EXAMINING THE RELATIONSHIP BETWEEN PERCEIVED TECHNICAL COMPETENCY AND INTRINSIC MOTIVATION FOR INFORMATION TECHNOLOGY MANAGERS

by

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A Dissertation Presented in Partial Fulfillment of the Requirements for the Degree

Doctor of Management in Organizational Leadership with a

Specialization in Information Systems and Technology

UNIVERSITY OF PHOENIX

September 2009

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ABSTRACT

Opportunities to develop technical competencies will continue to be a challenge for Information technology (IT) managers. Declining enrollment in technical programs, increased use of outsourcing models and the recent emphasis on developing business-savvy IT managers can result in less opportunity for IT managers to develop technical skills. Previous researchers emphasized the importance of multifaceted competencies necessary to deliver value to the business areas. Technical competency is just one of the key requirements for effective IT managers. In studies of motivational behavior, competence in general has a positive effect on motivational levels. Specifically, IT personnel enjoy the challenges of technology and the opportunity to stay current with technological trends. Aligning tasks that motivate employees can improve organizational performance and help align individual performance with corporate goals. The purpose of the quantitative, explanatory correlational study was to examine the relationship between the perceived technical competence and intrinsic motivation of IT managers in large U.S. companies. A convenience sample of 62 IT managers responded to an online survey. By using an online panel, the study was able to reach a qualified sample that was reliable, engaged and representative of the target population. A quantitative correlational method was appropriate to reach this goal. The analysis included examining the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when controlling for gender, age, years of experience, and type of organization. Based on the results of this study, a significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment subscale of the IMI and perceived competence. For organizations that include IT managers, perceived technical

competence could be a factor in driving internal motivation. Understanding the relationship between perceived technical competence and intrinsic motivation may be helpful in driving effective IT organizations. The findings from this study may offer important information to industry leaders to assist in understanding the behaviors of IT managers in a dynamic environment.

DEDICATION

I would like to dedicate the completion of this paper to my family. I appreciate all the sacrifices required of my wife Lori and the patience of my children, Jordano, Joshua, Bruno-Hunter, Montana, and Sophya. I look forward to spending more time with each of you.

ACKNOWLEDGEMENTS

I would like to offer my thanks to my mentor, Dr. Oludotun Oni for his assistance and constant feedback throughout the process. I also appreciate all the efforts of my committee members, Dr. Nancy Arduengo and Dr. Curtis Maybee. Their willingness to help and their expert knowledge assisted me in reaching my goals. I would like to acknowledge the extra efforts of Dr. Diane Dusick of BOLD for her assistance with the editing of the dissertation.

I would like to thank all my family members and friends who stepped in to help me with daily tasks while I was busy delivering the next part of the program. Many family members and friends helped with daily chores, babysitting, assisting with driving to various events, and putting up with my inattentiveness during critical points throughout the doctoral program. Lastly, I would like to thank Brian Daenzer and Chuck Brooks who offered their time and friendship to share ideas and viewpoints throughout the process. Thanks for making the journey an enjoyable experience.

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CHAPTER 1: INTRODUCTION

Information technology departments continue to adapt to technological advancements, workplace practices, and new business models. Gartner predicted 75% of information technology (IT) organizations would experience a significant change in their role in the 21st century (Gartner, 2005). The author also suggested that at least 10% of IT organizations would cease to exist. Key factors include the growing use of outsourcing, and greater penetration of technology workers in the business areas. Chief information officers (CIOs) focus on hiring managers with the right mix of technical and business skills to meet future demand but find it more difficult to find and retain quality employees than what was true in the past (Kolbasuk Mcgee, 2007). Quality IT employees are scarce because of declining enrollment in technical programs, the application of outsourcing models and concentration of efforts on managing outsourcing contracts rather than developing applications, and the recent emphasis on developing business-savvy IT managers (Anthes, 2006; Lai, 2006; Rao, Poole, Raven, & Lockwood, 2006; Rapoza, 2006a).

