environmental factors. Weitz, Sujan, and Sujan (1986) argue that sales management variables (i.e., selling environment), salesperson characteristics and

salesperson behaviour determine a salesperson's performance. Kohli (1989) propose that a salesperson's performance is impacted by variables that can be grouped in three categories: salesperson's characteristics and role perception, task characteristics, and supervisory behaviours. Finally, Verbeke, Dietz, and Verwaal (2011) identified five elements to predict sales performance, namely selling-related knowledge, adaptive selling, role ambiguity, aptitude, and work engagement.

To better assess the relationship between IT and sales performance, we base our arguments on the technology-to-performance chain (TCP) model (Goodhue & Thompson, 1995 p.217) of the TTF theory. Furthermore, and based on our discussion highlighting the factors that determine sales performance, we classify the impact of lead management systems' usage on sales performance via the following mediators: (1) task characteristics, (2) selling behaviour, and (3) salesperson's characteristics. These mediators reflect the benefits of lead management systems, plus they have been acknowledged in the literature as key determinants of sales performance (e.g., Weitz, 1981). These are briefly discussed below.

Task Characteristics

Tasks are activities performed by individuals to achieve outputs (Goodhue & Thompson, 1995). Studies have evaluated salespeople's tasks by measuring the effort a salesperson devotes to achieving sales objectives. Such effort is measured by the number of sales calls over the total time invested by the salesperson (Rapp et al., 2008; Rapp, Ahearne, Mathieu, & Schillewaert, 2006; Sujan, Weitz, & Kumar, 1994), the persistency devoted to work, and continuing to try in the face of failures (Sujan et al., 1994). An important representation of salespeople's efforts to realize their objectives is the activity through which they complete their tasks (Brown & Peterson, 1994; Rapp et al., 2008). In our research, the basic activities associated with achieving lead management tasks include identifying profitable leads, making calls to leads and following-up on leads with calls, voicemails and emails. Hence, we characterize a salesperson's effort on lead management into *call productivity* and *lead follow-up*.

Selling Behaviour

Plank and Reid (1994) defined selling behaviour as the strategy people use during the execution of selling-related activities to aid the performance of their jobs. Two selling

behaviours (adaptive and customer-oriented) have been investigated in the sales force research stream (Chakrabarty, Widing, & Brown, 2014; Franke & Park, 2006). The correlation between customer-oriented selling and sales performance is highly dependent upon long term buyer-seller relationship (Chakrabarty et al., 2014; Saxe & Weitz, 1982). However, given that our research is related to a short term customer acquisition activity (i.e., lead management), it may be difficult to obtain applicable data that can justify the relationship between the two variables, and hence, our research will not consider customer-oriented selling. Adaptive selling on the other hand is important in aiding the performance of the lead management process.

Salesperson Characteristics

A salesperson's characteristic has been conceptualized as a combination of a salesperson's selling-related knowledge, skills, attitude, role perception and motivation (Ahearne et al., 2008; Churchill Jr et al., 1985; Verbeke et al., 2011). We believe that a combination of these factors reflects a "salesperson's competency", competency being a cluster of related knowledge, attitudes, and skills of a person, resulting in effective and/or superior performance (Lambert, 2009; Richard, 1982).

3. CONCEPTUAL MODEL DEVELOPMENT

Based on the above, we propose a model (Figure 1) exploring the impact of lead management systems' usage on inside sales performance via the mediators *selling behaviour* (adaptive selling), *task characteristics* (call productivity and lead follow-up) and *salesperson characteristics* (Salesperson's competency). The following discussion explains the development of the concepts used in this study.

Sales Performance

The discipline of sales has a long history of research on performance. Sales performance is the realized outcome from executing tasks, which may differ greatly across different types of selling jobs and situations (Walker, Churchill, & Ford, 1979). In earlier times, dollar or sales volume was the insightful way to conceptualize sales performance (Barker, 1999). However, with the growing significance of customer satisfaction, loyalty, customer knowledge and other crucial customer interaction aspects (Zallocco, Pullins, & Mallin, 2009), diverse concepts for sales performance were established. Behrman and Perreault Jr (1982)

suggest that producing high market share, selling products with highest profit margins, quickly generating sales of new products, generating high levels of dollar sales, producing sales with long-term profitability, selling to major accounts, and exceeding annual sales objectives are significant reflections of sales performance.

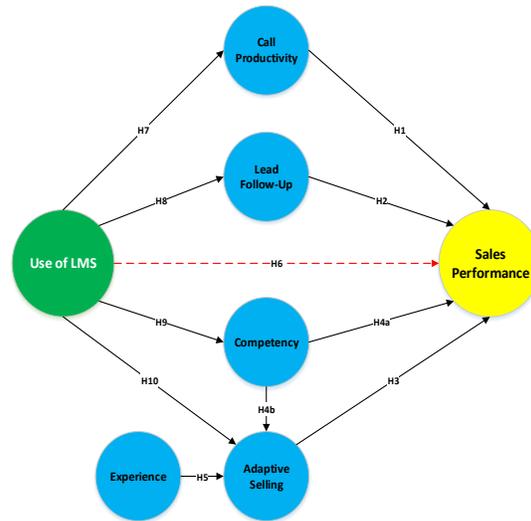


Figure 1: Conceptual Model

Anderson and Oliver (1987) see sales performance as the evaluation of salespeople based on outcomes (e.g., revenue) and behavioural (e.g., salesperson competence) performance. Zallocco et al. (2009) synthesised previous studies and grouped sales performance into performance *effectiveness* and performance *efficiency*. They describe efficiency as the ratio of selling output (close ratios) to selling input (sales calls), and effectiveness as a measurable salesperson's contribution and skill-based behaviours to valued organizational outcomes.

We define sales performance as the degree of efficiency and effectiveness to which a salesperson achieves the objectives of lead management for an inside sales organization. Most inside sales organizations set numeric goals for their salespeople to accomplish within a specified time period. The nature of the goal to be achieved varies from an organization to the next. Typically, it can be revenue or sales volume based. For some inside sales organizations, it might be measured by the number of call dials advocated by a salesperson.

Call Productivity

For inside sales organizations, a call is an instance of speaking to a lead or attempting to contact a lead through the phone or Internet technologies with the intention of selling a product or service. Productivity (output over input) is the key measure of a salesperson's calling activity (Ahearne et al., 2007; Sujan et al., 1994) and is not limited to making lots of calls but making quality calls that could yield sales. As reported in Vanillasoft (2014), most salespeople often dial to hit their daily call quota. We define sales call productivity as the number of sales calls made by a salesperson over the number of hours as well as the ratio of successful call connects. In general, the achievement of lead management activities influences sales performance. Improved sales call productivity has been known to impact sales performance (Ahearne et al., 2007; Rapp et al., 2012; Zallocco et al., 2009). We posit that:

Hypothesis 1: *Sales call productivity positively affects sales performance*

Lead Follow-up

Sabnis et al. (2013) described lead follow-up as customer acquisition efforts on generated leads. It is the ability of a salesperson to closely pursue leads and to maintain contact with these leads until the close of sales or a lead is abandoned. Every lead is a potential sale, so salespeople need to work on every lead with persistency and speed (Elkington & Oldroyd, 2007). The earlier a lead is contacted after an enquiry, the more chances there are of converting it into a sale. Response time impacts lead qualification and ultimately sales. Prospects usually develop a high perception of an organization's product or service when salespeople quickly contact them after an inquiry. Lead follow-up increases conversion ratio, and improved lead conversion ratio is a core indicator of enhanced sales performance. It also helps organizations to realize the full benefits of their marketing programs and reduce the number of leads that go to waste. We posit that:

Hypothesis 2: *Lead follow-up positively affects sales performance*

Adaptive Selling

This strategic selling approach involves the "altering of selling behaviours during a customer interaction or across customer interactions based on perceived information about the nature of the selling situation" (Weitz et al., 1986). Adaptive selling is measured by the ease and flexibility with which salespeople change their

selling styles while making sales (e.g., does a salesperson vary his/her selling style from customer to customer?).

Salespeople can use information gathered from customers to increase sales value and profits (Hughes, Le Bon, & Rapp, 2013) by modifying sales presentations strategies to fit individual customers' needs and preferences (Franke & Park, 2006) for the purpose of improving the likelihood of making a sale (Giacobbe, Jackson Jr, Crosby, & Bridges, 2006). The basis for adaptive selling behaviour comes from the fact that there is no single best way to sell, and therefore a good salesperson should be able to select, alter and implement a sales strategy based on the characteristics of the prospective customer and selling situation (Román & Iacobucci, 2010).

The sales and marketing literature provides general support for the relationship between adaptive selling and sales performance (Boorom, Goolsby, & Ramsey, 1998; Chakrabarty et al., 2014; Franke & Park, 2006; Goad & Jaramillo, 2014; Hughes et al., 2013; Hunter & Perreault Jr, 2006; Rapp et al., 2008; Verbeke et al., 2011; Weitz et al., 1986). Adaptive selling behaviour explained about one-third of the variation in sales performance in (Giacobbe et al., 2006). Chakrabarty et al. (2014) found that highly adaptive salespeople developed trust in their customers which in turn improved sales performance. Boorom et al. (1998), Franke and Park (2006), and Ahearne et al. (2008) found a direct positive relationship between adaptive selling and performance. Adaptive selling behaviour increases a salesperson's outcome performance, customers' feeling of satisfaction with the product and the salesperson (Román & Iacobucci, 2010). Finally, adaptive selling behaviour was ranked the second most significant driver of sales performance in Verbeke et al. (2011). Hence, we adapt to the growing body of research that has validated and is attempting to validate the positive relationship between adaptive selling behaviour and sales performance. We posit that:

Hypothesis 3: *Adaptive selling behaviour positively affects sales performance*

Salesperson Competency

We define salesperson competency as "the ability of a salesperson to effectively and efficiently carry out a sales task". Selling knowledge, presentation and targeting skills

(Ahearne et al., 2007) are important qualities in selling.

- **Selling Knowledge** symbolizes the quantity and richness of knowledge that salespeople use to advocate sales of an organization's product or service to help solve buyers' problems (Verbeke et al., 2011). It comprises the technical and market knowledge of a salesperson (i.e., product uses, specifications, current market situations, etc.) (Behrman & Perreault Jr, 1982). Knowledgeable salespeople are conversant with their company's product or service and have an understanding of the needs and expectations of customers and prospects (Rapp et al., 2006).
- **Sales Presentation Skills** represent "a line of conversation that attempts to convince a lead, to initiate and or close a sale of the product or service". Salespeople are the link between organizations and their customers and prospects, and are responsible for giving clear presentations and answering customers' questions (Behrman & Perreault Jr, 1984). Sales presentations are important to persuade leads that an organization's products or services will fulfil their needs.
- **Targeting Skills** refer to the ability of a salesperson to identify and select leads with high interest, potential and ability to buy, thus increasing the chances to convert these leads into sales (Ahearne et al., 2007). A salesperson's ability to target leads that represent the greatest potential for sales is crucial for inside sales organizations. These organizations want their salespeople to make more calls but even better they want these calls to create business opportunities and yield sales.

To relate these competency traits to performance, Weitz et al. (1986) suggested that salespeople's knowledge and skills impacted their performance and overall effectiveness. Ahearne et al. (2008) found a positive relationship between a salesperson's knowledge and sales performance, while Verbeke et al. (2011) ranked a salesperson's selling-related knowledge the first driver of sales performance. Behrman and Perreault (1982) revealed that giving high quality sales presentations that deliver the right message to prospects is a crucial dimension of a salesperson's

performance. Finally, Ahearne et al. (2007) found a positive relationship between a salesperson's targeting skills and sales performance. Hence, we posit that:

Hypothesis 4a: *A salesperson's competency positively affects sales performance*

Furthermore, studies found a positive relationship between salespeople's competency and their ability to effectively practice adaptive selling. Salespeople's selling knowledge affects the strategy they select to communicate and make sales presentations to buyers (Ahearne et al., 2007). Salespeople with enhanced selling knowledge and presentation and targeting skills know who to approach, when and how (Verbeke et al., 2011; Weitz et al., 1986). A salesperson practicing adaptive selling leverages knowledge about customers to tailor unique solutions to situations (Weitz et al., 1986). Hence we hypothesize that:

Hypothesis 4b: *A salesperson's competency positively affects their adaptive selling behaviour.*

The Moderating Effect of Experience

Rapp et al. (2006) define a salesperson's "experience" as his/her general sales experience, the amount of time spent working with the current company and the time spent in the current territory. Giacobbe et al. (2006) suggested that salespeople's experience impacts their adaptive selling behaviour via their intent to practice adaptive selling because a salesperson is better able to determine what sales strategy to use when he/she has already experienced such encounters and is aware of the possible outcomes of applying different sales approaches. Therefore choosing an approach is most likely to lead to a sale. Repeated experiences enable salespeople to align what they recognize to effectively practice adaptive selling. Park and Holloway (2003) and Levy and Sharma (1994) posited that a salesperson's experience may be a strong predictor of his/her selling behaviour. We posit that:

Hypothesis 5: *A salesperson's experience moderates the effects of adaptive selling on sales performance.*

Usage of Lead Management Systems

Lead management systems use various IT tools to streamline and automate labour-intensive lead management processes. They support inside sales with the appropriate tools to interact

with a higher volume of leads while sustaining quality conversations using background data about prospects delivered through CRM's marketing automation tools (Davis, 2013). They encompass key attributes of sales force automation (SFA) and CRM technology. As an SFA tool, a lead management system automates sales activities of lead management by providing tools (Erffmeyer & Johnson, 2001; Moutot & Bascoul, 2008; Rivers & Dart, 1999) to support information flow and the execution of routine lead management tasks (Rapp et al., 2008). As a CRM tool, it provides an interpretation of an organization's customer base (e.g., interaction and purchase histories) to support the objectives of managing customer relationships by making selling tasks more efficient (Ahearne et al., 2008; Rapp et al., 2008).

"IT can't increase or decrease the output of people's performance, only use of it can" (Orlikowski, 2000), and the use must be effective (Burton-Jones & Grange, 2013). We define "*usage of lead management systems*" as the degree to which salespeople integrate lead management systems to carry out lead management tasks. Usage refers to a de facto use of the lead management systems' potential.

Previous studies have connected IT and sales performance indirectly using mediators such as selling behaviour (Ahearne et al., 2008; Hunter & Perreault Jr, 2006; Rapp et al., 2008), task activities and salesperson competency (Ahearne et al., 2007; Ahearne et al., 2008; Goodhue & Thompson, 1995; Hunter & Perreault Jr, 2006; Rapp et al., 2008). We therefore posit that the effective usage of lead management systems to carry out lead management activities is indirectly associated with higher performance via the mediators call productivity, lead follow-up, adaptive selling and salesperson competency.

Hypothesis 6: *The use of lead management systems does not directly affect sales performance*

The use of IT improves communications and enhances salespeople's productivity, allowing salespeople to maintain direct contact with customers and prospects (Ahearne et al., 2008; Buehrer, Senecal, & Bolman Pullins, 2005; Erffmeyer & Johnson, 2001; Ferrell, Gonzalez-Padron, & Ferrell, 2010; Honeycutt Jr, 2005; Rapp et al., 2006). This reduces the time salespeople spend on non-selling activities, saving time for them to make more sales calls (Ahearne et al., 2007; Rapp et al., 2008).

Ahearne, Jelinek, and Rapp (2005) suggested that effectual use of IT enables salespeople to increase their number of sales calls. It improves the quality of sales calls through efficient filtering of qualified leads. Inside sales organizations deploy lead management systems to increase the call productivity of their salespeople by making available telecommunication tools, sufficient customer data and a standardized workflow to support effective communications with leads, thereby keeping salespeople focused on lead management activities (Ahearne et al., 2007; Goldenberg, 1996). We posit that:

Hypothesis 7: *The use of lead management systems positively affects call productivity*

A major reason inside sales organizations deploy lead management systems is to ensure all captured leads are given attention and contacted promptly, systematically and constantly. Additionally, salespeople have access to up-to-date information about their leads, lead status report, leads that resulted in sales, leads that have not been worked and why they have not been worked. This ensures the accountability of salespeople in managing leads. We posit that:

Hypothesis 8: *The use of lead management systems positively affects lead follow-up*

The literature has recognized IT's role in supporting adaptive performance enhancing behaviours (Ahearne et al., 2008; Hunter & Perreault Jr, 2007; Rapp et al., 2008). To practice adaptive selling, a salesperson needs detailed information about the lead (i.e., personality, mood, etc.) (Porter, Wiener, & Frankwick, 2003). The utilization of customer information is important for salespeople in demonstrating adaptive selling behaviours (Rapp et al., 2008; Weitz et al., 1986) and lead management systems amalgamate the customer information needed to enable these adaptive selling behaviours. Salespeople can use crucial customer information to better organize and support an effective sales presentation (Ahearne et al., 2008) tailored to a particular customer's need and wants (Rapp et al., 2008). Thus, we suggest that lead management systems provide salespeople with the customer information they need to carry out selling adaptability. We posit that:

Hypothesis 9: *The use of lead management systems positively affects adaptive selling behaviour*

To link IT usage and salesperson competency, it was confirmed that a salesperson's selling knowledge can be enhanced by providing information about sales and market situations for salespeople to use (Ahearne et al., 2007; Rapp et al., 2006). IT increases the richness and mobility of information (Jarvenpaa & Ives, 1994). A salesperson can search online databases and the Internet for intelligence, thus improving his/her knowledge of customer needs (Ahearne et al., 2005). Salespeople are able to sift through customer data and better focus on critical information, putting them in a better position to sell (Ahearne et al., 2005). A lead management system supports the sourcing of relevant information and serves as a repository for salespeople to keep abreast of knowledge about business relationships. Unarguably, selling over the phone or online without face-to-face interaction can be difficult, thus inside salespeople need sophisticated tools to support their calls. IT allows rich sales content to be delivered during interactions with customers and prospects. Lead management systems support salespeople with information about market, product and the leads themselves. Salespeople who use such information during presentations can provide a logical business and financial justification for the sale, hence improving product value and ultimately increasing the chances of sale (Ahearne et al., 2007).

As for targeting, Ahearne et al. (2007) found a positive relationships between salespeople's IT usage and their targeting skills. IT supports salespeople with the information needed to target the best leads at the best time. The enhanced visibility gained through the repository of information needed for contact and account management should motivate salespeople to properly select sales calls and only work on those they can justify, which should improve sales ratios. We posit that:

Hypothesis 10: *The use of lead management systems positively affects a salesperson's competency (selling knowledge, presentation and targeting skills)*

5. DISCUSSION AND CONTRIBUTIONS

In recent years, practitioners have tried to learn more about how technology usage influences performance in the inside sales industry. To understand the technology-to-performance link, practitioners must first identify what the important drivers and enablers of inside sales performance are. In this study we conducted a thorough literature review that allowed us to

identify three key factors that affect inside sales performance, namely: *task characteristics* (call productivity and lead follow-up); *salesperson's behaviour* (adaptive selling); and *salesperson's characteristics* (competency). Additionally, we recognized the impact of lead management systems usage on these inside sales performance enablers. Based on this review, we developed a conceptual model with hypothesized relationships for these concepts.

We believe our research has several theoretical and managerial contributions. To start with, we addressed the need for theoretical research on inside sales. Our research provides a theoretical standpoint and understanding of the inside sales practice, and the key role that IT plays in inside sales success. Secondly, we presented a conceptual model grounded in the technology-to-performance chain theory that may help researchers investigate the impact of IT usage on inside sales performance. We adapted key theories developed in sales research and applied them to inside sales. Most of the concepts used in this study were previously recognized and empirically validated in the related literature; however, these concepts together have not been used in a study exploring sales performance. Finally, our research identifies important drivers and enablers of inside sales performance.

We propose that the use of lead management systems to complete the lead management task is indirectly associated with higher performance via the following mediators: *task characteristics* (call productivity and lead follow-up), *selling behavior* (adaptive selling) and *salesperson characteristics* (competency).

The general implication for inside sales practice here is that we help managers understand that the benefits of lead management systems can be seen through better call productivity, improved lead follow-up and superior adaptive selling and competency qualities that occur during the sales process. Hence, it is important for managers to arm their salespeople with the effective lead management systems and most importantly, they should make sure their salespeople maximize the full potential of these systems. Using lead management systems may help salespeople remain constantly updated with information on the marketplace where they practice and the products/services they sell. The information-based gains from using lead management systems allow salespeople to better understand the needs and purchasing abilities of leads and the best way to sell to those leads.

Further research should improve the understanding of the impact of lead management systems usage on inside sales performance by validating the proposed model with empirical data. The next step in this research is to develop quantitative measures for our concepts, as well as empirically validate the relationships between the concepts in our model. Additional research needs to be conducted to identify the most effective and efficient lead management system architecture by evaluating both past and present development decisions to educate the market on sales technology approaches to the inside sales process that can help shape future development decisions and enhance sales performance.

6. REFERENCES

- Ahearne, M., Hughes, D. E., & Schillewaert, N. (2007). Why sales reps should welcome information technology: Measuring the impact of CRM-based IT on sales effectiveness. *International Journal of Research in Marketing*, 24(4), 336-349.
- Ahearne, M., Jelinek, R., & Rapp, A. (2005). Moving beyond the direct effect of SFA adoption on salesperson performance: Training and support as key moderating factors. *Industrial Marketing Management*, 34(4), 379-388.
- Ahearne, M., Jones, E., Rapp, A., & Mathieu, J. (2008). High touch through high tech: The impact of salesperson technology usage on sales performance via mediating mechanisms. *Management Science*, 54(4), 671-685.
- Anderson, E., & Oliver, R. L. (1987). Perspectives on behavior-based versus outcome-based salesforce control systems. *The Journal of Marketing*, 76-88.
- Barker, A. T. (1999). Benchmarks of successful salesforce performance. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, 16(2), 95-104.
- Behrman, D. N., & Perreault Jr, W. D. (1982). Measuring the performance of industrial salespersons. *Journal of Business Research*, 10(3), 355-370.
- Behrman, D. N., & Perreault Jr, W. D. (1984). A role stress model of the performance and satisfaction of industrial salespersons. *The Journal of Marketing*, 9-21.
- Boorum, M. L., Goolsby, J. R., & Ramsey, R. P. (1998). Relational communication traits and their effect on adaptiveness and sales performance. *Journal of the Academy of Marketing Science*, 26(1), 16-30.
- Brown, S. P., & Peterson, R. A. (1994). The effect of effort on sales performance and job satisfaction. *The Journal of Marketing*, 70-80.
- Buehrer, R. E., Senecal, S., & Bolman Pullins, E. (2005). Sales force technology usage—reasons, barriers, and support: An exploratory investigation. *Industrial Marketing Management*, 34(4), 389-398.
- Burton-Jones, A., & Grange, C. (2013). From Use to Effective Use: A Representation Theory Perspective. *Information systems research*, 24(3), 632-658.
- Chakrabarty, S., Widing, R. E., & Brown, G. (2014). Selling behaviours and sales performance: the moderating and mediating effects of interpersonal mentalizing. *Journal of Personal Selling & Sales Management*, 34(2), 112-122.
- Churchill Jr, G. A., Ford, N. M., Hartley, S. W., & Walker Jr, O. C. (1985). The determinants of salesperson performance: a meta-analysis. *Journal of Marketing research*, 103-118.
- Davis, J. (2013). What is Inside Sales and How Is It Changing? Retrieved June 12, 2014, from <http://www.ringdna.com/blog/what-is-inside-sales>
- Dickie, J., & Trailer, B. (2006). Improving Inside Sales Effectiveness Using Technology: – Putting Web Collaboration to Work: CSO Insights.
- Elkington, D., & Oldroyd, J. (2007). How Much Time Do You Have Before Web-Generated Leads Go Cold? Lead Response Management Study: [Insidesales.com](http://insidesales.com).
- Erfmeyer, R. C., & Johnson, D. A. (2001). An exploratory study of sales force automation practices: expectations and realities. *Journal of Personal Selling & Sales Management*, 21(2), 167-175.