Such fundamental role shifts within the IT industry result in little opportunity for IT managers to develop technical skills. IT managers with little technology background might find managing people with strong technical skills a unique challenge (Rapoza, 2006b). Some IT managers have no opportunity to develop technical expertise (Lai, 2006). The technical knowledge of IT managers can be an important factor for daily communication with highly trained employees and many of the technical departments within IT.

Students in IT programs recognize technical positions might not be available for them when they graduate. IT enrollment at Washington State University is down by 60%, and the enrollment at the University of Virginia is down by 50% (Gibson, 2005). Outsourcing of entry-level technical functions may continue, reducing opportunities to develop technical skills. The result of these activities could affect management competencies. Byrd, Lewis, and Turner (2004) indicated CIOs in many companies continued to perceive technical skills as important and critical to the success of the company.

Technical skills are one of the key competencies that are necessary to manage technical issues and discuss technical concerns with other IT personnel (Gramignoli, Ravarini, & Tagliavini, 1999). Managers realized the importance of supporting their subordinates, peers, or bosses, since this will result in reciprocal behavior (Deci & Flaste, 1995). The dynamics within the field of information technology, such as outsourcing, changing technical roles, and shifts in IT enrollment challenge IT managers whose job requirement is to implement technological solutions to increase organizational performance. Lack of technical competency may influence the motivation of IT managers for doing their jobs.

Deci and Ryan (2000) determined that lack of competency in a specific field could result in loss of motivation. Deci and Ryan's (2002) research indicated competency was a key factor in affecting intrinsic motivation (Deci & Ryan, 2002). According to the self-determination theory (SDT) (Gagne & Deci, 2005), people have an innate need to be competent, and innate needs are a form of intrinsic motivation. IT managers who are not

technically competent might be less effective if they are less intrinsically motivated to perform their role.

The research of Deci and Ryan (2002) that pertained to self-determination theory (SDT) and cognitive evaluation theory (CET) was the basis of this study. According to CET, individuals have an innate need for competence, autonomy, and relatedness, all factors of intrinsic motivation. The intent of the study was to extend the theory to the IT field and analyze the relationship between technical competency and intrinsic motivation of IT managers.

The research involved describing the role of the IT manager in a large corporation and the issues resulting from changing external conditions in the industry. Internal and external factors affect the responsibilities of IT managers, and the changes might influence the managers' perceptions of their roles and their motivation towards performance. Chapter 1 begins with background information and a statement of the problem, followed by the research questions and hypotheses of the study and a summary of the theoretical framework. The framework includes the concepts of self-determination theory and technical competency of managers. Included in chapter 1 are definitions of related terminology and details pertaining to the limitations and assumptions of the research study.

Background of the Problem

Maturing In-House IT Departments

As the IT industry matures, IT departments in organizations continue to emphasize the importance of systems knowledge as a core competency. A key role of IT managers is to align the goals and objectives of the IT departments with the business

areas of the organization (Duedahl, Andersen, & Sein, 2005). Developing the needed skills to deliver value-added services to support the business processes is critical.

Leaders of companies whose core business lies outside of IT may find it challenging to stay current with technological advances while meeting the changing needs of the business areas of the organization. IT departments are required to employ individuals with expert knowledge of business operations and up-to-date skills in the latest technological breakthroughs. In many cases, as IT departments mature, organizations look for ways to save money in IT costs.

To reduce costs, many organizations implement strategies to outsource technical positions (King, 2004). Less expensive, offshore individuals replace key human resources, increasing the challenge of maintaining technical skills within an IT group. Matching technology and business processes requires a strong understanding of a company's operations as well as technology trends (Pamecha, 2006). In spite of the availability of less expensive sources of technical human resources, developing internal employees with both technical and business knowledge is necessary for effectiveness at generating new solutions.