- Ferrell, L., Gonzalez-Padron, T. L., & Ferrell, O. C. (2010). An assessment of the use of technology in the direct selling industry. *Journal of Personal Selling & Sales Management, 30*(2), 157-165.
- Franke, G. R., & Park, J.-E. (2006). Salesperson adaptive selling behavior and customer orientation: a meta-analysis. *Journal of Marketing research, 43*(4), 693-702.
- Giacobbe, R. W., Jackson Jr, D. W., Crosby, L. A., & Bridges, C. M. (2006). A contingency approach to adaptive selling behavior and sales performance: selling situations and salesperson characteristics. *Journal of Personal Selling & Sales Management, 26*(2), 115-142.
- Goad, E. A., & Jaramillo, F. (2014). The good, the bad and the effective: a meta-analytic examination of selling orientation and customer orientation on sales performance. *Journal of Personal Selling & Sales Management*(ahead-of-print), 1-17.
- Goldenberg, B. (1996). Re-engineering sales & marketing with advanced information delivery systems. *Sales and Marketing Management, 1*, S1-S31.
- Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *Mis Quarterly, 213-236*.
- Griggs, R. (1997, 07; 2014/6). Give us leads! Give us leads! *Sales & Marketing Management, 149*, 66+.
- Honeycutt Jr, E. D. (2005). Technology improves sales performance—doesn't it?: An introduction to the special issue on selling and sales technology. *Industrial Marketing Management, 34*(4), 301-304.
- Hughes, D. E., Le Bon, J., & Rapp, A. (2013). Gaining and leveraging customer-based competitive intelligence: the pivotal role of social capital and salesperson adaptive selling skills. *Journal of the Academy of Marketing Science, 41*(1), 91-110.
- Hunter, G. K., & Perreault Jr, W. D. (2006). Sales technology orientation, information effectiveness, and sales performance. *Journal of Personal Selling and Sales Management, 26*(2), 95-113.
- Hunter, G. K., & Perreault Jr, W. D. (2007). Making sales technology effective. *Journal of Marketing, 71*(1), 16-34.
- Jarvenpaa, S. L., & Ives, B. (1994). The global network organization of the future: Information management opportunities and challenges. *Journal of Management Information Systems, 25-57*.
- Kohli, A. K. (1989). Effects of supervisory behavior: the role of individual differences among salespeople. *The Journal of Marketing, 40-50*.
- Kroque, K. (2013). What Is Inside Sales? The Definition Of Inside Sales. Retrieved May 21, 2014, from <http://www.forbes.com/sites/kenkroque/2013/02/26/what-is-inside-sales-the-definition-of-inside-sales/>
- Lambert, B. (2009). Creation and validation of the Salesperson Competency Analysis: A competency model for entry-level business-to-business salespeople in the services industry. In P. Haan, R. Plank & R. Murphy (Eds.), (pp. n/a): ProQuest, UMI Dissertations Publishing.
- Levy, M., & Sharma, A. (1994). Adaptive selling: The role of gender, age, sales experience, and education. *Journal of Business Research, 31*(1), 39-47.
- MarketingSherpa. (2011). B2B Marketing BenchMark Report. from Sherpastore.com/2011B2BMarketingReport
- Monat, J. P. (2011). Industrial sales lead conversion modeling. *Marketing Intelligence & Planning, 29*(2), 178-194.
- Moutot, J.-M., & Bascoul, G. (2008). Effects of sales force automation use on sales force activities and customer relationship management processes. *Journal of Personal Selling & Sales Management, 28*(2), 167-184.
- Oldroyd, J. (2009, 2009). *Remote Sales Trends Research Survey*. Paper presented at the Sales 2.0 Conference.
- Olenski, S. (2012). When It Comes To Inbound Marketing Time Is Definitely Of The Essence. Retrieved June 21, 2014, from <http://www.forbes.com/sites/marketshare/2>

- 012/05/22/when-it-comes-to-inbound-marketing-time-is-definitely-of-the-essence/
- Orlikowski, W. J. (2000). Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science*, 11(4), 404-428.
- Park, J.-E., & Holloway, B. B. (2003). Adaptive selling behavior revisited: An empirical examination of learning orientation, sales performance, and job satisfaction. *Journal of Personal Selling & Sales Management*, 23(3), 239-251.
- Plank, R. E., & Reid, D. A. (1994). The mediating role of sales behaviors: an alternative perspective of sales performance and effectiveness. *Journal of Personal Selling & Sales Management*, 14(3), 43-56.
- Porter, S. S., Wiener, J. L., & Frankwick, G. L. (2003). The moderating effect of selling situation on the adaptive selling strategy-selling effectiveness relationship. *Journal of Business Research*, 56(4), 275-281.
- Rapp, A., Agnihotri, R., & Forbes, L. P. (2008). The Sales Force Technology-Performance Chain: The Role of Adaptive Selling and Effort. *Journal of Personal Selling & Sales Management*, 28(4), 335-350.
- Rapp, A., Ahearne, M., Mathieu, J., & Schillewaert, N. (2006). The impact of knowledge and empowerment on working smart and working hard: The moderating role of experience. *International Journal of Research in Marketing*, 23(3), 279-293.
- Rapp, A., Beitelspacher, L. S., Schillewaert, N., & Baker, T. L. (2012). The differing effects of technology on inside vs. outside sales forces to facilitate enhanced customer orientation and interfunctional coordination. *Journal of Business Research*, 65(7), 929-936.
- Richard, E. B. (1982). *The competent manager: A model for effective performance*: John Wiley & Sons.
- Rivers, L. M., & Dart, J. (1999). Sales Technology Applications: The Acquisition and Use of Sales Force Automation by Mid-Sized Manufacturers. *Journal of Personal Selling & Sales Management*, 19(2), 59-73.
- Román, S., & Iacobucci, D. (2010). Antecedents and consequences of adaptive selling confidence and behavior: a dyadic analysis of salespeople and their customers. *Journal of the Academy of Marketing Science*, 38(3), 363-382.
- Sabnis, G., Chatterjee, S. C., Grewal, R., & Lilien, G. L. (2013). The Sales Lead Black Hole: On Sales Reps' Follow-Up of Marketing Leads. *Journal of Marketing*, 77(1), 52-67.
- Saxe, R., & Weitz, B. A. (1982). The SOCO scale: a measure of the customer orientation of salespeople. *Journal of Marketing research*, 343-351.
- Seley, A., & Holloway, B. (2008). Sales 2.0: improve business results using innovative sales practices and technology (pp. 55-91). Hoboken, New Jersey: John Wiley & Sons.
- Sujan, H., Weitz, B. A., & Kumar, N. (1994). Learning orientation, working smart, and effective selling. *The Journal of Marketing*, 39-52.
- Sundaram, S., Schwarz, A., Jones, E., & Chin, W. W. (2007). Technology use on the front line: how information technology enhances individual performance. *Journal of the Academy of Marketing Science*, 35(1), 101-112.
- Vanillasoft. (2014). 4 Ways Queue-Based Lead Management is Shaping the Inside Sales Industry VanillaSoft.
- Verbeke, W., Dietz, B., & Verwaal, E. (2011). Drivers of sales performance: a contemporary meta-analysis. Have salespeople become knowledge brokers? *Journal of the Academy of Marketing Science*, 39(3), 407-428.
- Walker, O. C., Churchill, G. A., & Ford, N. M. (1979). *Where do we go from here?: Selected conceptual and empirical issues concerning the motivation and performance of the industrial salesforce*: Graduate School of Business. University of Wisconsin-Madison.
- Warner, B. (2013). Inside Sales Market Size 2013 Executive Summary: INSIDESALES.COM Research Division.

Weitz, B. A. (1981). Effectiveness in sales interactions: a contingency framework. *The Journal of marketing*, 85-103.

effectiveness. *The Journal of marketing*, 174-191.

Weitz, B. A., Sujan, H., & Sujan, M. (1986). Knowledge, motivation, and adaptive behavior: a framework for improving selling

Zallocco, R., Pullins, E. B., & Mallin, M. L. (2009). A re-examination of B2B sales performance. *Journal of Business & Industrial Marketing*, 24(8), 598-610

Editor's Note:

This paper was selected for inclusion in the journal as a CONISAR 2015 Distinguished Paper. The acceptance rate is typically 7% for this category of paper based on blind reviews from six or more peers including three or more former best papers authors who did not submit a paper in 2015.

Governance of Outsourcing: Building a Better Relationship

Dr. Ron Babin
rbabin@ryerson.ca

Shane Saunderson
ssaunderson@ryerson.ca

Ted Rogers School of Management
Ryerson University, Toronto, Canada

Abstract

Outsourcing of IT and related services is an unstoppable business trend. This paper explores key requirements for successful outsourcing: governance and relationships. The research examines the distinction between contractual governance and relational governance through a series of structured interviews with large outsource buyers. Using an outsourcing maturity model, the key question this research seeks to answer is this: what effect does outsourcing maturity have on the outsourcing relationship between a buyer and a provider?

Keywords: Outsourcing, governance, relationships, contractual governance.

1. INTRODUCTION

Global outsourcing refers to third party management of assets and services delivered across multiple international locations. Outsourcing is an accepted practice in many business organizations and a significant body of knowledge has developed over the last two decades that has improved our understanding of the management of outsourcing relationships (Lacity et al., 2009, Hirschheim and Lacity, 2000, Oshri et al., 2009, Dibbern et al., 2004, Lacity and Hirschheim, 1993).

The global outsourcing market, "estimated to be worth nearly half a trillion dollars" (Lacity and Willcocks, 2012) continues to grow in both size and complexity. There can be little doubt that IT outsourcing (ITO) and business process outsourcing (BPO) have become standard business practice. International Data Corporation, a market research firm, estimates that 90% of Fortune 500 organizations have embraced outsourcing as a standard

management practice; for many, the management of outsourcing has become a core competency. With this growth, the topic of governance becomes increasingly important to organizations who find that they no longer managing internal teams and projects, but instead managing multiple outsourcing providers.

The research presented in this paper investigate the influence of contractual and relational approaches to outsourcing governance, (Lacity and Willcocks, 2012, Miranda and Kavan, 2005, Poppo and Zenger, 2002, Goo et al., 2009). Lacity and Willcocks have identified both contractual and relational governance as two important categories that determine successful outsourcing outcomes, "Overall, the research found that the best outsourcing relationships are based on sound contractual governance and on strong relational governance."

Yet despite the growing importance of governance, the management and maintenance of outsourcing relationships has continued to be a source of friction, even after 20 years of study (Lacity et al., 2009). Much like individual human relationships, organizational connections seem to suffer the same deterioration and lackluster interaction over time if not properly maintained. A broad study analyzing 20 years of ITO and BPO research from 1988 to 2008 showed that while outsourcing relationships may start with enthusiasm and excitement, by year three, many relationships enter a "mid-contract sag" where staff on both sides have grown exhausted and complacent towards the relationship (Lacity et al., 2008).

The objective of this research is to determine how organizational outsourcing maturity influences the interaction and behaviors of parties in an outsourcing agreement. Ultimately, the goal is to answer the question: what effect does outsourcing maturity have on the outsourcing relationship between a buyer and a provider? While prior literature has highlighted the importance of both maturity and the relationship, there is little research to investigate the interaction between the two concepts. This research will fill the gap in literature regarding outsourcing maturity and relationship.

The structure of the paper is as follows. First, the literature is examined to understand the background perspectives on contractual and relational governance of outsourcing arrangements. We then explain the research approach. Third, the findings are presented and we then offer an interpretation of the findings. Finally, we draw key implications for outsourcing buyers.

2. CONTRACTUAL AND RELATIONAL GOVERNANCE

Many authors have recognized the distinction between contractual governance and relational governance in outsourcing. (Poppo and Zenger, 2002, Vitasek et al., 2011, Goo et al., 2009, Lacity and Willcocks, 2012). Contractual governance deals with formal elements such as contract details, payment and penalties, contract type, duration and size (Lacity et al., 2009). Conversely, relational governance considers the informal, "softer issues of managing buyer-supplier relationships, including trust, norms, open communication, open sharing of information, mutual dependency and cooperation" (Lacity et al., 2009). While the argument has been made that formal contracts

can lead to distrust and opportunism between organizations (Ghoshal and Moran, 1996), more recent work in outsourcing has found that contractual and relational governance are actually complementary (Poppo and Zenger, 2002).

In general, contractual governance reflects the legal agreement between the outsource provider and buyer. Formal contracts, defined by legal processes, reflect an agreement at a point in time and will extend over many years i.e. the contract term. As Goo et al point out, the service level agreements (SLAs) which are defined by the contract provide the basis for executing the provisions of the contract on a formal basis. This execution is referred to as contractual governance. The challenge with outsourcing contracts is the difficulty in predicting the difficulty and complexity of changes that will occur over the many years of the contract term. These "formal controls are the written contractual and management initiated mechanisms designed to guide behavior towards desired objectives" (Macneil 1980 as cited in Goo et al., 2009, Macneil, 1980). Contracts are "designed primarily to address transactions and legal protections such as pricing and price changes, service levels, limitations of liability, indemnification, and liquidated damages" (Vitasek et al., 2011). As such, outsourcing contracts can be inflexible, incomplete or inadequate, established between two legal entities and defined by experts who are unlikely to participate in the ongoing management of the outsourcing arrangement.

Relational governance on the other hand is the ongoing interaction between individuals within the outsourcing buyer and provider organizations who are responsible for the execution and the success of the outsourcing arrangement after the contract is agreed and signed. Relationships are built on cooperation and "high level of trust and commitment" (Goo et al., 2009). In addition to trust, effective knowledge sharing as well as communication regarding expectations, progress, capabilities, strengths, weaknesses and directions for the future have been identified as contributing to "higher levels of outsourcing success" (Lacity and Willcocks, 2012). Indeed, Lacity and Willcock (2012) found in empirical evaluations that higher levels of relational trust and communication were always associated with outsourcing success. Vitasek describes relational governance as a symbiotic relationship where the parties have a vested interest each other's success (Vitasek et al., 2011). Vantage

Partners have suggested that relational governance, which requires defined structures, processes and skilled individuals, is a prerequisite to achieving value in outsourcing arrangement (Ertel et al., 2006). Mehta and Mehta refer to relational governance as investments where the “greatest outsourcing benefits accrue to the buyers that actively participate in developing an interactive relationship with the vendors” (Mehta and Mehta, 2010).

Figure 1. below depicts the distinction between contractual and relationship governance.

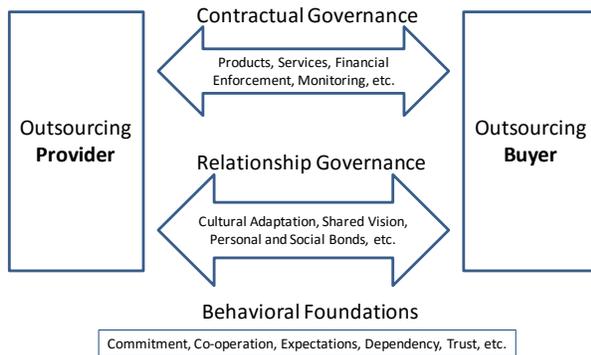


Figure 1. Dimensions of Contractual and Relational Governance (adapted from Kern and Willcocks, 2000).

In this figure, the Contractual Governance components include items described in a contract such as the delivery of products (e.g. hardware) and services (e.g. customer support), that results in financial enforcement (e.g. payments and penalties) and ongoing monitoring (e.g. Service Level Agreements). The Relationship Governance components are less specific and are typically not described in a document, such as cultural adaptation (e.g. how well the provider understands and works within the culture of the buyer), shared vision (e.g. an agreed definition of success), and personal and social bonds (e.g. empathy with and commitment to the individuals on the other side of the relationship).

3. RELATIONAL MANAGEMENT

Not to be confused with relational governance, the relationship defines the interaction between two individuals or organizations. Repeatedly, the management of this relationship is emphasized by authors as being crucial to the success of an outsourcing arrangement (Kern and Willcocks, 2000). Some researchers have identified how

“greater outsourcing benefits accrue to buyers that actively participate in developing an interactive relationship with vendors.” (Mehta and Mehta, 2010) In the case of outsourcing, this term refers to the connection between the buyer and the provider. From a high level, Kern and Willcocks described this outsourcing relationship as “consisting of context, structure, interactions and behavioural dimensions, which are informed by the antecedent conditions”(Kern and Willcocks, 2000). They go on to state that these antecedent conditions refer to elements of the contractual and relational governance, similar to our understanding of governance formed previously.

Much like governance, the relationship in an outsourcing arrangement can take on different forms. Commonly, literature has divided relationship types into two extremes: a “transactional style of relationship” and a “partnership style of relationship”(Gardner and Cooper, 1988). A transactional relationship is described as an “arm’s length relationship which the rules of the game are well specified and the failure to deliver on commitments by either party can be resolved through litigation.” Partnerships are characterized by “a long-term commitment, sense of mutual cooperation, shared risk and benefits, and other qualities consistent with concepts and theories of participatory decision making” (Henderson, 1990). It is important to note that these two styles are seen as bounds to the relationship type and many buyer-provider relationships will exist somewhere between the two.

Researchers have constantly identified a healthy relationship as a cornerstone for any outsourcing relationship (Lacity et al., 2009). However, despite 20 years of research, no clear solution has been defined to resolve the issue of how to best govern the buyer-provider relationship. While a multitude of other difficulties can lead to the worsening of an outsourcing arrangement, this paper will focus primarily on the relationship, as it has been indicated to stifle outsourcing year after year.

4. HOW THE RESEARCH WAS CONDUCTED

This qualitative study was performed in conjunction with the Centre for Outsourcing Research and Education (CORE) and Deloitte Consulting. The research team collected data from 15 outsourcing buyer teams across Canada, representing approximately 10% of the Canadian outsourcing market. Using a Deloitte outsourcing maturity assessment model,

questions were asked about governance and the buyer-provider relationship. The interviews were conducted as semi-structured, which allowed the interviewer to have “some latitude to ask further questions in response to what are seen as significant replies” (Bryman and Bell, 2007). Respondents, typically individuals responsible for the management of outsourcing contracts, provided insights on their organization’s governance capabilities and the state of their provider relationship. Interviews were conducted in-person at the buyer’s office with some members of the research team on conference call and lasted an average of 94 minutes.

Interviewee responses were noted by the research team and recorded for future reference. Data was analyzed under the inductive, interpretivist position that permitted the flexibility to recognize the differences between interviewees and their responses, while still interpreting meanings on a common understanding (Bryman and Bell, 2007). A coding technique outlined by McCracken (1988) was used to analyze interview data and develop the coding hierarchy which grouped all codes relating to governance and the relationship into common categories, each of which was classified as either contractual or relational. Where specific codes were repeated, instances of the code were also counted to give a sense of weighted emphasis to different topics and their importance to the buyer. A sample of the contractual and relational categories is provided in Appendix 1.

In addition to structured interviews, one buyer organization provided the opportunity for multiple interviews that created a small case study. As suggested by Yin (2009), this one case study allowed the research team to “expand and generalize theories, not to enumerate frequencies”.

Industry sector	Number of outsourcing deals
Financial services	7
Aerospace and aviation	4
Agriculture	2
Manufacturing / Energy	2

Table 1: Research participants
Table 1 provides a summary of the industry sectors represented in the data collection.

We prepared the interview guide from the Deloitte Outsourcing Maturity Model. The model

looks at ten dimensions of outsourcing. Table 2 below summarizes the ten dimensions with key questions for each dimension. In the semi-structured interviews, the researchers asked the key questions in an identical manner and the discussion would then focus on evidence of the maturity indicators for the outsourcing deal. The responses to the questions allowed the researchers to provide a score to each organization, with 1 being the lowest and 5 the highest. Figure 2 (in appendix B) provides a view of the scores across the 10 dimensions, and Figure 3 (in appendix B) provides a view of outsourcing maturity scores for the 15 projects examined.

Assessment Dimension	Key Questions
Outsourcing Model	Is there a formally defined outsourcing strategy in place, that enables collaborative and mutually beneficial relationships with key service providers?
Outsourcing Objectives and Business Alignment	Are the outsourcing objectives aligned to the needs of the business and the overall business strategy?
Outsourcing preparation	Are there capabilities in place to define scope, structure target state, understand current state impacts and coordinate transition plan?
Relationship	Are there formal processes to proactively manage relationships or interactions between service provider and internal stakeholders?
Performance Management	Are there capabilities to focus on the identification, reporting and benchmarking of performance attributes to assess the effectiveness of in-flight outsourcing contracts?
Service Management	Are best practice service delivery and support processes (e.g. ITIL) leveraged to ensure consistent provisioning and management of outsourcing activities?
Financial Management	Are there formal mechanisms to manage

	invoicing and payments? Are financial audits and benchmarking activities conducted to ensure costs are reflective of fair market prices?
Contract Management	Do key capabilities exist to proactively manage the contract life cycle (e.g. creation, mobilization, change and renewal, termination, dispute management, etc.)?
Outsourcing Organization Structure and Capabilities	Is there a well-defined and structured internal organization to oversee the outsourcing relationship? Are roles, responsibilities and accountabilities clearly established to maintain vendor oversight?
People and Change	Is there a capability to oversee buyer and provider organizational change activities throughout the contract lifecycle?

Table 2: Outsourcing maturity model (Deloitte)

5. RESEARCH FINDINGS

The following sections describe the three key findings and interpretations from the interviews.

Finding 1 - 'What gets measured, gets managed'

Contractual capabilities are typically those that can be documented, tracked and enforced. These are some of the more easily transferable capability areas since templates can often be applied across different contracts, business units, organizations or even industries. Across nearly all interviews, basic contractual elements were found to be relatively common. However, some of the most mature organizations interviewed were those who leveraged their contracts to the fullest by having the best understanding of their needs. That said, across both contractually mature and immature organizations, the contract was at times viewed as more a source of frustration than of usefulness.

Less experienced organizations showed their lack of maturity in outsourcing through a misunderstanding of their own needs. A medium sized agricultural organization found themselves

in a contract which was not appropriate to their needs. They began adjusting service provision, became overwhelmed by change orders, and had their relationship deteriorate with a feeling of helplessness.

"When we feel we're seeing too many change orders, it's really sad the answer that you get... 'get used to it'... this is a sore point and we were not going to go through that again."(Int2)

Eventually, managers begin to understand the things that are important to their organization: what works and what does not. A manufacturing company with over 10 years of outsourcing experience displayed very high procedural maturity and were able to identify the contractual elements that were important, such as delivery standards, and those that were useless to them, such as innovation clauses. However, one manager within this same organization suggested that his ideal scenario would be never to have to use the contract. He showed discontent when speaking about his provider who would overemphasize the use of the contract.

"Ideally, once every contract is done, put it in the drawer and never look at it again, but unfortunately, [provider] would clearly train people on what the contract is: where every comma and period is" (Int12)

He went on to state the potential shortcomings of this approach.

"There is a positive and negative. Sometimes, they don't necessarily understand the contract fully, every participant, so sometimes you have to catch a couple of things that are not ill-intended, but because of a lack of knowledge, they try to get in the contract which are not part of it" (Int12)

Interestingly, on the opposite end of the spectrum, one of the more contractually immature organizations had found a huge discrepancy in satisfaction between two service areas of the contract. One service area (customer care) was considered a huge success and looked at for best practices, yet it was indicated that their relationship had minimal foundation on contractual governance. Conversely, the organization's most troubled service area (IT) had all but given up on relational governance and fallen back to the contract, creating animosity between the buyer and the provider.

"Customer Care is probably the least aware of the terms of their contract, whereas IT could

quote you sections of the contract... but they are almost adversarial [with provider]" (Int4)

Contractual governance can be a very useful way of automating processes to reduce managerial overhead. A financial institution heralded a tremendous contractual success because they,

"were able to structure [the contract] and because it had end to end accountability, [they] could define what the end state was" (Int14). However, crucial to successful leveraging of procedure is the understanding of exactly what the organization needs. For organizations that are unclear about their current or future requirements, locking into a contractual obligation can be a risky endeavor and a potential source of animosity.

Finding 2 - 'The most important things cannot be measured'

Relational governance is viewed as the intangible half of governance. In contrast to contractual governance, relational characteristics are much more difficult to describe, document and track. As such, they appear to be less understood than contractual ones, however, are shown to be of equal, if not greater importance. Based on interviewee responses, informal communication, flexibility, trust, and openness are highlighted as influencers on the relationship. However, above all others, interviewees continually spoke to the importance of people in developing strong relational governance.

Immature outsourcing buyer organizations often found themselves in states of high provider turnover. During interviews with a crown corporation, struggles were mentioned with the provider relationship due to changing people. The discontent even grew internally in their organization and caused a rift with some of the end users.

"We had some real pain points when people were let go that were critical to a project and progress almost ended." (Int2)

Some of the less mature organizations stated a very hands-off approach to their provider's employee retention. Many took the 'black box' approach of not wanting to concern themselves with the details of the provider. However, maturing organizations began to understand their role in provider turnover. They saw that an employee did not simply work for the provider. Due to the intertwined nature of many

outsourcing arrangements, employees will often identify as much or more with the buyer organization.

"I think that the organization realized that we have a lot to do with attrition. If you're too hard on the supplier, if you treat them too much like a supplier and not enough like part of the family, you drive them away" (Int13)

The most mature outsourcing organizations treat providers not like suppliers, but like partners. By engaging in constant, informal communication that is open and upfront, issues were often seen ahead of time and confronted before they became serious. This type of frank communication also helped build trust and encourage partnership between the buyer and provider.

"There are a couple of issues have escalated, but it is very open and upfront, so things get dealt with quickly" (Int13)

"Have been some contractual misinterpretations, but at the end of the day, no one want to look bad in front of the other. We try to create a spirit of partnership so it's very rare that things go very wrong." (Int12)

This type of informal trust and understanding was raised as crucial by many respondents for allowing the flexibility needed in the service delivery. However, organizations such as the manufacturing company quoted below were undermining trust by being too contractually focused, and not being flexible enough themselves.

"I don't think we're there from a trust perspective, I think we still are putting our suppliers on notice when they are not following a process the way it should be followed." (Int10)

Juxtapose this with organizations who openly admitted to being very immature on contractual capabilities, however, maintained successful outsourcing arrangements due to their relational trust and flexibility. The first is a financial institution who trusted their provider enough that for a full year, they were effectively operating without any metrics. The second is a quote from a manufacturing company who stated that they had given up on their contract, but were still able to adjust through the recession because of the flexibility offered by the provider.

"We had to go on faith for the first year of our [billing drivers] because we were restructuring,

but luckily the trust level was so high that we could do that.” –Int9

“In 2008 when the market crashed, we had to tighten up, I took [35%] out of our deal because I said ‘I can’t afford it’... I was under contract with these guys, they did not have to cooperate to the extent that they did, but they were very, very flexible.”–Int11

This kind of trust and flexibility goes a long way towards developing the relationship. The interviewee from the second quote (Int11) also stated that because of this collaborative, understanding approach during the recession, he was now planning to expand the scope of outsourcing at the upcoming renewal.

Finding 3 – A poor relationship can result in reduced contract value

A single case study from one of the buyer organizations allowed the research team to dive deeper into the issues surrounding relational governance. This case is summarized in an IDC article describing multi-sourcing and the outsourcing centre of excellence. (Babin, 2013) In the late 1990s, a North American power utility realized that capital requirements for ongoing infrastructure upgrades and customer demands for competitive prices required that the utility should focus on its core competencies. As a result of the strategic realignment, the company decided to focus on the generation and distribution of electrical power as its core competency, while other processes within the organization — customer services, finance, HR, office services, and computer services — should be outsourced.

Through a rigorous public request for proposal (RFP), the utility identified one outsourced provider to deliver the non-core services. A key feature of the outsourcing agreement was the need for the provider to retain most, if not all, of the outsourced employees in the same jurisdiction as the hydro utility. This was clearly a first-generation outsourcing arrangement, since very little had been previously outsourced at the utility and there was little experience with outsourcing within the organization. The outsourcing deal was established as a 10-year multi-service deal; it was hailed as a significant strategic change that allowed the utility to focus on important issues. The deal was valued at approximately \$1 billion and was projected to save customers just under \$200 million. Both parties viewed the outsourcing relationship as strategic and transformational.

Approximately halfway through the deal, it became apparent that the 10-year single provider agreement was not working well. Although several of the services (towers) were operating well, several were not. From our interviews at the buyer we heard of dissatisfaction from internal and external customers, as well as poor or adequate performance, had created an atmosphere of distrust and tension. Several external reviews to seek areas for improvement had been conducted. As the deal reached the final years and the contract needed to be renegotiated, it became apparent that a single-vendor 10-year deal was out of the question. The various services were segmented and taken to market as multiple RFPs. The buyer organization recognized that it would take on the responsibility of integrating and providing oversight to multiple providers. The result was a multi-source arrangement, with the original vendor retaining a smaller set of services compared to the original contract.

The key interpretation of this case is the observation that although a well-defined contract had been established, and formed the basis for the formal governance processes, the relationship between individuals and between the two organizations lacked trust, openness and communication. The poor relationship resulted in a much-reduced scope and contract value for the incumbent outsource provider at renewal.

6. INTERPRETATION

Ideally, managers would have enough time to dedicate a focus to both to contractual and relational governance. When trying to govern an outsourcing relationship, “...the balance of not just multi-level, but formal and informal is important” (Int9). However, the reality for most outsourcing managers is a limitation on time and resources and a decision to be made between developing contractual governance or relationship governance capabilities. Interestingly, relational maturity seemed to be independent from maturity in contractual areas. Some organizations were very immature in contractual capabilities, yet quite mature from a relational perspective. Others were exceptionally mature at contractual capabilities, however, found their relationship suffering due to a lack of relational maturity.

Contractual capabilities, while better understood, often take more effort to develop and are difficult to get right. As such, inexperienced

outsourcing buyers seemed to find greater success in relational practice.

"It's a lot of the informal things that make things work. So you heard in the last minute the formal things don't often work and there's a reluctance to go to formal." – Int4

Even organizations with well-developed contractual capabilities identified the issue with contractual governance; it can become vastly complex, difficult to understand, and widely interpreted.

"I think we have a very strong contract with the right flexibility but it is this thick and... I don't think it's easily digestible and always transparent" –Int9

Relational governance by comparison is often more straightforward; simply maintain an open, flexible, understanding and collaborative connection with your provider to work towards a mutual vision of each organization's goals. However, the risk identified by the very individuals who had been operating with high relational and low contractual maturity, is that if key individuals leave or problems ever arise, there is little to fall back on. Contractual governance is required at times, particularly when resolving issues between the buyer and provider.

"...it all of a sudden matters when you get a major service failure. So I'm exposed there, I understand that and want to do something about that over time." –Int11

7. IMPLICATIONS FOR OUTSOURCING BUYERS

The implications of the above findings suggest a new way of developing the interactions between buyers and providers. Traditionally, companies just entering the outsourcing market will acknowledge their inexperience and seek third-party aid to develop a well-structured contract to guide them through the learning curve of their outsourcing relationship. This results in a defined set of contractual governance structures. The subtle nuances of the intangible forms of relational governance seem too complex to grasp without the proper experience.

However, the findings of this research suggest that the approach should be the opposite. Given the number of inexperienced organizations who aired grievances about the relationship pains caused by unsuitable contracts, contractual governance may not be the easy starting point. Findings instead suggest that inexperienced

outsourcing buyer organizations should look to develop relational governance capabilities in parallel with contractual governance capabilities. By developing a strong relationship, providers will be more willing to adapt and evolve the service provision through the difficult transition phase and towards a steady state. Once the relationship is firmly established, the buyer can then work with the provider to formalize many of the procedures and practices that are in place to ensure continuity of the arrangement even through tumultuous times.

Much like incorporating external legal teams in the development of new contracts, third-party consultants can be used to help expedite the development of the buyer-provider relationship and ensure best practices are adhered to. However, buyers must be wary when using consultants to help build their outsourcing relationships. Interview data indicated that during the preparation, negotiation and transition of the outsourcing arrangement, buyer organizations must thoroughly understand their own strategy and processes or risk misalignment of their provider with the true needs of the organization.

8. CONCLUSION AND FURTHER RESEARCH

Mature outsourcing (buyer) organizations benefit from contractual governance because they understand their goals and can define the contracts and procedures in a way that aligns the relationship with their current and future needs. However, even the most mature organizations need still to focus on relational governance, because no contract is perfect and there will always be relationship disputes that are more easily resolved through relational means. Mature buyers understand that a higher level of openness, trust and collaboration are critical to the success of complex outsourcing arrangements. More mature organizations appreciate the value of a better understanding of, and empathy for, the provider's business model and challenges.

Immature outsourcing organizations appear to suffer in the area of contractual governance because they do not understand their own outsourcing needs and tend to commit to long term contracts with inappropriate metrics, SLAs and terms, which deteriorate the relationship. Relational governance due to its flexibility can act as a substitute for poor contractual governance. As the organization learns more about what it needs, relational governance allows for a more organic evolution of the

relationship over time. A proactive commitment to more openness, cohesion, and collaboration between the outsourcing buyer and provider leads to higher levels of trust and better value from outsourcing.

Further research has been discussed with the participating organizations to examine both sides of an outsourcing deal from the perspective of provider and buyer regarding contractual and relationship governance. This would allow the researchers to understand the contractual and relationship perspectives from both sides of the outsourcing deal.

9. ACKNOWLEDGEMENTS

The authors would like to thank the Centre for Outsourcing Research (CORE) for sponsoring this research. As well, the research was funded with a grant from MITACS.

10. REFERENCES

- Babin, R. (2013). *IT Strategy and Governance: Preparing to Manage Your Outsourcing Vendor*. International Data Corporation.
- Bryman, A. & Bell, E. (2007). *Business Research Methods*, Oxford University Press.
- Dibbern, J., Goles, T., Hirschheim, R., & Jayatilaka, B. (2004). Information systems outsourcing: a survey and analysis of the literature. *ACM SIGMIS Database*, 35(4), 6-102.
- Ertel, D., Enlow, S. & Barr, K. (2006). *Managing Outsourcing Relationships*. Boston, Mass. : Vantage Partners.
- Gardner, J. & Cooper, M. C. (1988). *Elements of Strategic Partnership. Partnerships: A Natural Evolution in Logistics, Results and Proceedings of the 1988 Logistics Resource Forum*, Cleveland, Ohio. Leaseway Transportation Corporation & Ohio State University, 15-31.
- Ghosal, S. & Moran, P. (1996). Bad for practice: a critique of the transaction cost theory. *Academy of Management Review*, 21(1), 13-47.
- Goo, J., Kishore, R., Rao, H. R., & Nam, K. (2009). The role of service level agreements in relational management of information technology outsourcing: an empirical study. *MIS Quarterly*, 33, 119-145.
- Henderson, J. C. (1990). Plugging into Strategic Partnerships: The Critical IS Connection. *Sloan Management Review*, 31(3), 7-18.
- Hirschheim, R., & Lacity, M. (2000). The myths and realities of information technology insourcing. *Communications of the ACM*, 43(2), 99-107.
- Kern, T. & Willcocks, L. (2000). Exploring information technology outsourcing relationships: theory and practice. *Journal of Strategic Information Systems*, 9(4), 321-350.
- Lacity, M. & Willcocks, L. P. (2012). *Advanced Outsourcing Practice - Rethinking ITO, BPO and Cloud Services*, Palgrave MacMillan.
- Lacity, M. C. & Hirschheim, R. (1993). *Information Systems Outsourcing: Myths, Metaphors and Realities*, John Wiley & Sons.
- Lacity, M. C., Khan, S. A. & Willcocks, L. P. (2009). A review of the IT outsourcing literature: Insights for practice. *Journal of Strategic Information Systems*, 18(3), 130-146.
- Lacity, M. C., Willcocks, L. P. & Rottman, J. W. (2008). Global outsourcing of back office services: lessons, trends, and enduring challenges. *Strategic Outsourcing: An International Journal*, 1(1), 13-34.
- MacNeil, I. R. (1980). *The New Social Contract: an Inquiry into Modern Contractual Relations*, New Haven, CT, Yale University Press.
- McCracken, G. (1988). *The Long Interview*, Newbury Park, CA, Sage.
- Mehta, N. & Mehta, A. (2010). It takes two to tango: how relational investments improve IT outsourcing partnerships. *Communications of the ACM*, 53(2), 160-164.
- Miranda, S. & Kavan, B. (2005). Moments of governance in IS outsourcing: conceptualizing effects of contracts on value capture and creation. *Journal of Information Technology*, 20(3), 152-169.
- Oshri, I., Kotlarsky, J. & Willcocks, L. P. (2009). *The Handbook of Global Outsourcing and Offshoring*, Palgrave MacMillan
- Poppo, L. & Zenger, T. (2002). Do Formal Contracts and Relational Governance Function

as Substitutes or Complements? Strategic Management Journal, 23 (8), 707-725.

insight versus oversight. Operations leadership exchange. Corporate Executive Board and The University of Tennessee.

Vitasek, K., Stevens, G. & Kawamota, K. (2011). Unpacking outsourcing governance: how to build a sound governance structure to drive

Yin, R. K. (2009). Case Study Research Design and Methods, Fourth Edition, Sage.

Exploring Relationships between the Strategic Importance of IT and the Effectiveness of IT Security and Mobile Device Management

James A. Sena
jsena@calpoly.edu

Taryn Stanko
tstanko@calpoly.edu

Management Area
Orfalea College of Business
California Polytechnic State University
San Luis Obispo, CA 93407, USA

Mark Sena@xavier.edu
Xavier University
Cincinnati, Ohio, USA

Abstract

Based on the analysis of 131 executive interviews, this study explores the relationships among three key aspects of the strategic use of information technology: the perceived strategic importance and effectiveness of IT, the perceived effectiveness of information security, and the perceived effectiveness of mobile device management. Relationships among the three sets of items are explored using NVivo qualitative assessment of executive comments along with correlation measures and differences in mean responses of Likert scale responses. The research findings indicated that organizations recognize the strategic importance of IT and the effectiveness of IT. Across industries, IT is strategically important but for some industries not as effective. Security is linked closely to mobile devices.

Keywords: IT Strategy, Effectiveness, Security, Mobility, Mobile devices

1. INTRODUCTION

Organizations of all sizes recognize the opportunities to deploy mobile devices that foster collaboration and drive new levels of productivity. However, many IT administrators, developers, and organizational leaders are struggling to find an effective way to secure and control mobile use while stimulating user adoption. Early uses of smart devices at work centered on a few core apps: email, calendar, and contacts. Users then started bringing their "personal apps" into the workplace, and

software providers recognized this trend and began offering productivity apps for the workplace. IT must secure and support corporate apps on devices they do not own or entirely control. This support is vital to ensure security and governance of corporate assets (Mobile Application Management, 2015).

As the distinction between personal and organizational device usage continues to blur, the combination of applications that interact increases the need to investigate potential security issues (Suby, 2014). Mobile devices are

integrating into increasingly globally transparent business infrastructures (IBM MobileFirst, 2015). Gartner (2012) predicted that, by 2016, 40 percent of the workforce will be mobile and that the majority of them would possess a smartphone. This evolution potentially impacts a range of business strategies that include network security, device and application development, and data management.

A study conducted by IBM (Taft, 2015) highlights the lax security practices among enterprises. The results indicate that mobile app developers are not investing sufficiently in security. Nearly 40% of large companies, including many in the Fortune 500, are not taking proper precautions to secure the mobile apps they build for customers. The study also found organizations are not protecting their corporate and BYOD mobile devices against cyber-attacks—opening the door for hackers to access user, corporate and customer data. All the while, the number of mobile cyber-security attacks is continuing to grow. At any given time, malicious code infects more than 11.6 million mobile devices. The study showed that most organizations tend to prioritize speed-to-market and user experience over security. Moreover, they tended to scan their mobile apps for security vulnerabilities infrequently and much too late.

For enterprise CIOs, this means creating strategies to ensure that their IT component within their organizations is secure. At the same time, they need to ensure that IT continues to be effective as a partner in an organization's strategic plan. IT is becoming stewards of business agility and change – and serves as the primary engine for implementing change (IBM Institute for Business Value 2012).

According to Gartner (2014) by 2020, 75% of enterprises' information security budgets will be allocated for rapid detection and response approaches, up from less than 10% in 2012. Most external assessments of enterprise value, security and viability will include explicit analysis of IT assets and capabilities. IT will continue to performance, competitive advantage, risk management and transparency -and- the enterprises ability to merge, acquire and partner.

In this paper, we explore the relationship between the strategic importance and effectiveness of IT and the effectiveness of security and mobile device management. We address the pros and cons of IT as an effective

instrument in maintaining companies have an increasing impact on competitive business strategies. Figure 1 shows the relationships and proposed framework. We focus on information security and mobility as change agents across industries. We begin with a consideration of IT as a part of corporate strategy and competitive positioning. The main focus of this study addresses the need for an effective competitive strategy gave the changing landscape of mobility and mobile work and security measures. In section two, we provide a background and a brief discussion on varying strategic perceptions of IT across industries and the impact of mobility and security issues. In section three, we detail the methodology and research questions addressed in the study. In section four, we reveal the results of the analysis and related discussion. Lastly, in section five we provide conclusions, limitations, and opportunities for future research on this subject.

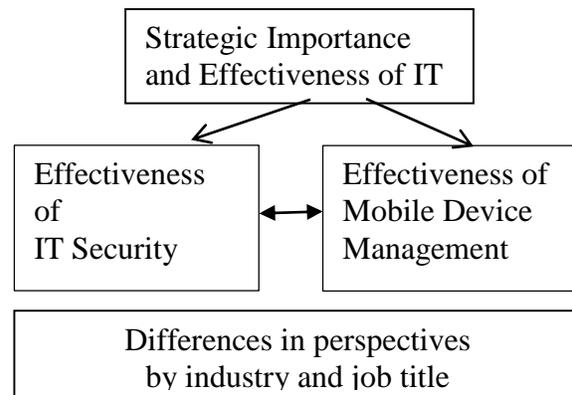


Figure 1: Research Framework

2. DISCUSSION OF THE FRAMEWORK

Strategic Use of IT

As with other forms of capital, organizations are motivated to invest in IT to increase productivity, gain an advantage over competitors, and increase profitability. Competitive advantage through investment in IT alone, however, is difficult to achieve and sustain and is vulnerable to the ability of competitors to replicate the productivity and profitability improvements gained through innovation. Investments in IT are more likely to be effective when coupled with some other sustainable advantage(s) by taking advantage of changing conditions in the workplace. There are four forces driving innovations: maintaining data control; implementation costs (e.g. software as a service); responses to changes; and, foremost providing a secure work environment.

IT Considerations

In general, the literature supports the notion that IT initiatives do not necessarily lead to a positive return on investment. A McKinsey Global Institute study (Manyika, 2011) on "U.S. Productivity Growth for 2000-2008" found a positive correlation between IT investments and productivity in only 35% of the industries. Strassmann (2003) earlier contended that "profitability and IT spending were unrelated" and return on IT investments is a primary concern and appropriate measures necessary to "distinguish fads from substance." He asserted that the major pitfall in IT decision making was embracing a solution without fully understanding underlying needs.

According to McKinsey (Arandjelovic et al., 2015), when CIOs play an active role in business strategy, IT performance on a wide range of functional and business tasks improves. In their business technology survey, few executives say their IT leaders are involved closely in helping shape the strategic agenda, and confidence in IT's ability to support growth and other business goals is waning. Akella et al., 2012).

Mobility Issues

Today work is becoming less defined as a place where one *goes to* and is more defined by what one *does*. There has been a rapid shift in workplace dynamics with workers outside the traditional office boundaries. The increase in remote workers and the trend to work on-the-go requires the need to be connected and to interact with business-critical information. Wherever one is — whether it is visiting customers, teleworking or accessing information in the manufacturing plant about customer orders or product performance requires connectivity.

At the tip of the iceberg, organizations are feeling the pressure to allow users to access sensitive corporate data via their personal mobile devices. These devices have become a widespread issue as 74% of organizations are allowing or planning to allow employees to use their own devices in the workplace (Zdnet, 2015). Employees want the flexibility to use applications from within the workplace, and at any time from any device. Such applications include enterprise resource planning (ERP), customer relationship management (CRM), and other enterprise systems; not only e-mail and instant messaging. With so much at stake, including network security and customer privacy the organization needs to address these new and changing requirements cautiously. Already

organizations of all sizes are taking advantage of anytime, anywhere access; web services; and social networking features to boost employee collaboration, improve customer service and speed of decision-making, providing organization's competitive edge. Like previous technology waves, these personal devices are a godsend for productivity and collaboration (Akella et al., 2012). As users become more adept in utilizing computing resources in their private lives, they tend to demand more from their business resources as well. This concept referred to as "consumerization" reflects the changing expectations that users place on workplace technology resources (Symantec Global Services, 2015).

Organizations must exist and function competitively and profitably in the virtual world of cyberspace (Harrell, 2002). More people in the world now have a mobile phone than a land line. Mobile devices outnumber personal computers by three to one, credit cards by two to one and TVs by two to one (Campbell, 2009)..

The Mobile Worker Issues

Every organization has a distinct threshold for absorbing change. This threshold ultimately determines the pace at which many initiatives are implemented. When considering the mobile worker both IT and the organization at large need to understand the supply and demand of change and anticipate appropriately. To be a successful enabler the organization and the IT function must achieve a balance between tolerance and need for change.

With work no longer a "place" where one receives pertinent business information and remain productive, the trend towards a larger mobile or remote workforce is more of a reality. Advances in mobile-accessible technology, from more sophisticated devices with increased processing power to business intelligence software, enable a more productive workforce by pushing the boundaries of what can be accomplished "on-the-go." No longer does location mean restricted access.

One characteristic of the high-performance workplace is the inclusion of ubiquitous collaboration, defined as *collaboration anytime, anyplace, and anywhere* (Gartner, 2011). Because of its ubiquitous nature, technologies for accomplishing collaborative tasks are of high importance to individuals at all levels and in all types of organizations. While organization leaders frequently focus on the cost benefits analysis in choosing technologies for their firms,

members of the collaborative work teams may be more impressed with features that aid in efficient and effective task accomplishment. These divergent aims may prevent organizations from achieving maximum efficiency and effectiveness from new technologies.

As organizations stretch their wings and adjust to operating in the world without boundaries management must take steps to eliminate the distance between data centers and remote and mobile workforces. Access to business-critical applications and data, while maintaining a secure environment, is critical. The structure of the traditional work environment is continuously changing. Existing work practices and managerial strategies are often not appropriate in those environments. In particular, traditional office communication with coworkers and management, usually dependent on physical proximity, has been disrupted (Gargiulo, 2010).

Most employees already use some mobile device in their personal lives. Moreover, more and more companies are expecting their workers to be available when they are out of the office. All of these factors combine to make handheld mobile devices a necessity, and. Therefore, IT must support them. It is the forward-thinking companies that have seen benefits across the organization, including IT, executive management, field service delivery and repair technicians, sales, operations, marketing and customer service. They've seen a positive impact on employee collaboration and productivity, real-time access to critical business information and employee satisfaction. They've also witnessed reduced costs, faster decision making and improved customer satisfaction (Sybase, 2010).

However, organizations face a particular challenge (Desouza, 2009). While teleworking and remote-access are becoming the norm increasingly, the majority of business applications and the critical customer data contained within them remain cordoned inside the four walls of the enterprise. Once field workers leave the office, they become isolated from vital customer information and desk-bound enterprise applications lose their immediate value. A mobilization strategy can counter this. At a corporate level, mobile business applications play an integral part of increasing customer satisfaction levels and meeting increasingly stringent service level agreements in an ever more competitive marketplace.

As mobile workforces grow, the demands on IT (McDowell, 2010) executives to provide the tools that allow employees to have access to key organizational data anytime, anywhere is growing as well. Add to that today's business environment, which moves at breakneck speed, and more CIOs are incorporating a mobile strategy into their IT infrastructure plans. According to Forrester Research (Leggett, 2015), providing more mobility support to employees is a top telecommunications and IT initiative of today's enterprises. Also, Forrester states that nearly half of enterprises say that formalizing and executing a mobile strategy (one that contains architectural frameworks for mobility) is a priority.

Security Issues

The sheer size and complexity of today's enterprises makes it nearly impossible to keep up with the rate of change in IT security, requiring a top-down strategy that prioritizes risk and accepts the limitations of available technologies. Only through the adoption of high-level policies and controls aimed at fostering flexible security practices across the organization and via more aggressive sharing of information about threats with others can companies improve their protection.

Mobility (Oliver, 2010) brings numerous opportunities – but also challenges. Mobile workers are imperative to an organization's success, but their device usage varies broadly. For example, information workers (that is, people who work both at a desk and outside of the office) need to use their devices for email, PDFs, and scheduling. By contrast, task workers need access to the most up-to-date customer information and require fast approval for business processes such as work orders. Adding to this complexity, the number of devices that support these workers are proliferating throughout corporations. With a mobile workforce comes the widespread distribution of sensitive, proprietary, and sometimes top-secret data outside the secure walls of headquarters. It is critical to the success of a mobile deployment to put measures in place to control and protect mobile assets. By implementing a solution that proactively manages and secures mobile data, devices, and applications, mobile projects can improve efficiency, customer service and – ultimately – profitability.

Organizations are in a difficult position of maintaining security provisions while enabling the productivity and conveniences afforded by mobile devices. Users are challenging, and even

rejecting, traditional mobile-device management (MDM) solutions, fearing their employers' ability to access, alter or delete personal data stored on their mobile devices (Eddy, 2015).

Corporate policy should limit the amount and type of sensitive information that's storable on a remote laptop or handheld device. If a small amount of sensitive information must be stored, the policy should mandate software that executes some Storage-level encryption. Of course, for the highest levels of data sensitivity, the policy should entirely prevent data storage on mobile devices. Access and control of mobile devices within the corporate network is imperative because software-based virtual private network (VPN) clients allow secure remote access to corporate networks from laptops. Thus, the second set of requirements addresses selecting mobile devices is based on security. Each remote device must have VPN software support, and basic locks and password protection.

Protecting the confidentiality, integrity and availability of electronic information -- is an important issue for businesses. Security incidents cost money regardless of the size or scale of the business operation. Most all businesses, regardless of size, have a web presence, interact with their suppliers and customers via the Internet and perhaps have offices or presence in different geographical areas. Also, the presence of the cloud and the myriad of mobile devices further serve to confound firm's IT policies. These changes dramatically increase security risk. Security solutions exist to support businesses of all sizes but do not necessarily take into account the specific nature of the business.

3. RESEARCH QUESTIONS AND METHODOLOGY

To investigate the ramifications of IT security, mobility and the cloud on IT strategy and effectiveness we offer the following research questions:

Research Question 1: To what extent is IT used as a strategic resource? How effective are efforts to use IT as a strategic resource?

Research Question 2: To what extent are effective security policies related to the strategic use of IT?

Research Question 3: To what extent are effective mobile policies related to security policies?

The investigation based on these research questions consisted of personal interviews with 131 senior level executives during a three-year period (2012 to 2014). We used a subset of questions described in Table 2 that closely followed our primary long-term research effort. MBA graduate students at their place of employment conducted the interviews primarily face-to-face. The subjects were offered confidentiality -- their names and affiliations were not revealed in the data set. Most of the interviews were conducted with executives in a relatively large city in the Midwestern United States. Thus, the findings in this research paper may be limited if there are regional differences in perspectives. Consistent with other academic empirical research, the subject pool was not restricted to one respondent per organization. Thus, the results should be interpreted with the potential that large companies might have multiple entries.

The executives were asked to comment on a series of questions about IT strategy, effectiveness, mobile policies, and security and provide a Likert scale rating (5=strongly agree, 3=neutral, 1=strongly disagree). The comments were accompanied by narrative discussions related to each question.

	Question
IT Strategic	1. My organization uses IT as a strategic, competitive resource?
IT Effective	2. My organization manages IT projects effectively?
Maintain Security	3. My organization maintains effective IT security (policies, education, technologies) to manage risks within a reasonable budget?
Mobile Computing	4. Has my organization an effective policy for managing mobile devices?

Table 2. Interview Questions

Using Figure 1 as a starting point we constructed two tables (see the Appendix) that presented the question results by industry classification and position expressed in mean values and percentages. Also, correlations along with relevant question nomenclatures were included.

The intent was to place the research questions interpretation in a holistic manner. We also made extensive use of Pivot Tables and filters to examine further the findings.

To help us better understand these dimensions, our interviewees were asked to describe in more detail why they gave a particular rating for each of the questions listed in Table 2. We used NVivo, a qualitative analysis software package, to analyze this additional data. Each interviewer provided detailed notes and quotes from the interview conducted, and the notes for all 131 interviews were imported into NVivo for analysis. To conduct this analysis, we first grouped the interviewees into categories depending on how they answered the study questions. Responses to each study question were placed into one of two categories: (1) high (Likert score above 3), or low (Likert score less than or equal to 3). We then created collections of interviewees in NVivo for each of our research questions based on responses to the study questions. For example, to help us explore our second research question we created collections (groups of interviews) based on the respondents' answers to interview questions 1 and 3 – regarding whether the company uses IT as a strategic resource and whether they are particularly effective in maintaining IT security.

Two of the authors then met in a series of face-to-face meetings to code the data to identify common themes that emerged and clustered these themes into categories. For example, "Lack of IT staff" and "Shifting Priorities" emerged in coding responses to the questions of whether IT is strategical. These codes were clustered into a higher level category called "Barriers." Themes that emerged are displayed and discussed for each research question.

4. ANALYSIS AND FINDINGS

The Pearson Correlation was conducted to examine the research questions (see Appendix). The Pearson Correlation is a measure of linear dependence between two variables. It is common in academic literature to perform statistical tests for linear, continuous relationships among the variables since the study data are Likert-scaled, with end points of "strongly agree" to "strongly disagree."

Research Question 1: To what extent is IT used as a strategic resource? How effective are efforts to use IT as a strategic resource?

The question as to whether IT is a strategically important resource has generated many controversies in the past decade. Carr's (2003) publication of "IT Does not Matter" in the *Harvard Business Review* was a tipping point. Table A-1 (in Appendix) reveals that there is statistically significant correlation between the strategic importance of IT and the effective use of IT to manage IT projects (.348). Based on the survey Information Technology is regarded as being very important to the strategic success of their organization with an overall mean value of 3.89. As one might expect, there is a very significant correlation between perspectives on IT as being strategically important and the effectiveness of IT. However, there is a curious anomaly when examining the responses. For those respondents (Table 3) that did not view IT to be strategically important (35.1%) over two-third of the respondents did not rate IT to be effective. Moreover, for those that viewed IT to be strategically important only 58% felt that IT was effective. Hence, the debate about the relevance of IT strategically continues.

The Nvivo analysis allowed us to identify key facilitating factors and constraints that either enabled or hindered companies in using IT strategically and effectively (see Table 3). On the positive side, nine key facilitating factors emerged from the qualitative coding process. For example, companies that reported both that IT was used strategically and the company was effective at harnessing IT reported that major investments were made in IT both for general systems as well as specifically in the areas of mobile device and cloud use. IT also brought internal and external data to connect staff with mission critical stakeholders. Strategic use of IT was not always linked with the effective use of IT, however. Constraints to using IT effectively include changes and delays in scope and project size, risk averse stakeholders, and other activities (e.g. security compliance) slowing down systems.

With respect to the industry categories respondents across most all industries rated IT to be of strategic importance. Only Government and Non-Profits rated IT Strategy to not be important. In terms of effectiveness, there was not a substantial variation in service industries (*professional services, energy, retail*) whereas *technology, consumer products, and manufacturing industries* had greater agreement that IT serves as a basis for competitive advantage and effectiveness. We can conclude that the relevance of IT strategically varies across industries.

IT Strategic = Yes [64.9%]	
IT Effective	
Yes [57.5%]	No [42.5%]
Facilitating Factors	Constraints
Company made a major investment in IT	Lack of key IT resources, such as equipment and staff
Major investments made in mobile and cloud areas	Change takes too much time, training, and attention
Company able to maintain scale and cost	Security compliance slows implementation
Provided outside IT services	Key stakeholders are highly risk averse
Supply chain operates efficiently	Sense of complacency
IT harnessed to connect with mission critical people	Delays due to scope and size

IT Strategic = No [35.1%]	
IT Effective	
Yes [33.3%]	No [66.7%]
Facilitating Factors	Constraints
High commitment to providing mobile solutions to employees	Company believes IT is not a differentiator because all companies utilize it
Ample supply of contract IT workers	Industry regulation creates constraints
Company uses latest IT collaboration tools	Company believes IT plays only a supporting role

Table 3. Comparison of IT Strategy with IT Effectiveness

With respect to the industry categories respondents across most all industries rated IT to be of strategic importance. Only Government and Non-Profits rated IT Strategy to not be important. In terms of effectiveness, there was not a substantial variation in service industries (*professional services, energy, retail*) whereas *technology, consumer products, and manufacturing industries* had greater agreement that IT serves as a basis for competitive advantage and effectiveness. We can conclude that the relevance of IT strategically varies across industries.

Breakdown (within)	IT Strategic	
Position	No	Yes
0-CIO (CTO, MIS,IT)	50.0%	55.3%
1-CEO(Pres, Ex VP)	21.7%	14.1%
2- Other	28.3%	30.6%
Grand Total	35.1%	64.9%

Breakdown (within)	IT Effective	
Position	No	Yes
0-CIO (CTO, MIS,IT)	46.8%	59.4%
1-CEO(Pres, Ex VP)	21.0%	13.0%
2- Other	32.3%	27.5%
Grand Total	47.3%	52.7%

Breakdown (overall)	IT Strategic	
Position	No	Yes
0-CIO (CTO, MIS,IT)	17.6%	35.9%
1-CEO(Pres, Ex VP)	7.6%	9.2%
2- Other	9.9%	19.8%
Grand Total	35.1%	64.9%

Breakdown (overall)	IT Effective	
Position	No	Yes
0-CIO (CTO, MIS,IT)	22.1%	31.3%
1-CEO(Pres, Ex VP)	9.9%	6.9%
2- Other	15.3%	14.5%
Grand Total	47.3%	52.7%

Position	Overall
0-CIO (CTO, MIS,IT)	54.2%
1-CEO(Pres, Ex VP)	16.8%
2- Other	29.0%
Grand Total	100.0%

Table 4. Position Breakdown for IT Strategic and Effectiveness

From a job position standpoint (see Table A-3 in Appendix) there were slight differences in the means of the three position categories for IT being strategic. Table 4 depicts the breakdown for IT Strategic and IT Effectiveness in the position survey and the distribution for each preference. Of note though for those that regard

IT to be strategic (65%) only 53% felt IT be effective. The CIOs in contrast to the other two positions (CEO and other professionals) regarded the IT Effectiveness as much higher than the CEOs and Others. We can also conclude that the perception of IT as being strategic depends on the position within the organization.

Given the various data, we can conclude that strategic IT is an important concern across most industries. However, there is not a strong link between effectiveness and competitive strategy for those that do not regard IT projects to be effective.

Research Question 2: To what extent are effective security policies related to the strategic use of IT?

The correlation table in the Appendix reveals that there is a moderate statistically significant correlation (.216) between the strategic importance of IT and the security policies. The mean values for IT Strategy were 3.89, for IT being Effective was 3.55 and Security Policies 4.20. The relationship between IT effectiveness and Security Policies showed a somewhat moderately significant correlation (.178).

For those respondents (Table 5) that did not view IT to be strategically Important (35.1%) over eighty percent of the respondents felt Security policies was important. Moreover, for those that viewed IT to be strategically important over eighty-five percent felt that Security was important.

To further explore this data, we examined the qualitative data to identify clusters of security policies used and security weaknesses reported. These are shown in Table 5. For those companies that felt they used IT strategically and had effective security policies in place, the most common policies discussed were actively conducting vulnerability assessments and extensively training and educating employees on security issues. Common regarding security include lack of necessary IT tools to manage security issues, lack of training and education of employees regarding security, and delayed response to security threats.

IT Strategic = Yes [64.9%]	
Maintain Security	
Yes [85.8%]	No [14.1%]
Security Policies Used	Security Weaknesses

Proactively conduct vulnerability assessments of IT systems	Lack of necessary IT tools regarding security
Extensively train and educate employees on secure use of IT	Lack of employee training around policies
Actively monitor IT use for breaches	Company is slow to respond to threats
Implement digital security measures (e.g. password protection, encryption, etc.)	Lack of employee education around policies

IT Strategic = No [35.1%]	
Maintain Security	
Yes [81.3%]	No [18.8%]
Security Policies Used	Security Weaknesses
Strongly control physical devices (e.g. disallowing USB keys)	Company has deficient and incomplete security policies
Train and educate employees on secure use of IT	Lack of employee education around policies
Actively monitor IT use for breaches	Slow to respond to security threats

Table 5. Comparison of IT Strategy with Security

From a Position standpoint approximately 81% overall considered Security to be important. Of note, all positions rated Security policies as high. With respect to the industry categories respondents across all industries rated security measures to be very important (over 79%). Across industries there does not appear not to be substantial variation. *Given the various data, we can conclude that security is an important concern across all industries. However, there is not a strong link between security and IT.*

Research Question 3: To what extent are effective mobile policies related to effective security policies?

The correlation table A-1 in the Appendix reveals that there was a statistically significant correlation (.329) between mobile policies and security policies. The mean values for security were 4.20, and for Mobile Policies was 3.40. This was further substantiated in Table 6 where Security is rated as very important (81%) but

Mobile Computing was only rated as important by 63%. Curiously those that did not rate Security to be important (19%) over eighty percent rated Mobile Computing to be important. The relationship Mobile Policies and IT strategy did not have a significant correlation (.072).

Maintain Security= Yes [81%]	
Mobile Computing	
Yes [63.3%]	No [36.6%]
Mobile Policies Used	Mobile Constraints
Extensive mobile device management policies created	Company lacks a mobile device management plan
Company tailors access, so that different employees have access to select data	Deep-seated concerns about how mobile will threaten security
Company likely to provide heavily controlled work mobile device	Company struggles with the tension between going mobile and balancing the expense involved
Company uses formal written agreements regarding mobile use	Company struggles with the rapid pace of technological change

Maintain Security = No [19%]	
Mobile Computing	
Yes [87%]	No [13%]
Mobile Policies Used	Mobile Constraints
Extensive mobile device management policies created	Company lacks a mobile device management plan
BYOD almost always allowed	Deep-seated concerns about how mobile will threaten security
Company provides mobile work device	Lack of necessary resources to go mobile

Table 6. Comparison of Security with Mobile Policies

A qualitative assessment of responses regarding company mobile policies revealed several key themes around effective mobile policies and key constraints that limited companies' ability to harness mobile devices. These are shown in Table 6. Those companies is reporting high levels of effective mobile policy use, not surprisingly, commonly reported having detailed

and comprehensive mobile device management plans in place that employees were well aware of. For those companies who were also effective in their use of security measures, we see evidence of policies that reflect a thoughtful implementation of mobile devices that include the use of formal written agreements that employees must sign as well as greater frequency in the deployment of heavily controlled company-provided mobile devices.

Security is considered much more important than Mobile Computing. However, for those that do not rate Security to be important the majority rate Mobility to be important.

5. CONCLUSIONS

This research provides insights into the potential differences and commonalities among organizations regarding IT as being strategic and effective—a competitive weapon and the impact of effective security and mobile device policies. The key findings of this study can be summarized as follows:

Strategic IT is an important concern across most industries. However, there is not as strong a link between effectiveness and competitive strategy for those that do not regard IT projects to be effective. Analysis of the qualitative data reveals that for those companies that harness IT strategically the main factor preventing effective use of IT is high levels of risk aversion and a sense of complacency. For those companies that does not harness IT strategically, key factors preventing effective IT use stem from a belief that IT cannot function as a differentiator and instead mainly plays a supportive role.

Given the various data, we can conclude that security is an important concern across all industries. However, there is not a strong link between security and IT. Assessment of the qualitative data suggests that those who are effective at harnessing IT strategically and have effective security policies are those who are aggressively and proactively working to assess vulnerability to attack.

Security is considered much more important than Mobile Computing. However, for those that do not rate Security to be important the majority rate Mobility to be important. Qualitative analysis of interview data also indicates that those companies that was highly effective in managing IT security were also those who were more likely to struggle with embracing change around mobile device use.

There are a few potential limitations to this study. Interviews for this study were conducted primarily in one metropolitan city in the mid-western part of the United States. The perceptions of the respondents may not reflect the national or worldwide view of the subject matter. While interview subjects were granted assurances that results were confidential, there may be inherent bias in the results if respondents were reluctant to express criticism of the role of IT and the impact of security and the use of mobile devices in their organization. Despite these limitations, these findings provide an important foundation for future research on the research to develop models and analyze in a more complex and rigorous nature, the issues raised in this exploratory study.

6. REFERENCES

- Accellion, Inc (2014). *Mobile Data Security: Best Practices for Securing Your Mobile Workforce*. An Accellion Whitepaper. Accellion, Inc, Palo Alto, CA.
- Akella, Janaki, Brown, Brad, Gilbert, Greg and Lawrence Wong (2012), *Mobility Disruption: A CO Perspective*, McKinsey Quarterly: Insights & Publications, September, 2012.
- Arandjelovic, Pedja Libby Bulin, and Naufal Khan (2015) *Why CIOs should be business-strategy partners*, McKinsey Quarterly Insights, February, 2015.
- Campbell, Don (2009) *Mobile Evolution Opens Doors to New Definitions of Work Place*, CIO Magazine. January 2009.
- Carr Nicholas G. (2004) *In Praise of Walls*. MIT Sloan Management Review April 15, 2004.
- Carr, N.G. (2003). *IT doesn't matter*. *Harvard Business Review*, 81(5), 41-49.
- Desouza Kevin C. (2009) *Securing information assets: The great information game*. *Business Information Review* Vol 26(1): 35-41, SAGE Publications Los Angeles, London, New Delhi, Singapore and Washington DC, [DOI: 10.1177/0266382108101305].
- Eddy, Nathan. (2015) *BYOD Security Issues Cause Headaches for Employees*, IT Pros. eWeek. <http://www.eweek.com/security/byod-security-issues-cause-headaches-for-employees-it-pros.html>.
- Garglulo, Terence. *The Ten Top Strategies for Managers of Mobile Workers*. Making Stories. 2010.
- Gartner Inc. (2011) *Gartner's Top Predictions: For IT Organizations and Users, 2011 and Beyond: IT's Growing Transparency*. [Gartner.com/predicts2011](http://gartner.com/predicts2011).
- Gartner Inc. (2012). *Gartner Says 821 Million Smart Devices Will Be Purchased Worldwide in 2012*
- Gartner, Inc. (2014) *Information Security: Is your Information Security Program a Roadblock to Business Progress?*. Gartner Webinar, <http://www.gartner.com/technology/topics/information-security.jsp>, Gartner Inc.
- Harrell, G. D. (2002). *Marketing: Connecting with customers* (2nd ed.). Upper Saddle River, NJ.
- IBM Institute for Business Value. *Leading through Connections*. IBM.com/ceostudy/2012, IBM, 2012.
- IBM Institute for Business Value. *The New Voice of the CIO*. ibm.com/iibv, IBM, 2010.
- IBM MobileFirst (2015), [http://www.ibm.com/mobilefirst/us/en/Put your Business in Motion](http://www.ibm.com/mobilefirst/us/en/Put_your_Business_in_Motion)).
- Legett, Kate (2015): *Transform The Contact Center For Customer Service Excellence. Executive Overview: The Contact Centers For Customer Service Playbook* June 3, 2015. |
- Manyika, James and David Hunt. *Growth and renewal in the United States: Retooling America's economic engine*. McKinsey Global Institute, 2011.
- Marquis, H. A. (2006) *Finishing Off IT*. Harvard Business Review. July 1, 2006.
- McDonald, M. and Aron, D (2011) *Reimagining IT: The CIO Agenda*. Gartner Executive Programs.
- McDowell. *Making Mobility your Business Advantage*. CIO Magazine. Customer Solutions Group, 2010.

- Mobile Application Management (2015),
Definitive Guide to Mobile Application
Management | Apperian.
[https://www.apperian.com/mobile-
application-management-gui](https://www.apperian.com/mobile-application-management-gui).
- Oliver, Mike. Mobility for Dummies. Sybase: A
John Wiley and Sons, Ltd. Publication, 2010.
- Sale, Nick. The way we will all work. Global
Telecoms Business. London: Jul/Aug 2007.
pg. 1.
- Strassmann, P. A. (2003). Letters to the editor,
Does IT matter? An HBR Debate. Harvard
Business Review, 81(7), 7-9.
- Suby, Michael (2014) Best Practice Security in a
Cloud-Enabled World, Stratecast, Frost and
Sullivan.
- Symantec Endpoint Security Services (2015),
Symantec Endpoint Global Services,
Symantec Corp, Cupertino, CA.
- Taft, Darryl (2015) IBM Study Shows Mobile App
Developers Neglecting Security, eWeek
(2015-03-21),
[http://www.eweek.com/developer/ibm-
study-shows-mobile-app-developers-
neglecting-security.html](http://www.eweek.com/developer/ibm-study-shows-mobile-app-developers-neglecting-security.html).
- ZdNet (2015) Research: 74 percent using or
adopting BYOD, (2015-09-29),
[http://www.zdnet.com/article/research-74-
percent-using-or-adopting-byod](http://www.zdnet.com/article/research-74-percent-using-or-adopting-byod).

Editor's Note:

This paper was selected for inclusion in the journal as a CONISAR 2015 Distinguished Paper. The acceptance rate is typically 7% for this category of paper based on blind reviews from six or more peers including three or more former best papers authors who did not submit a paper in 2015.

Appendices

Correlation	IT Strategic	IT Effective	Security	Mobile
IT Strategic	1			
IT Effective	0.348	1		
Security	0.216	0.178	1	
Mobile	0.072	0.081	0.329	1

Table A-1. Correlations

Category	Percent	IT Strategic	IT Effective	Security	Mobile
CONSPROD	14.5%	3.89	3.68	4.37	3.45
Energy	10.7%	3.50	3.00	4.25	3.71
FINSVC	14.5%	4.00	3.66	4.34	3.61
Govt	2.3%	2.75	3.50	4.25	3.25
Health	16.8%	3.95	3.59	4.14	3.32
INSURANCE	3.1%	3.75	4.50	5.00	3.75
MFG	8.4%	4.00	3.73	3.73	3.36
NONPROFIT	2.3%	3.00	3.67	3.67	1.67
Other	5.3%	4.00	3.33	3.50	3.17
PROFSVC	5.3%	3.86	3.00	3.86	3.00
Retail	3.1%	4.25	2.75	4.75	3.75
Tech	13.7%	4.22	3.78	4.33	3.44
Grand Total	100%	3.89	3.55	4.20	3.40

Table A-2 Mean Values by Category

Position	Percent	IT Strategic	IT Effective	Security	Mobile
0-CIO (CTO, MIS,IT)	53.40%	3.9	3.66	4.21	3.37
1-CEO(Pres, Ex VP)	16.80%	3.68	3.23	3.98	3.45
2- Other	29.80%	3.97	3.53	4.31	3.44
Grand Total	100%	3.89	3.55	4.2	3.4

Table A-3 Mean Values by Position

Moving Beyond Coding: Why Secure Coding Should be Implemented

Mark Grover
mjgrover@us.ibm.com
Technical Enablement Specialist, Watson University
IBM Watson Group
Durham, NC

Jeff Cummings
cumming sj@uncw.edu

Thomas Janicki
janickit@uncw.edu

Information Systems and Operations Management Dept.
University of North Carolina Wilmington
Wilmington, NC 28403

Abstract

Consistently, malicious attacks through unpatched software continues to be one of the leading causes of security breaches year after year. Most attention has been placed on continuous patching to eliminate any security holes in existing software. However, as more devices continue to be connected (i.e., Internet of Things) and entire industries move to a connected environment (e.g. healthcare), closer attention needs to be placed on the development process, specifically implementing secure software development guidelines. The purpose of this research is to examine the current security issues related to inadequate focus on secure coding and to provide an overview including suggestions on how to improve coding by focusing on security during development. In the following paper, we discuss the need for secure coding by first evaluating current data breaches caused by software flaws followed by a history of secure coding. This is followed by a discussion options available to developers for implementing secure coding. We finish by providing general recommendations for incorporating secure coding into current practices that could be adapted for both an organizational environment and higher education.

Keywords: Software Development, Secure Coding, Hacking, Certified Ethical Hacker

1. INTRODUCTION

Companies, governments, and private individuals are more and more vulnerable to the loss of confidential information. This is exasperated as companies are conducting more of their B2B, B2C and internal applications via internet or cloud applications. Loss is not limited

to organizations as the exposure to loss of personal information for private citizens continues to grow exponentially as the number of smart devices grows (National Vulnerability Database, 2015). While the reasons often mentioned for these losses include poor security policies, network intrusions, hardware swapping, vendor / supplier lack of security policies

(Patrizio, 2014), poor software programming is often cited as how information is ultimately stolen (Verizon Solutions, 2014).

Much has been written to address the need for CIO and CTO's to address the protection of data (Pettigrew, et al. 2010; Richardson, 2008; Zafar, et al. 2011). This paper will review one potential area that all software developers could undertake to improve the quality of their coding and make their applications more secure. Jones and Rastogi (2004) argued as far back as 2004 for the need for building security into the software development life cycle.

To understand the need for secure coding, the paper will initially review significant breaches of data as related to software coding issues. This will be followed by a discussion of the term and definition of 'secure coding' including concepts of what makes coding more secure. Next the concept of certification and training in the area of Certified Secure Programmer will be introduced. Finally, recommendations will be made to software developers and their supervisors will be made.

2. DATA BREACHES

Announcements from firms experiencing a data breach have become a daily occurrence. This includes many of the top breaches recently reported including JPMorgan Chase, Target, Home Depot, SAP and numerous companies impacted by the Heartbleed bug (see below for additional details of each breach). Many of these breaches can be traced back to a vulnerability discovered in a piece of software implemented at the breached organization. In the following section, we will highlight a few of these recent breaches expanding on how most were caused by vulnerabilities in software that could have been minimized by secure coding.

JPMorgan Chase

An attack occurring at JPMorgan Chase late last year resulted in the compromise of 76 million household accounts and 7 million small business accounts. The cause of the breach has been traced to hackers obtaining a list of applications being run at the organization which was then crosschecked with known vulnerabilities (Silver-Greenberg, Goldstein & Perlroth, 2014). While there was no evidence that financial data was compromised, JPMorgan Chase did alert customers that names, addresses, phone numbers and emails were likely stolen.

Target & Home Depot

Both attacks on Target and Home Depot can originally be tracked back to access through third-party vendor credentials. The malware was then loaded on the companies POS terminals which enabled hackers to steal the customer's credit card information totaling 80 million and 20 million, respectively. Recent details suggest this malware was exploiting a software vulnerability in the operating system installed in the POS system (Patrizio, 2014).

SAP

Recently, researchers analyzed hundreds of companies who had SAP implementations and found that over 95% of SAP deployments are vulnerable to cyber security attacks. Many of these companies also had patching windows of over 18 months. This is critical as in 2014 alone, SAP average more than 30 patches a month (~391 security patches issued) (Curtis, 2015).

Heartbleed Bug

Finally, in 2014, the Heartbleed bug which affected OpenSSL sent companies scrambling to patch the security hole in the software with some estimating close to 66% of active sites on the Internet being impacted. These included companies such as Google, Facebook, YouTube and Amazon (Schneier, 2014).

The breaches just described include only a few examples in which security flaws found within software can lead to breaches. While these have been highly publicized breaches, they are not the only cases of breaches as the number of vulnerabilities found in software continues to rise. The national vulnerability database reported that, in 2014, the category of software flaws included over 7,900 identified vulnerabilities and at the end May 2015, over 2,500 software flaws have been identified causing numerous vulnerabilities in a variety of common software used at organizations (figures obtained from the national vulnerability database, <https://nvd.nist.gov/>).

Many researchers expect vulnerabilities to continue to increase exponentially as we connect more and more devices. This includes anything from medical devices (Forrester, 2015) to home devices such as watches, activity tracker (e.g. Fitbit) and other devices falling under "Internet of Things" (Hesseldahl, 2015). As we expand into these new areas yet to extensively explored, it becomes imperative to increase the focus on secure coding to stop vulnerabilities at the source. The subsequent section discusses

how secure coding has been approached in the past and what is needed into today's environment.

3. SECURE CODING AND NEED

A review of academic journals resulted in few articles in the area of building more secure applications. To find a clear definition of secure coding, one must examine practitioner material such as the application developers' guides and other material distributed by the major application platforms.

Apple's Developer Library defines secure coding as "the practice of writing programs that are resistant to attack by malicious or mischievous people or programs." (Apple, 2014) Jim Canup, Enterprise Security Consultant for HP's Fortify Software Company, defines secure coding as "a process used to decrease risk and increase the overall quality of code as it pertains to security." (Canup, 2012) Microsoft's definition is quite simple, "write code that can withstand attack and use security features properly." (Microsoft, 2014)

Combining their definitions one could define secure coding as:

"The practice of writing code that is resistant to attacks."

If the leading companies understand the need for increased concern from security in coding, why is it not always done? According to Kenneth Van Wyk (2003), there are three factors that work against secure coding: "*Technical factors* (underlying complexity of the task), *Psychological factors* ('mental models'), and *Real-world factors* (Economic or other social factors)." The real challenge is that coders typically work for profit and have limited time and resources available to complete a given task. Best intentions, and practices, are often challenged when faced with deadlines.

History of Secure Coding

Software development has been around for over 60 years, and this begs the question, how long has secure coding been practiced? It appears the appreciation for the need for secure coding only came with the explosion of the internet and the .dot com era. Prior to the internet most coding efforts were for individual companies and access by malicious outsiders to company software was very limited.

For Microsoft, Bill Gates elevated the need for increased secured code in early 2002. On January 15, 2002, Bill Gates sent out an email to all full-time employees at Microsoft detailing the company's highest priority for the year. In the email Bill Gates states, "Trustworthy Computing is the highest priority for all the work we are doing. We must lead the industry to a whole new level of Trustworthiness in computing." (Gates, 2002) He goes on to define "Trustworthy Computing as computing that is available, reliable and secure as electricity, water services and telephony." Gates goes on continues to list the three key aspects as being Availability, Security, and Privacy.

As a result of this key priority, in January 2002, Microsoft formed the Trustworthy Computing team which was responsible for the development of the Microsoft Security Development Lifecycle (SDL) (Microsoft, 2014). The Microsoft SDL became a mandatory policy in 2004, and now is an integral part of software development at Microsoft. Microsoft's then director of Trustworthy Computing, Tim Rains said "Organizations today simply cannot afford to conduct business online without prioritizing security." (Rashid, 2013). Microsoft has been pushing its Security Development Lifecycle since its inception, and makes the tools and resources freely available. A Trustworthy Computing Blog entry titled "SDL at 10: Driving Business Vale", dated March 6, 2014, states that to date Microsoft's SDL tools have been downloaded over 1 million times. (Hall, 2014) Microsoft has even created a version for Agile. For a timeline of Microsoft SDL evolution, and a graphical representation of Microsoft's SDL, see Appendix A.

At the same time other software firms were venturing into more secure coding. As far back as 2002, Symantec detailed five problems (and solutions) that "make up 90% of all security vulnerabilities" (Wong, 2002). They are:

- 1) Buffer Overflow - avoid by checking the length type of input data
- 2) Format String vulnerabilities - avoid by proper input validation and exception checking
- 3) Authentication - use 8+ character passwords including alphanumeric and special characters
- 4) Authorization - ensure it is properly performed, avoid falsified data, and check for canonicalization errors (common character set).
- 5) Cryptography - avoid custom-built cryptographic algorithms

Wong (2002) continues by suggesting some best practices for secure coding include distrusting user input, always using input validation, and using source code analysis to enhance security. The article closes by saying "it would be negligent to not build hacker resistant code." Burnett and Foster (2004) also addressed practices to incorporate into all applications by examining a particular vulnerability which is the use of client side validation on entry of data. The challenge of client-side validation is that it can be 'easily disabled or custom tools can be used to bypass validation.' Fortunately, more modern software developer tools have assisted developers in avoiding this potential vulnerability.

In an April 2002 edition of eWeek, Dennis Fisher wrote that "CIOs, growing impatient with security vulnerabilities, are fighting back with language in contracts that holds software companies liable for breaches and attacks that exploit their products" (Fisher, 2002). The reasoning was that placing a monetary penalty for poor coding would effectively force companies to be more careful when coding. Not surprisingly, this article is just one of many placing blame on the people coding programs for their vulnerabilities.

One of the early challenges in the first decade of 2000 was the lack of clearly written standards. As already mentioned, Microsoft was developing their own standard but that would not be publically available until 2004. At that time the solution to securing code was the use of code reviews. The problem with code reviews was that it "is a process without a specific deliverable to a customer, and it often becomes a collaborative effort – without a leader, or an owner" (Hentzen, 2002). Code review was designed to find bugs, not to find security flaws. There was a lot of thought being given to the need to securely code, but consistent, tangible ways were not yet clearly established.

In 2003 Microsoft Press published a book titled "Writing Secure Code: Practical Strategies and Proven Techniques for Building Secure Applications in a Networked World." (Howard and LeBlanc, 2003) Recommendations include to think like an attacker, key considerations are:

- 1) Software must be written to defend all points as an attacker will choose the weakest point for intrusion.
- 2) Software coding must defend against known attacks but also consider other entry points by intruders.

- 3) Software developers 'play by the rules' while hackers have no rules.

It concludes with the challenge that any secure coder should consider: "The Internet is an incredibly complex and hostile environment, and your applications must survive there" (Howard and LeBlanc, 2003).

Fast forward eleven years from Bill Gates' original email, and secure coding is still being discussed. In 2013 a Network World article details that secure coding is still a challenge: "Coding practices could use greater attention to security, according to a survey commissioned by Microsoft last fall. Of 2,726 respondents made up of IT pros and application developers, 37% say their organizations build their products with security in mind. Of the 492 developers in the poll 61% say they don't take advantage of risk mitigation technologies that already exist such as address space layout randomization (ASLR), Structured Exception Handler Overwrite Protection (SEHOP) and data execution prevention (DEP)" (Greene, 2013). Among the reasons cited for not using enhanced techniques, convincing management to spend money to implement risk mitigation technologies was given.

As recent as 2013, a survey detailed the emphasis on secure coding by developers globally. It reported a peak of 79% for India develop with secure coding in mind, down to 61% in the United States and lows of 47% in China an only 33% in Japan. The survey also reported that 76 percent of U.S. developers use no secure application program process. The primary reasons for the lack of a secure program process were "cost at 21%, lack of support and training at 26%, and lack of discussion of the topic at 46%" (Ward, 2013).

How to verify if secure coding was used

According to the National Security Telecommunications and Information Systems Security Policy (NSTISSP) #11, the United States government requires that software products used for national security applications be subjected to formal evaluation prior to their use (NIAP, 2014). This is important during the evaluation of commercial, off-the-shelf application and government off-the-shelf products. These products are typically advertised as being secure, but without third party evaluation, such claims cannot be validated. NSTISSP attempts to ensure a given product meets the Common Criteria Evaluation and Validation Scheme (CCEVS) Program as well

as the Cryptographic Module Validation Program (CMVP, 2005).

The CCEVS was created 1985 (and most recently updated in 2012) to create a common criterion for evaluating a given product. The Common Criteria is composed of three parts:

- Introduction and General Model
- Security Functional Requirements,
- Security Assurance Requirements.

A key benefit of the standards is that by implementing a common criterion, software products can be evaluated with the same standard. Countries participating in the Common Criteria Scheme are Australia, New Zealand, Canada, France, Germany, Japan, Netherlands, Spain, UK, and the US. The purpose of using a common criterion is that it allows software developed in any one of these participating countries be evaluated by these standards, and be recognized and accepted by other member countries.

According to the National Institute of Standards and Technology, CMVP focuses on validation of cryptographic modules and cryptographic algorithm implementations (NIST). This ensures that the implementation of cryptographic functions adhere to stringent security standards. The reason why this is so important is to ensure no flaws exist in the implementation of a cryptographic method.

3. SECURE CODING CERTIFICATION

As a response for the need for training and certification the industry has developed certification based on specific languages and/or platforms. Examples of these newer certifications are:

- The EC-Council offers the Certified Secure Programmer in .NET, also known as ECSP. This certification "is intended for programmers who are responsible for designing and building secure Windows/Web based applications with .NET Framework." (EC-Council, 2014)
- Global Information Assurance Certification (GIAC) offers three programming related certifications. Their offerings include certification in Java, .NET, and Web Applications.
- The GIAC Secure Software Programmer-.NET (GSSP-.NET) and GIAC Secure Software Programmer-Java (GSSP-Java) certifications require a candidate "demonstrate mastery of the security knowledge and skills needed to deal with

common programming errors that lead to most security problems" (GIAC, 2014).

- The GIAC Certified Web Application Defender (GWEB) "allows candidates to demonstrate mastery of the security knowledge and skills needed to deal with common web application errors that lead to most security problems." This certification stresses that "successful candidates have hands-on experience using current tools to detect and prevent Input Validation flaws, Cross-site scripting (XSS), and SQL Injection as well as an in-depth understanding of authentication, access control, and session management, their weaknesses, and how they are best defended" (GIAC, 2014).

International Information System Security Certification Consortium, also known as (ISC)², offers a Certified Secure Software Lifecycle Professional (CSSLP) certification. This certification was designed to validate Software Development Lifecycle security competencies. The CSSLP is targeted at people involved in the Software Development Lifecycle with at least 4 years of proven work experience. The certification shows proficiency in "developing an application security program in your organization, reducing production costs and application vulnerabilities, enhancing the credibility of your organization and its development team, and reducing loss of revenue and reputation due to a breach resulting from insecure software." ((ISC)²)

To gauge if industry has embraced certification in hiring a search of information technology job postings was completed in 2014. On the day of the search there were 80,695 tech jobs listed on DICE.com. Searching by each of the previously mentioned certifications resulted in the following responses:

A search for ECSP (EC Council Certified Secure Programmer) on DICE.com resulted in 1 job listed. Interesting the posting was to teach the concept. A search on Monster.Com on the same day resulted in zero job listings. An investigation of LinkedIn detailed 82 people with the ECSP certification.

Likewise, a search for GSSP (Global Secure Software Programmer) on DICE.com resulted in eight unique postings. A GWEB (Certified Web Application Developer) resulted in four postings while the top certification in the search was CSSLP (Certified Secure Software Lifecycle Professional) yielded 13 unique postings.

While there are few postings listing certifications, it is hopeful to see that perhaps some companies are thinking of security more in the development life cycle process. However, this also shows a lack of concern by organizations when it comes to hiring developers with secure coding experience.

4. RECOMMENDATIONS

Following a review of current industry publications and white papers, a checklist is included below of the items to consider when writing software that will help reduce security concerns. These will help both those in organizations and those instructing on coding (e.g., higher education) a foundation to begin incorporating secure coding in their development process. They are a consolidation of recommendations from: George (2013), IEEE (2014), Mano (2015) and OWASP (2010)

1. Explicitly validate all user input
2. Authenticate all users using a mechanism that cannot be bypassed, the default option should be to deny access
3. Earn or Give, but never assume Trust with suppliers or customers (offloading security functions to a client is a lot less trustworthy)
4. Understand how integrating external components changes your attack mechanisms
5. Use caution with dynamic SQL Queries
6. Pay heed to compiler 'warnings'
7. Verify database permissions, especially those with write permissions
8. Identify sensitive data and how it should be handled, sanitize data sent to other systems
9. Design with the ability to isolate or toggle functionality.
10. Verify access to known and tested URLs
11. Send garbage to your application as a test
12. Use Cryptography correctly

5. SUMMARY

The research demonstrates not only the need for developers to begin considering secure coding, but also the need for IT management to encourage and implement secure coding principles in their development life cycle.

In reaction to past incidents, software development companies are beginning to

recognize that there is a need for secure coding practices, but the adoption rate is still woefully low. For those choosing a career in coding, a certification seems to be a good investment. According to a Dice.com search of "Java programmer", the salary ranges from \$50,000 - \$120,000 per year. On average, the same job with the addition of a secure coding certification such as GSSP certification will earn more, approximately \$85,000 - \$130,000 per year.

Writing secure code may take a little more time, but the long term benefits outweigh the initial time investment. The challenge is that new developers are taught how to code for time, and security is often viewed as something done later. Adopting Secure Software Development Lifecycle practices is not just best practice, but it also makes code that is resistant to attacks. Certification may be viewed as a measurable way to verify a programmer's knowledge of secure coding practices. Secure coding is a choice between doing something poorly or doing it the proper, secure way. It is either you pay now (better development) or your pay (a lot more) later.

Additionally, by providing some high level recommendations/checklist, we hope this paper will encourage companies and instructors of software developers to begin incorporating security into software design.

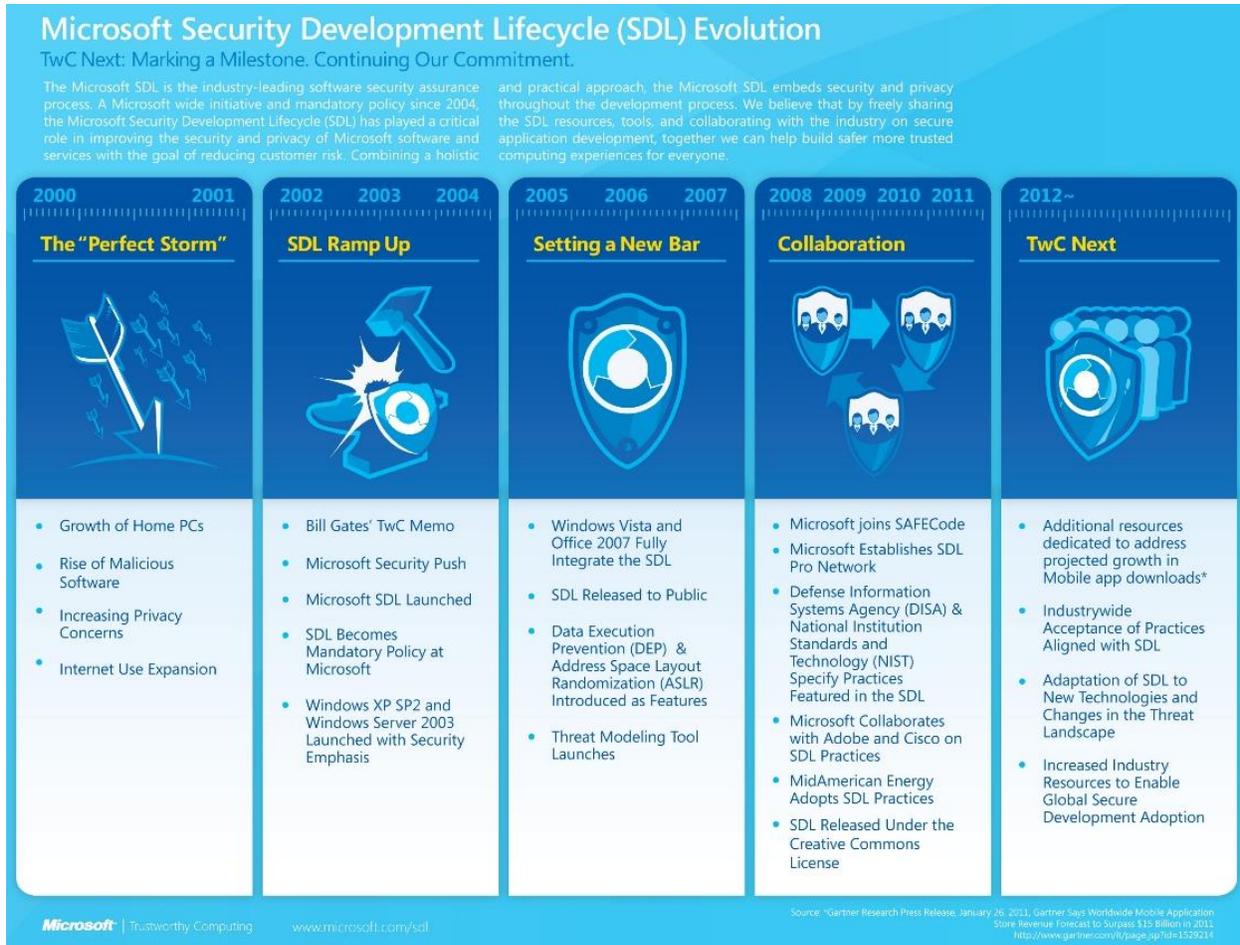
6. REFERENCES

- Apple, Inc. *Mac Developer Library*. 11 Feb. 2014. Retrieved 8 Mar 2014. <<https://developer.apple.com/library/mac/documentation/security/conceptual/SecureCodingGuide/Introduction.html>>.
- Burnett, M., Foster, J. (2004). James Foster. *Hacking The Code: ASP.NET Web Application Security*. Rockland: Syngress Publishing, 2004. eBook Collection (EBSCOhost).
- Curtis, J. (2015). "95% of SAP deployments 'vulnerable to cyber attacks'." *ITPro*. Retrieved 8 May 2015. <http://www.itpro.co.uk/hacking/24577/95-of-sap-deployments-vulnerable-to-cyber-attacks>
- Canup, Jim (2012). "Secure Coding: Best Practices." *Info Systems Audit and Control Association: 2012 North America Computer Audit, Control and Security Conference Resources*.

- EC-Council Inc. (2014) *EC-Council Certified Secure Programmer (ECSP) .NET*. Retrieved 8 Mar. 2014. <http://www.eccouncil.org/Certification/ec-council-certified-secure-programmer-dotnet>
- Fisher, Dennis (2002). "Contracts getting tough on security (Cover Story)." *eWeek: The Enterprise Newsweekly* 19 Apr. 2002. Academic Search Complete. Retrieved 6 Mar. 2014.
- Forrester, A. (2015). "IEEE Issues Security Guidelines for Medical Device Software Development." *ExecutiveBiz*. Retrieved 19 May 2015. <http://blog.executivebiz.com/2015/05/ieee-issues-security-guidelines-for-medical-device-software-development/>
- Gates, Bill (2002). *Bill Gates: Trustworthy Computing*. 17 Jan. 2002. Retrieved 8 Mar. 2014. <http://www.wired.com/techbiz/media/news/2002/01/49826>.
- George, Randy (2013). The Five Most Common Security Pitfalls in Software Development. Dark Reading, Retrieved 3 June 2015. <http://www.darkreading.com/the-five-most-common-security-pitfalls-in-software-development/d/d-id/1140103?>
- GIAC, Inc. (2014). *GIAC Secure Software Programmer-Java (GSSP-JAVA)*. Retrieved 8 Mar. 2014. <http://www.giac.org/certification/secure-software-programmer-java-gssp-java>
- Greene, Tim (2013) . *Microsoft commits to secure coding standard*. Retrieved 8 Mar. 2014. <http://www.networkworld.com/news/2013/051413-microsoft-secure-coding-269733.html>.
- Hall, Adrienne (2014). *SDL at 10: Driving Business Value*. Retrieved 8 Mar. 2014. <http://blogs.technet.com/b/trustworthycomputing/archive/2014/03/06/sdl-at-10-driving-business-value.aspx>.
- Hentzen, Shil (2002). *The Software Developer's Guide*. Whitefish Bay: Hentzenwrke Publications, 2002. eBook Collection (EBSCOhost).
- Hesseldahl, A. "A Hacker's Eye View of the Internet of Things." *Re/code*. 7 Apr. 2015. <http://recode.net/2015/04/07/a-hackers-eye-view-of-the-internet-of-things/>
- Howard, M., LeBlanc, D. (2003). *Writing Secure Code: Practical Strategies And Proven Techniques For Building Secure Applications In A Networked World*. Redmond: Microsoft Press, 2003. eBook Collection (EBSCOhost). 6 Mar. 2014.
- IEEE (2014). Avoiding the Top 10 Software Security Design Flaws. IEEE Center for Secure Design. Retrieved 3 June 2015 http://cybersecurity.ieee.org/images/files/images/pdf/FOR_DISTRIBUTION_IEEE_Center_for_Secure_Design_Release.pdf
- Jones, R. L., & Rastogi, A. (2004). Secure coding: building security into the software development life cycle. *Information Systems Security*, 13(5), 29-39.
- Microsoft, (2014). *Evolution of the Microsoft SDL*. Retrieved 8 Mar. 2014. <http://www.microsoft.com/security/sdl/resources/evolution.aspx>.
- . *Writing Secure Code*. 8 Mar. 2014. Website. 8 Mar. 2014. <http://msdn.microsoft.com/en-us/security/aa570401.aspx>.
- NIAP (2014) *CC/CEM Documentation*. Retrieved 8 Mar. 2014. https://www.niap-ccevs.org/Documents_and_Guidance/cc_docs.cfm.
- . *National Policy Regarding the Evaluation of Commercial Products*. 24 Mar. 2005. Retrieved 8 March 2014. https://www.niap-ccevs.org/NIAP_Evolution/faqs/nstissp-11/index.cfm?&CFID=20754558&CFTOKEN=1af2804fc368770e-57C50E2A-B120-B58D-2EF63ACFF8A8F107.
- NIST (2009). *Security Management & Assurance*. Retrieved 8 Mar. 2014. <http://csrc.nist.gov/groups/STM/index.html>.
- OWASP (2010). OWASP Top 10 Application Security Risks – 2010. Retrieved 3 June 2015. <https://www.dropbox.com/home/Secure%2>

- 0Software%20Development?preview=OWASP_T10_-_2010_rc1.pdf
- Patrizio, A. "Home Depot, Target breaches exploited Windows XP flaw, report says." *NetworkWorld*. 18 Sep. 2014. <http://www.networkworld.com/article/2685295/microsoft-subnet/home-depot-target-breaches-exploited-windows-xp-flaw-report-says.html>
- Paul, M. (2015). White Paper VIII: Software Security in a Flat World. ICS2, Retrieved 3 June 2015. <https://www.isc2.org/csslp-whitepaper.aspx>
- Pettigrew, J., Ryan, J., Salous, K., & Mazzuchi, T. (2010). Decision-Making by Effective Information Security Managers. In Proceedings of the 5th International Conference on Information Warfare and Security.
- Rashid, Fahmida Y. (2013). Microsoft Talks Secure Coding Practices, *Standards at Security Development Conference*. Retrieved 8 Mar. 2014. <<http://www.securityweek.com/microsoft-talks-secure-coding-practices-standards-security-development-conference>>.
- Richardson, R. (2008). CSI computer crime and security survey. *Computer Security Institute*, 1, 1-30.
- Schneier, B. "Heartbleed." *Schneier on Security*. 9 Apr. 2014. <https://www.schneier.com/blog/archives/2014/04/heartbleed.html>
- Silver-Greenberg, J., Goldstein, M., & Perlroth, N. "JPMorgan Chase Hacking Affects 76 Million Households." *New York Times*. 2 Oct. 2014. http://dealbook.nytimes.com/2014/10/02/jpmorgan-discovers-further-cyber-security-issues/?_php=true&_type=blogs&_r=1
- Van Wyk, K. R. (2003). Secure coding: principles and practices. *O'Reilly Media, Inc.*.
- Verizon Solutions, (2014). Verizon 2014 data breach investigations report. <http://verizon.com>.
- Ward, Keith. (2013) Study: Majority of U.S. Developers Use No Secure Coding Processes. Retrieved 8 Mar. 2014. <<http://visualstudiomagazine.com/articles/2013/07/16/majority-of-us-devs-dont-practice-secure-coding.aspx>>.
- Wong, David. (2002) Secure Coding. Retrieved 8 Mar. 2014. <<http://www.symantec.com/connect/articles/secure-coding>>.
- Zafar, Humayun, Myung Ko, and Kweku-Muata Osei-Bryson. (2011) "Does a CIO Matter? Investigating the Impact of IT Security Breaches on Firm Performance Using Tobin's q." *44th Annual Hawaii International Conference on System Sciences (HICSS)*.

Appendix A Microsoft SDL / Evolution & Timeline



Security Development Lifecycle:



Assessing Cultural Aspects of Organizations for Knowledge Management Initiatives

Justin Fruehauf
Jdfst18@mail.rmu.edu

Dwayne Lehman
dwlst9@mail.rmu.edu

Information Systems and Communications
Robert Morris University
Moon Township, PA 15108, USA

Abstract

Managing organizational knowledge is a critical factor in the success of any institution. A key goal of knowledge management initiatives is to strengthen organizational culture. An appropriate culture must exist in the organization for knowledge management initiatives to be successful. This paper represents a review of literature aimed at providing a strategy for the understanding of organizational culture in order to assist in the development of an effective knowledge- management plan. In particular, this paper will focus on the work put forth by Lee Bolman and Terrence Deal as well as Dave Logan, John King and Halee Fisher-Wright. The goal of this paper is to examine the similarities between the respective authors' notions of organizational frames and the tribes that exist within organizations. It applies the concepts as a tool to address knowledge management barriers within organizations.

Keywords: knowledge, knowledge management, organizational culture, Bolman and Deal Four Frames Model, organizational tribes

1. INTRODUCTION

Managing organizational knowledge is a critical factor in the success of any institution. The ability to capture and effectively use knowledge is heavily dependent on the culture of the organization. Indeed, understanding the entity's culture is crucial to the development of a knowledge management strategy. Without this understanding, knowledge remains a wasted asset.

A key goal of knowledge management (KM) initiatives is to strengthen organizational culture (Davenport & Prusak, 1998; DeLong, 1997; Jennex et al. 2009; Nonaka, 2007). Ironically, an appropriate culture must exist in the organization for knowledge management initiatives to be successful. Successful

knowledge management initiatives lead to the creation of learning organizations and new knowledge (Nonaka, 2007). Jennex et al. (2009) indicate eight beneficial performance outcomes generated by KM initiatives; Product and service quality, productivity, innovative ability and activity, competitive capacity and position in the market, proximity to customers and customer satisfaction, employee satisfaction, communication and knowledge sharing, and knowledge transparency and retention (p. 177). The measure of success for these initiatives are dependent on the KM resources used, the relationships personnel build across the organization, and the values and underlying assumptions of the employees toward knowledge as an asset.

This paper represents a review of literature aimed at providing a strategy for the

understanding of organizational culture in order to assist in the development of an effective knowledge management plan. In particular, this paper will focus on the notions put forth in *Reframing Organizations: Artistry, Choice and Leadership* by Lee Bolman and Terrence Deal (2008) as well as *Tribal Leadership: Leveraging Natural Groups to Build a Thriving Organization* by Dave Logan, John King and Halee Fisher-Wright (2008).

The goal of this paper is to examine the similarities between the respective authors' notions of organizational frames and the tribes that exist within organizations. (The notion of organizational tribes is explained in section 6 of this article). It applies the concepts as a tool to address knowledge management barriers within organizations.

2. KNOWLEDGE AND KNOWLEDGE MANAGEMENT

Before addressing any strategy for knowledge management it is important to identify key terms and concepts. Knowledge management remains just as crucial to an organization in 2015 as it did when Peter Drucker first described the "knowledge society" in the 1980's. It is the cornerstone of an institution's competitive strategy and the foundation for an organization's survival (Davenport & Prusak, 1998; Naserieh, Pourkiani, Ziaadini, & Fahim, 2012; Serban & Luan, 2002; Schmitz, Rebelo, Gracia, & Tomas, 2014). Davenport and Prusak provide a more comprehensive definition of knowledge; Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms (1998, p. 5).

Knowledge can be characterized into two forms, explicit and tacit. Explicit and tacit are not mutually exclusive, but coexist within an institution at the individual, group, and organizational levels (O'Dell & Grayson, 1998; Sabherwal & Becerra-Fernandez, 2003; Serban & Luan, 2002). Explicit knowledge is found in an organization's policies, procedure manuals, and institutional documents such as the mission, vision and value statements and is easily codified, stored and transferred (Gao, Meng, & Clarke, 2008; Kidwell, Vander-Linde, & Johnson, 2000). Tacit knowledge is personal and individualized. It is created and validated by

personal experience, contextualized in specific situations, and influenced by personal values, and cannot be easily communicated or transferred (Cardoso, Meireles, & Ferreira Peralta, 2012; Kidwell, Vander-Linde, & Johnson, 2000; Nonaka, 1994; Polanyi 1966). "Tacit knowledge is the deep understanding of how to act on knowledge effectively" (Kidwell et al. 2000, p. 31). It is the management of this knowledge, specifically tacit knowledge, that promises to deliver huge returns for organizations that learn to use it effectively (Kidwell et al. 2000).

Knowledge management (KM) is the systematic process of identifying, capturing, and transferring information and knowledge to those who need it in a timely manner. It is critical to the success of the organization, impacting the operational efficiency, leadership, and strategic decision-making of the institution (Jennex, Smolnik, & Croasdell, 2009). There are six phases in the knowledge management process according to Cardoso (as cited in Schmitz et al., 2014); Creation and acquisition, attribution of meaning, sharing and diffusion, organization memory, measurement, and recovering. Organizational culture greatly impacts the management of its knowledge in each phase of the KM process.

3. ORGANIZATIONAL CULTURE

Culture is an important aspect of any institution. Ironically, there is no unified definition of culture. This paper relies on Schein's definition of organizational culture: the "Pattern of shared basic assumptions learned by a group as it solved its problems of external adaption and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems" (Schein, 2010). An organization's culture can be viewed at three levels: artifacts, espoused beliefs and values, and basic underlying assumptions (Schein, 2010). Artifacts are easily observed in the physical spaces of the institution, the apparent behaviors of employees, and how work is organized and processed (McDermott & O'Dell, 2001; Schein, 2010). Artifacts can be aligned with the explicit knowledge within an organization. Espoused beliefs and values can be seen in the organization's stated vision, mission and goals but also can be found in individual ideals, principles and personal aspirations (McDermott & O'Dell, 2001; Schein, 2010). This level of culture is expressed as explicit knowledge and

also the more personal, unspoken tacit knowledge. The cultural level of basic underlying assumptions represents the unstated thoughts, feelings, and perceptions that influence decision-making actions and employee behavior (Schein, 2010).

This level of culture is the invisible dimension of an organization not easily or readily communicated and relates to tacit knowledge (McDermott & O'Dell, 2001). In addition to these levels of culture within an institution there also exists a collection of subcultures and micro-cultures that exist based on organizational hierarchy, geographic location, or are defined by a common set of functions or tasks by a group of individuals (Schein, 2010). Within the same institution each of these subcultures and micro-cultures can have their own artifacts, espoused beliefs and underlying assumptions.

4. CULTURE AND KNOWLEDGE MANAGEMENT

An institution's culture significantly impacts knowledge and knowledge management tools, processes, and initiatives (McDermott & O'Dell, 2001). DeLong (1997) identified four ways in which culture and knowledge interact within an organization. Institutional culture shapes the assumptions and determines what knowledge is useful and important to an organization, who owns particular knowledge, what knowledge is communicated and how is it communicated, and the acceptance or rejection of new knowledge through validation by the organization (DeLong, 1997). Szulanski (1993) indicated four cultural barriers to the successful sharing and transferring of best practices and knowledge within an organization. The first barrier is ignorance on both ends of the transfer of knowledge, i.e., individuals with knowledge did not realize its value to others, and others seeking knowledge did not know where to find it. The second is the absorptive capacity, or the lack of resources to obtain the knowledge. Third is the lack of relationship between a knowledge-holder and the knowledge-receiver. The final barrier is the slow rate of adoption of new knowledge caused by a lack of motivation within the organization.

5. BOLMAN AND DEAL'S FOUR FRAME MODEL

Bolman and Deal's *Reframing Organizations: Artistry, Choice and Leadership* provides four frames to examine an organization and its culture: structure, politics, human resources and

symbolism. Through each of these frames a manager or leader can examine and define the artifacts, espoused values and underlying assumptions of the culture at the organizational, subculture, and micro-cultural level. In studying an organization's culture, barriers to effective knowledge management can be addressed.

Organizations and organizational cultures are complex. As previously stated Bolman and Deal (2008) propose a four frame model for understanding an organization. Structure refers to the formal relationships, goals, technology, work processes, and rules within an organization. The human resource frame addresses the needs, skills, and relationships between individuals that work in an institution. The political frame examines the struggles for limited resources and the allocation and balance of power. The symbolic frame explores the meaning of rituals, ceremonies, stories and heroes and their important impact on the culture of an organization (Bolman and Deal, 2008).

6. LOGAN'S FIVE TRIBES

In *Tribal Leadership: Leveraging Natural Groups to Build a Thriving Organization*, Logan, King and Fischer-Wright state that within an organization, people form a tribe or tribes. What is a Tribe?

- A tribe is any group of about 20 to 150 people who know one another enough that, if they saw another walking down the street, they would stop and say "hello"
- They are likely than people in your cell phone and in your Outlook address book
- A small company is a tribe, and a large company is a tribe of tribes
- Culture makes some tribes more effective than others. Each time people speak, their words exhibit the characteristics of one of five tribal stages. Stage 5 outperforms 4, which accomplishes more than 3, which gets more done than 2, which is more effective than 1
- A medium to large Tribe (50-150 people) usually has several cultural stages operating at the same time (Logan, et al., 2008)

Organizational leaders must focus on the language that is used and the relationships that are formed within and between these internal tribes (Logan, et al., 2008).

The authors develop the idea of members of organizations evolving through five stages of awareness and group interaction.

Stage 1 – “Life Sucks”
Stage 2 – “My Life Sucks”
Stage 3 – “I’m Great”
Stage 4 – “We’re Great”
Stage 5 – “Life is Great”

The authors maintain that the goal of an organization’s leadership should be to push most if not all members to achieve stage five, a level in which members work for the good of the organization and society at large.

See Appendix A for a table summarizing the 5 levels of Organizational Tribes as described by Logan, et al.

7. MODEL FOR UNDERSTANDING ORGANIZATIONAL CULTURE

The ideas put forth by Logan and colleagues in *Tribal Leadership* parallel the four frames concept developed by Bolman and presented in *Reframing Organizations*. It is the process of evolving through Logan’s 5 stages that mirrors the four frames of Human Resources, Structure, Symbolism, and politics of Bolman and Deal’s model. A comparison of the two respective concepts demonstrates their similarities as well as their usefulness for understanding organizational culture (and by extension one can use this understanding to develop a sound knowledge management strategy).

Logan et al’s ideas of tribal leaders, (i.e., people who change the culture of an organization) is similar to the notion of the “cultural hero” put forth by Bolman and Deal. “Without the leaders building the tribe, a culture of mediocrity will prevail. Without an inspired tribe, leaders are impotent (Logan, et al., 2008).” Bolman and Deal discuss the idea of cultural heroes. People, who are not always management, can influence the culture of the organization (Bolman and Deal, 2008). “Doing their jobs, ordinary people often perform exemplary deeds” (Bolman and Deal, 2008). These people influence others in the organization and become role models for those around them, changing attitudes (Bolman and Deal, 2008).

In the Bolman and Deal model these heroes reflect the symbolic frame. The model maintains that the symbolic frame is made of five suppositions. One of these is “culture forms the

superglue that bonds an organization, unites people, and helps an enterprise accomplish desired ends (Bolman and Deal, 2008).”

This notion of culture is paralleled in *Tribal Leadership* where the authors claim that every tribe has its own culture. “Every tribe has a dominant culture” (Logan, et al., 2008). Where Logan et al. differ from Bolman and Deal’s model is that they state that an organization is made of differing tribes each with their own culture. The goal of the leader should be to bring every member of the organization into the stage five culture. “There are many heroes...But two stand out as Tribal Leaders because their efforts have gone a long way to upgrade tribal culture (Logan, et al. 2008).”

While the tribal model offers a spin on the issue, the underlying ideas are the same as Bolman and Deal. The role of the leader is to bring the members of the organization into a united culture focused on the betterment of the organization.

It is the tribal leaders who provide the motivation to take on a KM initiative, and champion the effort by gathering the buy-in from tribal members to increase the rate of adoption and create the upwelling of knowledge transfer and sharing.

Bolman and Deal extend their notions further when entertaining the political frame of an organization. They state that “organizations are coalitions of assorted individuals and interest groups (Bolman and Deal, 2008).” Furthermore, their assessment of the political frame claims that coalition members have different perceptions of reality (Bolman and Deal, 2008). Bolman and Deal do not describe these coalitions as tribes, but the fundamental descriptions of their coalitions and the notions of organizational tribes put forth by Logan and colleagues are the same. “People always form tribes and that the dominant cultural stage determines effectiveness (Logan, et al., 2008).” The terms ‘coalition’ and ‘tribe’ are interchangeable. In both models, people within an organization form internal groups. Furthermore, the attitudes and perceptions of these groups can dictate the direction the organization takes unless proper leadership guides them.

Bolman and Deal’s political frame determines the resources available for a KM initiative. In addition to a champion, the knowledge management initiative requires financial assets

and human resource commitments (Davenport & Prusak, 1998; O'Dell & Grayson, 1998).

It is in the human resources frame that the similarities between the two hypotheses truly comes into focus. Bolman and Deal present two key assertions about the human resource frame. First, if there is a poor fit between an individual and organization, both suffer: both become susceptible to exploitation. Second, if there is a good fit between the two, both flourish: individuals find meaningful work and organizations retain necessary talent and functional energy (Bolman and Deal, 2008).

The main difference between the two models is that the tribal model breaks people down further into tribes and offers descriptions for the behavior of each tribe. The authors then claim to offer insights into how to move this tribe to the next level. While presenting it in a different manner than the four frame model, the tribal theory's description of a tribe's transition into stage four is apparent. "People collaborate and work toward a noble cause, propelled from their values...People seek employment in the company and stay, taking the company a long way toward winning the war for talent (Logan, et al. 2008)." Just as in the four frame model, the tribal model puts forth that as tribes enter into stage four they find a "good fit" and both the organization and individual flourish.

This is in stark contrast to stage two, where a "person at Stage Two will often try to protect his or her people from the intrusion of management. The mood that results from Stage Two's theme, "my life sucks," is a cluster of apathetic victims (Logan, et al., 2008)." Here the individuals are in a bad fit in an organization and thus are feeling exploited or exploiting the organization and dysfunctional.

Finally, the Bolman and Deal model presents the structural frame. According to the model "Where the human resource approach emphasizes dealing with issues by changing people (through training, rotation, promotion, or dismissal), the structural perspective argues for putting people in the right roles and relationships (Bolman and Deal, 2008)." This statement describing structure drives to the core of the tribal model as a whole.

The tribal model maintains that an organization can only achieve Stage 5 if tribal leaders emerge who can motivate the tribes to progress. "Tribal Leaders do two things: (1) listen for which cultures exist in their tribes and (2) upgrade those tribes using specific leverage points

(Logan, et al., 2008)." This is the same message of the structural frame of Bolman and Deal. Combined with the Human Resource frame, the structural frame gives organizational management the tools necessary to identify the needs of the members and their culture (or their tribes) and to put these people (or tribes) into the proper roles to succeed. "Give everyone a choice, and then work with the living (Logan, et al., 2008)". Furthermore, it gives the tools necessary to push people who would naturally stagnate: "Without any external coaching, people advance through the stages very slowly (Logan, et al., 2008)". Both the human resource frame and the structural frame address the need for relationships to counter the cultural barriers within organizations that prevent or inhibit KM initiatives.

8. CONCLUSION

By building relationships, knowledge holders can identify those who need knowledge as well as identify where the knowledge is located within an organization. This in turn leads to greater utilization of the knowledge. In essence, a webbed network between organizational members is created that allows information and knowledge to be shared (Logan, et al. 2008).

The tribal model offers an intriguing spin on the Bolman and Deal model. It is interesting to note that at no point in the referenced text do Logan and colleagues refer to or cite the work of Bolman and Deal; however, the similarities between the two works are clear.

The works offer a complimentary tandem. Bolman and Deal generalize organizational "groups" or coalitions. Tribal theory breaks this generality into five stages, providing descriptions of each. At the same time, the tribal model then generalizes the factors necessary to move tribes to the next level, where the four frames give a context in which to develop the tools necessary to facilitate these stage moves.

An organization must codify, store and most importantly, share the knowledge the institution possesses in order to remain competitive and grow. Organizational culture plays a major part in the success or failure of knowledge management initiatives. Culture can also produce barriers to these KM initiatives. By examining an organization's culture through the four frames indicated by Bolman and Deal, and Logan, King and Fischer-Wright's tribes and tribal leaders, barriers to knowledge

management initiatives are recognized and addressed.

the Next Level with Social Media. Hoboken, NJ: John Wiley and Sons.

9. REFERENCES

- Bolman, L. G., & Deal, T. E. (2008). Reframing organizations: Artistry, choice and leadership (4th Edition ed.). San Francisco, CA: Jossey-Bass.
- Cardoso, L., Meireles, A., & Ferreira Peralta, C. (2012). Knowledge management and its critical success factors in a social economy organizations. *Journal of Knowledge Management*, 16 (2), 267-284.
- Davenport, T. H., & Prusak, L. (1998). Working knowledge: how organizations manage what they know. Boston, MA: Harvard Business School Press.
- DeLong, D. (1997). Building the knowledge-based organization: how culture drives organization behaviors. (Working paper): Center for Business Innovation. Ernst & Young LLP.
- Drucker, P. F. (1988). The coming of the new organization. *Harvard Business Review*, 66 (1) 45-53.
- Gao, F., Meng, L., & Clarke, S. (2008). Knowledge, management, and knowledge management in business operations. *Journal of Knowledge Management*, 12 (2), 3-17.
- Gill, A. (2009). Knowledge management initiatives at a small university. *International Journal of Education Management*, 23 (7), 604-616.
- Jahani, S., Ramayah, T., & Effendi, A. A. (2011). Is reward system and leadership important in knowledge sharing among academics? *American Journal of Economics and Business Administration*, 3 (1), 87-94.
- Jennex, M. E., Smolnik, S., & Croasdell, D. T. (2009). Towards a consensus knowledge management success definition. *Journal of Information and Knowledge Management Systems*, 39 (2), 174-188.
- Kidwell, J. J., Vander-Linde, K. M., & Johnson, S. L. (2000). Applying corporate knowledge management practices in higher education. *Educause Quarterly*, 23 (4), 28-33.
- Leistner, F. (2012). Connecting Organizational Silos: The Knowledge Flow Management to
- Logan, D., King, J., & Fischer-Wright, H. (2008). *Tribal Leadership: Leveraging Natural Groups to Build a Thriving Organization*. New York, NY: Harper Business.
- Marquardt, M. J. (2002). *Building the Learning Organization: Mastering the 5 Elements for Corporate Learning*. Palo Alto, CA: Davies-Black Publishing.
- Mas-Machuca, M., & Martinez Costa, C. (2012). Exploring critical success factors of knowledge management projects in the consulting sector. *Total Quality Management*, 23 (11), 1297-1313.
- McDermott, R., & O'Dell, C. (2001). Overcoming cultural barriers to sharing knowledge. *Journal of Knowledge Management*, 5 (1), 76-85.
- Naserieh, M. Y., Pourkiani, M., Ziaadini, M., & Fahim, I. (2012). Value study of a proper pattern for promotion of knowledge management. *International Journal of Academic Research in Business and Social Science*, 2 (12), 267-287.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5 (1), 14-37.
- Nonaka, I. (2007). The knowledge creating company. *Harvard Business Review*, 85 (7/8), 162-171.
- Nurluoz, O., & Birol, C. (2011). The impact of knowledge management and technology: an analysis of administrative behaviors. *The Turkish Online Journal of Education Technology*, 10 (1), 202-208.
- O'Dell, C., & Grayson, C. J. (1998). *If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice*. New York, NY: The Free Press.
- Polanyi, M. (1966). *The Tacit Dimension*. Chicago, IL: The University of Chicago Press .
- Ramachandran, S. D., Chong, S. C., & Ismail, H. (2009). The practice of knowledge management processes: a comparative study of public and private higher education institutions in Malaysia. *VINE: The Journal of*

- Information and Knowledge Management Systems, 39 (3), 203-222.
- Sabherwal, R., & Becerra-Fernandez, I. (2003). An empirical study of the effect of knowledge management processes at individual, group, and organizational levels. *Decision Science*, 34 (2), 225-260.
- Schein, E. (2010). *Organizational Culture and Leadership*. San Francisco, CA: Jossey-Bass.
- Schmitz, S., Rebelo, T., Gracia, F., & Tomas, I. (2014). Learning culture and knowledge management process: to what extent are they effectively related? *Journal of Work and Organizational Psychology*, 30, 113-121.
- Serban, A. M., & Luan, J. (2002). Overview of knowledge management. *New Directions for Institutional Research*, 113, 5-16.
- Steyn, G. M. (2004). Harnessing the power of knowledge in higher education. *Education*, 124 (4), 615-631.
- Szulanski, G. (1993). Intra-firm transfer of best practice, appropriate capabilities and organizational barriers to appropriations. *Academy of Management Best Papers Proceedings*, (pp. 47-51).

Appendix A

5 Levels of Tribal Leadership	
Stage	Description
Stage 1 – “Life Sucks”	<ul style="list-style-type: none"> • 2% of U.S. workforce* • Despairingly hostile • people band together to confront a violent world
Stage 2 – “My Life Sucks”	<ul style="list-style-type: none"> • 25% of U.S. workplace “tribes”* • Passively Antagonistic • Disengaged • Seen it all before - and it will fail again • No innovation, sense of urgency, accountability • No team building, motivational speeches, core values or strategic plans will make a difference
Stage 3 – “I’m Great”	<ul style="list-style-type: none"> • 49% of U.S. workplaces* • I am GREAT...And you are not! • Highly competitive • Need to win • Winning is personal • Lone wolves • Knowledge is power • “Sage on the stage”
Stage 4 – “We’re Great”	<ul style="list-style-type: none"> • 22% of U.S. workers “We are great”* • We are great and they are not • The bigger the foe, the more powerful tribe • People collaborate working toward a noble cause, propelled by personal values • Fear and stress decrease as the “interpersonal friction” of working together decreases • The entire tribe shifts from resisting leadership to seeking it out • People seek long-term employment in the company • Organizational learning becomes effortless, with the tribe actively teaching its members • Overall health statistics improve, injury rates and sick days go down • “Group think” eases development and implementation of competitive strategy
Stage 5 – “Life is Great”	<ul style="list-style-type: none"> • 2% of U.S. workplace* • Global impact • Miraculous innovation • Pure leadership, vision, and inspiration

* The percentages were the result of Logan et al. comprehensive research study of six organizations that included a sample size 472 people between 1997 and 2000.

An Expanded Analysis of Internet Dependencies by Demographic Variables

Alan R. Peslak
arp14@psu.edu
Penn State University – Worthington Scranton
Dunmore, PA 18512, USA

Abstract

This study presents an expanded review of Internet use in the US and the possibility of an unhealthy Internet dependence that may have developed. In this analysis of Pew Internet Research data, we review the relative strength of this dependence, and we explore how it varies by income, education, age, gender, and community type. The manuscript explores the concept of Internet addiction, the extent of our dependence and explores the literature on both Internet addiction and how past studies have found some demographic differences. This detailed study statistically reviews key demographic variables and also interaction effects among age and gender.

Keywords: Internet, Internet Addiction, Internet Dependence, Income, Education, Age, Gender, Gender, Community type, Internet Usage

1. INTRODUCTION

The Internet has become a dominant activity in our society. We constantly rely on the Internet for all types of information, from directions to dictionaries. According to Internet World Stats (2015), 88% of North America is online. Our online activity is so prevalent many it has been suggested that we are seeing a new disorder develop, Internet addiction. We may be addicted to the Internet (Griffiths, 2000). The Internet has become our link to the world, our communication device, our source of information, even a source and facilitator of relationships. But how strong is this dependence? There have been many studies which have begun to examine this dependency. In this analysis of Pew Internet Research data, we review the relative strength of Internet dependence and we explore how it varies by age, gender, income, education, and community type. It is important to understand the extent of Internet dependence. Some have seen Internet addiction as a disorder and others see may see an over reliance on external knowledge to the sacrifice of learned knowledge. Either way an exploration of the extent of this dependence is warranted.

2. RESEARCH METHODOLOGY

Our research centered upon the following research questions: Can we live without the Internet? What is the extent of Internet usage and dependence and how does it vary by demographic variables in the US. The Pew study and report examined overall responses to Internet usage, however, they did not examine nor explore demographic differences in Internet usage. In order to fully understand the variances in Internet dependence, a variety of research hypotheses are proposed. The demographic variables chosen are very common and the literature review provides evidence of each as worthy variables for study.

The research hypotheses to be tested are as follows:

H₁: Internet dependence as measured by difficulty of giving up the Internet exists in the US.

H₂: Internet dependence will show significant difference based on Income

- H₃: Internet dependence will show significant difference based on Education
- H₄: Internet dependence will show significant difference based on Age and Gender
- H₅: Internet dependence will show significant difference based on Community Type

3. LITERATURE REVIEW

Demographics

Busselle, R., Reagan, J., Pinkleton, B., & Jackson, K. (1999) found "two of the demographics are significant, younger males use the Internet more often. Gender and age were significant demographic predictors of use, younger males being heavier users." Neither education nor income were significant. But his sample of faculty and staff may have skewed demographic conclusions. Porter and Donthu (2006) studied attitudes towards Internet usage and demographics. They examined the demographic categories of age, education, and income, They found that older individuals have lower perceived ease of use and thus a less positive attitude towards the Internet. They also found that less educated individuals have lower perceived ease of use. With regard to income, lower income individuals found the Internet as more costly affecting attitude towards Internet use.

Talukdar and Gauri (2011) performed a comprehensive study of Home Internet Usage and Socio-economic status in a 2011 study for the Communications of the Association for Information Systems. Their longitudinal study found that a differences exists along many socio-economic variables and that it has even widened between 2002 and 2008. They studied income, education, gender, age, and residential location. They found significant differences in all these demographic categories in both 2002 and 2008, in Internet access and daily internet usage. Higher access and usage were found for:

Higher income	Internet access increased
More education	Daily usage increased
Male	Same
White Americans	Internet access increased relative to other races
Older age	Same
Urban resident	Internet Access and Daily Internet Usage Increased versus rural

Hu, Zhang, Dai, and Zhang (2011) used a logistic regression analysis to find gender differences in college students' perception of the internet. They found that males had higher levels of Internet self-efficacy, experience and information overload versus females. Self-efficacy was a measured factor and included statements on proficiency, ease, confidence, and good skills. Experience was measured by hours of use. Information overload was measured by too much information and more information than they could interpret.

Castleton, K., Fong, T., Wang-Gillam, A., Waqar, M. A., Jeffe, D. B., Kehlenbrink, L, Gao & Govindan, R. (2011) performed a detailed demographic analysis of cancer patients who searched the Internet for information about their cancer. They performed chi square analysis based on age, gender, and education. They found significant differences in each demographic category except gender. Younger patients (<59) searched the Internet for cancer information more than older patients. And generally more education resulted in more Internet access. There was no significant difference between Males and Females.

Teo (2001) studied demographic variables associated with Internet usage activities. He studied gender, age, and educational levels. He found that males were more likely to engage in browsing and downloading activities versus females but messaging activities showed no difference. Age differences depended on specific activity. Older individuals used the Internet more for purchases but younger individuals messaged and downloaded more than older individuals. Education level was positively correlated to higher usage.

van Deursen, A. J., & Van Dijk, J. A. (2014) studied a variety of demographic factors and Internet usage in Holland. They used multiple linear regression analysis and studied gender, age, education, income, and residency. They found significant greater amount of Internet use for males versus females, less usage for ages 50-64, and higher usage for urban dwellers versus rural. Their findings in one way were different than most studies. They found that in the Netherlands lower levels of education lead to higher overall Internet usage (social interaction and gaming). Household income had no significant impact. Baturay and Toker (2015) found that males engage in cyberloafing to a greater extent than females. Cyberloafing was defined as using the Internet at work for personal purposes.

According to Nie and Ehring (2000) "the most important factor facilitating or inhibiting Internet access are education and age, and not income – nor gender, each of which account for less than 5 percent change in rates of access and are statistically insignificant.

Joiner, R., Gavin, J., Brosnan, M., Cromby, J., Gregory, H., Guiller, J. and Moon, A. (2012) performed a follow up study on gender differences in Internet usage in 2012. Their first study was in 2002 and found that males had a "greater breadth" of Internet use versus females. Their follow up study they found that things had changed with regard to Internet usage. Males still had greater breadth of usage but now found that females use the Internet for communications and social networking more than males. Cherry, J., Clinton, M., & Tillotson, J. (2013) found predominately male users at the University of Toronto library.

Duggan, M., & Brenner, J. (2013) analyzed other Pew survey data and found age, and gender play significant roles in social media use with younger individuals, and females showing strong interest in social media.

children, 15% of Chinese youth, and 1 in 8 of American adults are addicted to the Internet. The author suggests that all existing behaviors or substances that lead to addiction have social or legal constraints (alcohol, gambling etc.). He suggests there may be a problem that needs to be dealt with. Young suggested in 1998 that Internet Addiction may be emerging as a new clinical mental disorder. She suggests that it most similar to pathological gambling. In 1996 Griffiths found that behavioral addictions do exist and should be treated no differently from the better-known chemically based addictions. Then Griffiths (2000) suggested "The time has come for the addiction research community to take Internet addiction seriously.

Brenner (1997) also suggests that Internet addiction is a topic that needs to be addressed. Most of users he surveyed suggest that there have been instances where Internet usage has interfered with other aspects of their lives. Chao and Hsiao (2000) studied Taiwanese college students and found 54 instances of Internet addiction out of 910 students. They found that males were significantly more likely to the Internet addicts than females. Shin (2014) studied Korean and US mobile Internet users. Shin found that Koreans are more "Internet dependent" than US users. He also found that students, unemployed, and younger students are more likely to be Internet dependent. He also found Korean women as being particularly susceptible to Internet dependence. He found no such gender difference in US mobile users. Gencer and Koc (2012) studied 1380 high school students in Turkey and found that males were more likely to experience "Internet abuse" than females. Internet abuse was defined by author as "excessive use, ... preoccupation with the Internet, and using the Internet to escape from negative feelings".

Table 1 Internet Use and Demographics

Author	Year	Age	Gender	Education	Income	Community Type
Porter and Donthu	2006	S		S	S	
Talukdar and Gauri	2011	S	S	S	S	S
Castleton et al.	2011	S	NS	S		
Van Deursen et al.	2014	S	S	S	NS	S
Baturay and Toker	2015		S			
Nie and Ehring	2000	S	NS	S	NS	
Duggan and Brenner	2013	S	S			
Hosein Jafarkarimi, Alex Tze Hiang Sim, Robab Saadatdoost, and Jee Mei Hee	2016	NS	NS	NS	NS	
Busselle, R., Reagan, J., Pinkleton, B., & Jackson, K.		S	S	NS	NS	

S=signficant, NS=Not Significant, and Blank=Not tested in this study

A summary of the demographics literature (Table 1) shows that age when tested is consistently a significant variable in Internet usage whereas gender and income and education have shown mixed results.

Internet Addiction and Abuse

There have also been some studies on the concept of Internet abuse and addiction. According to Christakis, D. A., & Moreno, M. A. (2009) estimates are that 4% of Korean

Hosein Jafarkarimi, Alex Tze Hiang Sim, Robab Saadatdoost, and Jee Mei Hee (2016) found in their study of Malaysian students that according to the Bergen Facebook Addiction Scale (BFAS), 47% of respondents were addicted to Facebook. They also found no demographic differences based on age, gender, religion, income, or education. The BFAS were used in this study to measure Facebook addiction. This scale contains six questions on 5 Likert Scale basis each reflecting a dimension of six basic components of addiction (salience, mood modification, tolerance, withdrawal, conflict and relapse). "BFAS asks the respondents to answer how often during last year they have experienced the following: "1. Spent a lot of

time thinking about Facebook or planned use of Facebook”, “2. Felt an urge to use Facebook more and more”, “3. Used Facebook in order to forget about personal problems”, “4. Tried to cut down on the use of Facebook without success”, “5. Become restless or troubled if you have been prohibited from using Facebook.” And “6. Used Facebook so much that it has had a negative impact on your job/studies. “Respondents have 5 options ranging from very rarely to very often”. Morahan-Martin, J., & Schumacher, P. (2000) found one-quarter of students (27.2%) reported no symptoms of pathological Internet use while 64.7% reported one to three symptoms (Limited Symptoms) and 8.1% reported four or more symptoms.

Emmanouilides, C., & Hammond, K. (2000) studied predictors of active users and frequency of use and found many reasons for heavier usage but did not study demographics. Amichai-Hamburger, Y., & Hayat, Z. (2011) found that contrary to popular opinion, the Internet does not lead to isolation and loneliness. Rather they found in a study across 13 countries and 22,002 participants that Internet usage can actually enhance social lives of users. Armstrong, L., Phillips, J. G., & Saling, L. L. (2000) studied Internet addiction and its proposed construct derived from DSM-IV which provides a psychological construct for substance abuse. They found that low self-esteem leads to excessive Internet use. They suggest the male; highly educated stereotype of Internet addict be reassessed. LaRose, R., Lin, C. A., & Eastin, M. S. (2003) also examined Internet addiction and found that addiction was not isolated to specific activities but “significantly and positively correlated to Internet across the entire range of consumption”. It does however also correlate to depression and habits formed to deal with depression.

4. RESEARCH METHODOLOGY

The results in this report are based on data from telephone interviews conducted by Princeton Survey Research Associates International from January 9-12, 2014, among a sample of 1,006 adults, age 18 and older. Telephone interviews were conducted in English and Spanish by landline and cell phone. For results based on the total sample, one can say with 95% confidence that the error attributable to sampling is plus or minus 3.5 percentage points. For results based on internet users (N=857), the margin of sampling error is plus or minus 3.9 percentage points.

Pew Research Center is the source of the data, and the authors acknowledge that the Center bears no responsibility for the interpretations presented or conclusions reached based on analysis of the data. Duggan and Brenner (2013). All results were processed using IBM SPSS 22.0. This work is an extension of work performed by the author earlier this year. (XXXX, 2015)

5. RESULTS

Overall

Before we explore each individual demographic hypothesis, we first must examine whether there is an overall Internet dependence in our overall population. The questions analyzed first then is what are the existence of Internet dependence in the US is today and how strong is this dependence.

H₁: Internet dependence as measured by difficulty of giving up the Internet exists in the US.

Table 2 presents the mean and quartiles for question PIAL5d in the survey. This question will serve as our main dependent variable in this study and reads:

PIAL5 How difficult would it be, if at all, to give up the following things in your life? If you do not use or have the item, just tell me. How hard would it be for you to give up (The internet 1=Very Hard, 2=Somewhat Hard, 3=Not Too Hard, 4=Not Hard at all). (Duggan and Brenner, 2013). There were also some volunteered answers in the study which are noted as VOL. These volunteered answers were not included in any significance analyses.

Table 2 shows that the mean is 1.92 which is more than Somewhat Hard. But Table 3 is the Difficulty Frequency Table and shows that 52.2% of those surveyed and had valid responses found it Very Hard to Give Up the Internet. With over one half of the surveyed population expressing that it would be “very hard” to give up the Internet and another 17% finding it somewhat hard, we believe that an Internet dependency exists in the US. Based on this percentage we believe that hypothesis 1 is supported.

A binomial nonparametric test (table 4) was performed to see if this percentage is statistically significant. We used 5% as our test proportion and found that 52% is significantly over .05 at $p < .000$. Therefore, we conclude that Hypothesis 1 is supported. The 52% of the

population who view it very hard to give up the Internet is not due to chance. Internet dependence exists in the US and is prevalent in over 50% of the population.

Table 2 Give Up Internet Statistics

PIAL5d How difficult would it be, if at all, to give up the following things in your life? If you do not use or have the item, just tell me. How hard would it be for you to give up? – The Internet

N	Valid	2669
	Missing	413
Mean		1.92

Table 3 Difficulty Frequency table

	Frequency	Valid Percent	Cumulative Percent
Valid Very hard	1394	52.2	52.2
Somewhat hard	528	19.8	72.0
Not too hard	398	14.9	86.9
Not hard at all	308	11.5	98.5
Impossible	20	.8	99.2
Do not use / Do not have	13	.5	99.7
Don't know	5	.2	99.9
Refused	2	.1	100.0
Total	2669	100.0	
MissingSystem	413		
Total	3082		

Table 4 Binomial Test

	Category	Observed Prop.	Test Prop.	Sig. (1-tailed)
How difficult to give up... - The Internet	1 <= 1	.52	.05	.000
	2 > 1	.48		
Tot		1.00		

Income

In most situations, the Internet costs money. Though there are free wi-fi hot spots in coffee shops or the library, for the most part people have to subscribe to an Internet Service Provider to access the Internet. As a result, it would be assumed that Internet use and dependence would vary based on income, with higher income resulting in more Internet use. Past studies have shown mixed results on Internet use and the effect of income. Porter and Donthu (2006) and Talukdar (2011) found significant influence on Internet use with higher income resulting in higher usage and dependency. Van Duesen and Nie (2014) however did not find significant influence. As shown in table 5, in general higher levels of income resulted in higher Internet dependence. A regression analysis (table 6) shows differences to be significant at $p < .001$. A review of the crosstab table (table 5 and Appendix Table 1) shows that in general higher income results in greater difficulty in giving up the Internet. For those earning less than \$75,000 the highest percentage is 49.4% but for those over \$75,000, all are much higher with those making over \$150,000 a staggering 75.3% who would find it very hard to give up the Internet. Hypothesis 2 is supported.

Table 5 Very Hard to Give up % for each Income Level

INC. Last year - that i	Very hard		
Less than	64	33.70%	
\$10,000 to	109	47.00%	
\$20,000 to	159	49.40%	
\$30,000 to	116	44.60%	
\$40,000 to	84	39.30%	
\$50,000 to	181	46.80%	
\$75,000 to	191	59.30%	
\$100,000 t	156	68.70%	
\$150,000 c	165	75.30%	
Don't know	169	57.10%	
Total	1394	52.20%	

Table 6 Regression AgeGroup * Difficulty

Model	Standardized Coefficients	Sig.
	Beta	
1 (Constant)		.000
AgeGroup	.097	.000

Education

Nearly study in our literature search found that educational level has a significant and positive effect on difficulty with giving up the Internet with the exception of the Dutch study (Van Duesen) which found a significant but negative relationship with education. Our study confirms what nearly all past studies have found, that there is a significant difference between education level and Internet dependence and that Internet dependence increases with education.

Our study shows rising difficulty in giving up the Internet. Table 7 shows the percentage of respondents who saw giving up the Internet as Very Hard by Education Level (full results for each category are in Appendix table 2). Only 17.5% of those with less than an 8th grade education would find it Very Hard to give up the Internet. This doubles to 36% for those with some high school and 44% for those with a high school diploma. College increases this dependence with 2 year degrees and some college at 50% and 54% respectively. Four year college graduates rise to 64% and post graduate degrees move this dependence even higher. Education level has a significant impact on Internet dependence. Regression Analysis (table 8) finds the differences significant at $p < .001$. Hypothesis 3 is supported.

Table 7 Very Hard to Give up % for each Education Level

EDUC2. What is the highest level of	Very hard	
	Count	%
Less than high school (Gr	11	17.50%
High school incomplete (31	36.00%
High school graduate (Gra	363	44.40%
Some college, no degree	315	53.50%
Two year associate degre	139	49.50%
Four year college	322	64.00%
Some postgraduate or pro	11	64.70%
Postgraduate or professio	194	66.70%
Don't know/Refused	8	38.10%
Total	1394	52.20%

Studies of the impact of age have nearly all shown that age has a significant and negative impact on Internet use. In other words the older you are, the less you use the Internet. Studies of gender however have been mixed. We have also studied this relationship in a prior published study but in this manuscript we explore in addition whether there are interaction effects between age and gender. A Univariate ANOVA was performed to examine the direct

relationships between age, gender and difficulty in giving up the Internet. Age ranges were used to facilitate post hoc analysis.

Table 8 Regression EducationLevel * Difficulty

Model	Standardized Coefficients	Sig.
	Beta	
1 (Constant)		.000
EDUC2. What is the highest level of school you have completed or the highest degree you have received? [DO NOT READ]	-.175	.000

Age and gender

Table 9 shows the Descriptive Statistics associated with gender and Age range. Total male and female scores are at 2.06 and 1.79 respectively suggesting females would have a more difficult time giving up the Internet. This is a bit surprising since many past studies have found significantly higher usage by males. Duggan and Brenner (2013) did find however higher usage by females due to social media. This may be the reason for the findings in our study. As the Internet moves toward more social activity and support, females who tend to be more social may be more attached to the Internet. Table 10 which shows the analysis of Test of Between-Subjects Effects and shows the main effect of gender to be significant with a p value $< .001$, clearly showing a significant difference. In addition, a review of the descriptive statistics seems to suggest a lower level of difficulty with increasing age with 1.82 at ages 18-25 but 2.06 over 65. This is again is born out in the ANOVA with just age range significant at $p < .001$. Age does play a role in Internet dependency. The interaction effect was also measured in the ANOVA and the combination of Age Range were found to be significant at $p < .10$, with an actual p value of .057. Chart 1 shows each age group and the differences between genders. For all age groups, males would have less difficulty than females but for the highest age group, >65, there is little difference. A very large difference exists in the 36-45 age group. This may be due to a social difference where more women may be at home raising children and thus relying on the Internet for more for social activity. Further study is warranted to explore this relationship. Post hoc analysis in table 11 suggests that significant

differences for age groups lie in the 18-25 and 46-55 group and the 56-65 group. For the 26-35 group significant differences are indicated versus age groups 46-55, 56-65 and over 65. Hypothesis 4 is supported.

Table 9 Age and Gender Descriptive Statistics

Dependent Variable: PIAL5d How difficult would it be, if at all, to give up - The Internet

GENDER. Respondents gender	AgeGroup	Mean	Std. Deviation	N
Male	18-25	1.94	1.104	262
	26-35	1.81	1.182	223
	36-45	2.21	1.278	203
	46-55	2.18	1.117	244
	55-65	2.16	1.267	201
	>65	2.07	1.558	188
	Total	2.06	1.250	1321
Female	18-25	1.69	1.056	234
	26-35	1.59	.877	233
	36-45	1.65	.925	291
	46-55	1.91	1.322	254
	55-65	1.99	1.177	216
	>65	1.98	.997	157
	Total	1.79	1.081	1385
Total	18-25	1.82	1.088	496
	26-35	1.70	1.042	456
	36-45	1.88	1.118	494
	46-55	2.04	1.232	498
	55-65	2.07	1.223	417
	>65	2.03	1.331	345
	Total	1.92	1.174	2706

Table 10 AgeGroup * Gender F test

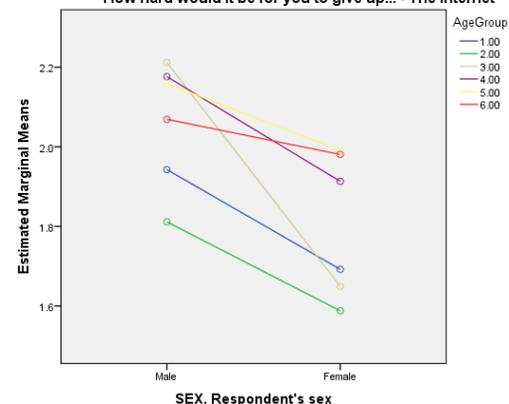
Source	F	Sig.
Corrected Model	7.616	.000
Intercept	7336.634	.000
gender	33.044	.000
AgeGroup	7.262	.000
gender * AgeGroup	2.147	.057
Error		
Total		
Corrected Total		

Table 11 AgeGroup Post Hoc Tests

(I) AgeGroup	(J) AgeGroup	Mean Difference (I-J)	Std. Error	Sig.
18-25	26-35	.13	.075	1.000
	36-45	-.06	.074	1.000
	46-55	-.22*	.074	.047
	5.00	-.25*	.077	.020
	>65	-.20	.081	.179
26-35	18-25	-.13	.075	1.000
	36-45	-.18	.075	.225
	46-55	-.34*	.075	.000
	5.00	-.37*	.079	.000
36-45	18-25	.06	.074	1.000
	26-35	.18	.075	.225
	46-55	-.16	.074	.423
	5.00	-.19	.077	.196
46-55	18-25	.22*	.074	.047
	26-35	.34*	.075	.000
	36-45	.16	.074	.423
	5.00	-.03	.077	1.000
5.00	18-25	.25*	.077	.020
	26-35	.37*	.079	.000
	36-45	.19	.077	.196
	46-55	.03	.077	1.000
>65	18-25	.04	.084	1.000
	26-35	.20	.081	.179
	36-45	.33*	.083	.001
	46-55	.15	.081	1.000
>65	18-25	-.01	.081	1.000
	26-35	-.04	.084	1.000
	36-45	-.01	.081	1.000
	46-55	-.04	.084	1.000

Chart 1

Estimated Marginal Means of PIAL5d How difficult would it be, if at all, to give up the following things in your life? If you do not use or have the item, just tell me. How hard would it be for you to give up... - The Internet



Community type

The last variable studied is community type. Limited past studies have shown a significant variance in Internet usage based on community type. Both studies found that urban residents had higher Internet usage. Table 12 shows that 52% of Suburban residents would find it very hard to give up the Internet. Full results are shown in Appendix table 3. Our study reviews urban, rural, and suburban residents via a chi-square analysis. Results show that there are significant differences between the community groups at $p < .001$ (table 13). In order to find where these differences existed, t-test of means of independent samples were performed. These found that there were significant differences between Urban and Suburban at $p < .064$ (table 14), with Suburban users having greater Internet dependency. The differences were more significant between Suburban and Rural ($p < .001$) (Table 15) and Urban and Rural ($p < .003$) (Table 16). In both cases Rural showed less dependency. Hypothesis 5 is supported.

Table 12 Very Hard to Give up % for each Community Type

			Very hard
Communi	Rural	Count	172
		%	12.30%
	Suburban	Count	728
		%	52.30%
	Urban	Count	493
		%	35.40%
Total		Count	1393
		%	100.00%

Table 13 Community Type * Difficulty Statistics

CommType	Mean	N	Std. Deviation
Urban	1.93	927	1.275
Suburban	1.84	1330	1.096
Rural	2.15	413	1.179
Total	1.92	2669	1.178

Chi Square $p < .001$

Table 14 Urban versus Suburban

	CommType	N	Mean	Std. Deviation	Std. Error Mean
PIAL5	1.00	927	1.93	1.275	.042
	2.00	1330	1.84	1.096	.030

$p < .064$

Table 15 Suburban versus Rural

	CommType	N	Mean	Std. Deviation	Std. Error Mean
PIAL5	2.00	1330	1.84	1.096	.030
	3.00	413	2.15	1.179	.058

$p < .001$

Table 16 Urban Versus Rural

	CommType	N	Mean	Std. Deviation	Std. Error Mean
PIAL5	1.00	927	1.93	1.275	.042
	3.00	413	2.15	1.179	.058

$p < .003$

6. CONCLUSIONS

Our report analyzes a detailed and scientific sample cross section of the US population based on the Pew Internet survey. Our results found that Internet dependence appears to be a real phenomenon with over 50% of the population finding it Very Hard to give up the Internet. This rate rises when age is factored into the

equation. Fully 78% of 18-25 year olds would find it Very Hard to give up the Internet. With regard to hypotheses, Income, Education Level, Age, Gender, Interaction of Age and Gender and Community type were found to be significant variables influencing Internet dependence. Higher educated, higher income, younger Americans, females, and Suburban dwellers were found to be more dependent. This high dependence and demographic profile presents important information for researchers and practitioners. Further study is recommended to determine whether these recognized dependencies are a threat. Further study between professional versus personal use is called for and the affect it may be having needs exploration. If found to have negative affect, the demographic analyses can then be used to target potential behavioral modification efforts.

7. REFERENCES

- Amichai-Hamburger, Y., & Hayat, Z. (2011). The impact of the Internet on the social lives of users: A representative sample from 13 countries. *Computers in Human Behavior*, 27(1), 585-589.
- Armstrong, L., Phillips, J. G., & Saling, L. L. (2000). Potential determinants of heavier internet usage. *International Journal of Human-Computer Studies*, 53(4), 537-550.
- Baturay, M. H., & Toker, S. (2015). An investigation of the impact of demographics on cyberloafing from an educational setting angle. *Computers in Human Behavior*, 50, 358-366.
- Brenner, V. (1997). Psychology of computer use: XLVII. Parameters of Internet use, abuse and addiction: the first 90 days of the Internet Usage Survey. *Psychological reports*, 80(3), 879-882.
- Busselle, R., Reagan, J., Pinkleton, B., & Jackson, K. (1999). Factors affecting Internet use in a saturated-access population. *Telematics and Informatics*, 16(1), 45-58.
- Castleton, K., Fong, T., Wang-Gillam, A., Waqar, M. A., Jeffe, D. B., Kehlenbrink, L., Gao, F. & Govindan, R. (2011). A survey of Internet utilization among patients with cancer. *Supportive Care in Cancer*, 19(8), 1183-1190.
- Chou, C., & Hsiao, M. C. (2000). Internet addiction, usage, gratification, and pleasure experience: the Taiwan college students' case. *Computers & Education*, 35(1), 65-80.
- Cherry, J., Clinton, M., & Tillotson, J. (2013). Internet use through the University of Toronto Library: Demographics, destinations, and users' reactions. In *Proceedings of the Annual Conference of CAIS/Actes du congrès annuel de l'ACSI*.
- Christakis, D. A., & Moreno, M. A. (2009). Trapped in the net: will internet addiction become a 21st-century epidemic?. *Archives of pediatrics & adolescent medicine*, 163(10), 959-960.
- Duggan, M., & Brenner, J. (2013). The demographics of social media users, 2012 (Vol. 14). Washington, DC: Pew Research Center's Internet & American Life Project.
- Emmanouilides, C., & Hammond, K. (2000). Internet usage: Predictors of active users and frequency of use. *Journal of Interactive Marketing*, 14(2), 17-32.
- Fox, S. and Raine. (2014) The Web at 25 in the U.S.
<http://www.pewinternet.org/2014/02/27/the-web-at-25-in-the-u-s/>
- Gencer, S. L., & Koc, M. (2012). Internet Abuse among Teenagers and Its Relations to Internet Usage Patterns and Demographics. *Educational Technology & Society*, 15(2), 25-36.
- Griffiths, M. (1996). Nicotine, tobacco and addiction. *Nature*, 384(6604), 18.
- Griffiths, M. (2000) Internet Addiction - Time to be Taken Seriously? *Addiction Research & Theory* 8 (5) , 413-418
- Hosein Jafarkarimi, Alex Tze Hiang Sim, Robab Saadatdoost, and Jee Mei Hee, (2016) "Facebook Addiction among Malaysian Students," *International Journal of Information and Education Technology* vol. 6, no. 6, pp. 465-469.
- Hu, T., Zhang, X., Dai, H., & Zhang, P. (2012). An examination of gender differences among college students in their usage perceptions

- of the internet. *Education and Information Technologies*, 17(3), 315-330.
- Internet World Stats (2015). <http://www.internetworldstats.com/stats.htm>
- Joiner, R., Gavin, J., Brosnan, M., Cromby, J., Gregory, H., Guiller, J., ... & Moon, A. (2012). Gender, internet experience, internet identification, and internet anxiety: a ten-year followup. *Cyberpsychology, Behavior, and Social Networking*, 15(7), 370-372.
- LaRose, R., Lin, C. A., & Eastin, M. S. (2003). Unregulated Internet usage: Addiction, habit, or deficient self-regulation?. *Media Psychology*, 5(3), 225-253.
- Morahan-Martin, J., & Schumacher, P. (2000). Incidence and correlates of pathological Internet use among college students. *Computers in human behavior*, 16(1), 13-29.
- Nie, N. H., & Erbring, L. (2000). *Internet and society*. Stanford Institute for the Quantitative Study of Society.
- Park, C., & Jun, J. K. (2003). A cross-cultural comparison of Internet buying behavior: Effects of Internet usage, perceived risks, and innovativeness. *International Marketing Review*, 20(5), 534-553.
- Porter, C. E., & Donthu, N. (2006). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of business research*, 59(9), 999-1007.
- Shin, L. Y. (2014). A Comparative Study of Mobile Internet Usage between the US and Korea. *Journal of European Psychology Students*, 5(3), 46-55.
- Statistical Abstract of the United States (2012). <http://www.census.gov/compendia/statab/2012/tables/12s1240.pdf>
- Talukdar, D., & Gauri, D. K. (2011). Home internet access and usage in the USA: trends in the socio-economic digital divide. *Communications of the Association for Information Systems*, 28(7), 85-98.
- Teo, T. S. (2001). Demographic and motivation variables associated with Internet usage activities. *Internet Research*, 11(2), 125-137.
- van Deursen, A. J., & Van Dijk, J. A. (2014). The digital divide shifts to differences in usage. *New Media & Society*, 16(3), 507-526.
- XXXX (2015) Can We Live Without the Internet? An Overall and Demographic Analysis of Internet Usage and Dependence Issues in Information Systems (pending).
- Young, K. S. (1998). Internet addiction: The emergence of a new clinical disorder. *CyberPsychology & Behavior*, 1(3), 237-244.

APPENDIX

Appendix Table 1 Full Income Crosstab

	INC. Last year - that is, in 2013 - approximately what was your total family income before taxes? Just tell me when I get to the right category. (READ)										Total
	Less than \$10,000	\$10,000 to \$20,000	\$20,000 to \$30,000	\$30,000 to \$40,000	\$40,000 to \$50,000	\$50,000 to \$75,000	\$75,000 to \$100,000	\$100,000 to \$150,000	\$150,000 or over	Don't know/Refused (VOL.)	
Very hard	64 33.7%	109 47.0%	159 49.4%	116 44.6%	84 39.3%	181 46.8%	191 59.3%	156 68.7%	165 75.3%	169 57.1%	1394 52.2%
Somewhat hard	44 23.2%	35 15.1%	63 19.6%	55 21.2%	49 22.9%	97 25.1%	74 23.0%	12 5.3%	24 11.0%	76 25.7%	529 19.8%
Not too hard	41 21.6%	36 15.5%	48 14.9%	43 16.5%	48 22.4%	74 19.1%	30 9.3%	36 15.9%	13 5.9%	28 9.5%	397 14.9%
Not hard at all	36 18.9%	49 21.1%	42 13.0%	46 17.7%	29 13.6%	31 8.0%	21 6.5%	20 8.8%	17 7.8%	17 5.7%	308 11.5%
(VOL.) Couldn't	0 0.0%	3 1.3%	5 1.6%	0 0.0%	1 0.5%	2 0.5%	6 1.9%	3 1.3%	0 0.0%	0 0.0%	20 0.7%
(VOL.) Do not use / Do not have	0 0.0%	0 0.0%	5 1.6%	0 0.0%	3 1.4%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6 2.0%	14 0.5%
(VOL.) Couldn't know	5 2.6%	0 0.0%	0 0.0%	0 0.0%	5 0.2%						
(VOL.) Couldn't Refused	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 0.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 0.1%
Total	190 100.0%	232 100.0%	322 100.0%	260 100.0%	214 100.0%	387 100.0%	322 100.0%	227 100.0%	219 100.0%	296 100.0%	2669 100.0%

Appendix Table 2 Full Education Crosstab Crosstabulation

		EDUC2. What is the highest level of school you have completed or the highest degree you have received? [DO NOT READ]									
		Less than high school (Grades 1-8 or no formal schooling)	High school incomplete (Grades 9-11 or Grade 12 with NO diploma)	High school graduate (Grade 12 with diploma or GED certificate)	Some college, no degree (includes some community college)	Two year associate degree from a college or university	Four year college	Some postgraduate or professional schooling, no postgraduate degree	Postgraduate or professional degree, including master's, doctorate, medical or law degree	Don't know/Refused	Total
Very hard	Count %	11 17.5%	31 36.0%	363 44.4%	315 53.5%	139 49.5%	322 64.0%	11 64.7%	194 66.7%	8 38.1%	1394 52.2%
Some what hard	Count %	9 14.3%	17 19.8%	131 16.0%	157 26.7%	62 22.1%	96 19.1%	0 0.0%	53 18.2%	2 9.5%	527 19.8%
Not too hard	Count %	26 41.3%	10 11.6%	183 22.4%	51 8.7%	53 18.9%	51 10.1%	1 5.9%	22 7.6%	0 0.0%	397 14.9%
Not hard at all	Count %	13 20.6%	28 32.6%	127 15.5%	58 9.8%	25 8.9%	30 6.0%	2 11.8%	20 6.9%	6 28.6%	309 11.6%
(VOL.) Impossible	Count %	0 0.0%	0 0.0%	3 0.4%	8 1.4%	2 0.7%	2 0.4%	3 17.6%	2 0.7%	0 0.0%	20 0.7%
(VOL.) Do not use / Do not have	Count %	4 6.3%	0 0.0%	10 1.2%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	14 0.5%
(VOL.) Don't know	Count %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	5 23.8%	5 0.2%
(VOL.) Refused	Count %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 0.4%	0 0.0%	0 0.0%	0 0.0%	2 0.1%
Total	Count %	63 100.0%	86 100.0%	817 100.0%	589 100.0%	281 100.0%	503 100.0%	17 100.0%	291 100.0%	21 100.0%	2668 100.0%

Appendix Table 3 Full Community Crosstab

			PIAL5d How difficult would it be, if at all, to give up the following things in your life? If you do not use or have the item, just tell me. How hard would it be for you to give up... - The Internet								Total
			Very hard	Somewh at hard	Not too hard	Not hard at all	(VOL.) Impossible	(VOL.) Do not use / Do not have	(VOL.) Don't know	(VOL.) Refused	
Community type - merge from Zip 2012	Rural	Count %	172 12.3 %	89 16.9%	75 18.8 %	73 23.6 %	5 25.0%	0 0.0%	0 0.0%	0 0.0%	414 15.5 %
	Suburban	Count %	728 52.3 %	261 49.4%	187 46.9 %	142 46.0 %	7 35.0%	6 42.9 %	0 0.0%	0 0.0%	1331 49.9 %
	Urban	Count %	493 35.4 %	178 33.7%	137 34.3 %	94 30.4 %	8 40.0%	8 57.1 %	5 100.0 %	2 100.0 %	925 34.6 %
Total		Count %	1393 100.0 %	528 100.0%	399 100.0 %	309 100.0 %	20 100.0%	14 100.0 %	5 100.0 %	2 100.0 %	2670 100.0 %