Process of Sharing Knowledge and Gaining Competencies

An IT manager is knowledgeable in technology, business processes, and operational procedures (Koskinenen & Pihlanto, 2006). Years of cross-functional experience working on various systems are foundational for effectiveness as IT manager. Real-life opportunities drive learning that becomes integrated into the development of future systems. IT managers add value to an organization by sharing technical understanding and innovative trends with others in the company. Koskinen and Pihlanto

(2006) highlighted the value of experience and the importance of transferring competencies from the *old timers* to the *newcomers*. Experience is the path to gaining tacit knowledge.

Technical skills begin as explicit knowledge and become tacit knowledge when applied. The knowledge and experience of workers is part of the value employees bring to a company. Experienced workers share their competencies with less experienced workers to aid in knowledge transfer. "Acquisition and sharing of competence depend on motivation as much as on the technical knowledge involved" (Koskinen & Pihlanto, 2006, p. 5).

In an IT department, knowledge transfer applies to procedures, methods, technology, and contacts needed to perform a task (Koskinen & Pihlanto, 2006). Opportunities to gain technical knowledge can occur through the sharing of information among peers. IT personnel may discuss the latest technology trends as a way to find opportunities to improve business processes. People have an innate need to feel competent in their tasks, to be in control of their actions, and to experience relatedness to others (Baard, Deci, & Ryan, 2004). Studying the effect of perceived technical competence of IT managers can be valuable for defining future roles and organizational structures.

Knowledge Workers and Motivation

In a knowledge-based economy, creating and maintaining a competitive advantage requires the ability to apply new knowledge to real-world problems. Creativity and the ability to generate new ideas come from the knowledge base of the workforce. Understanding what motivates knowledge workers is critical to creating new applications

and implementing new technologies. In the IT field, many ideas come from IT managers. Motivating employees to improve organizational performance and to align individual performance with corporate goals is a critical component to success (Gottschalg & Zollo, 2007). A driving force for individuals who enter the IT field usually relates to the use of new technology.

As suggested by Armour (2006), IT personnel enjoy the challenge of discovering ways to take advantage of technological advancements. Software developers who lose touch with technology trends can become bored and find their tasks mundane. Operating within the comfort zone can become unrewarding and less effective (p.21). IT workers enjoy the process of challenging their competencies and moving out of their comfort zones to develop new skills. Testing the edge of a comfort zone is associated with researching and implementing new technologies into the processes of the organization. The learning process can be the challenge that motivates many IT managers.

A fine line exists between a comfort zone and a competency zone. In order to challenge existing processes, individuals must learn and maintain a flow of new ideas (Armour, 2006). IT workers enjoy challenging their existing competencies and learning new skills. Technical skills are one area where IT workers challenge their comfort zone and reach new levels of knowledge.

Competence is instrumental in obtaining money, power, and prestige (Deci & Ryan, 2002). Self-determination theory (SDT) provides a framework based on the existence of the primary psychological needs of autonomy, competence, and relatedness motivating human behavior (Deci & Ryan, 2002). According to Gagne and Deci (2005), an innate need to be competent in a specific field drives human motivation. "Attaining

competence at an activity is one important psychological determinant of enjoyment and fun, thus the pursuit of competence and seeking enjoyment/fun in the task can, in some instances, be inextricably intertwined" (Deci & Ryan, 2002, p. 375).

Intrinsically motivated individuals perform certain activities for the enjoyment or satisfaction of the task. Researchers have used SDT to study the motivation of athletes in sports and children in education and to assess employees in a work environment (Deci & Ryan, 2002). Although some studies exist on management competencies and motivation, there appeared to be little research assessing technical competencies and intrinsic motivation in the IT field.

The focus of the study was the IT manager. The goal was to understand the relationship between motivational behaviors of IT managers and their perceptions of the IT manager's technical competencies. Developing a better understanding of the underlying triggers to intrinsic motivation may help with the effectiveness of IT managers in large corporations.

Statement of the Problem

The general problem is a void in the pool of technically skilled IT managers resulting from the lack of entry-level technical positions in the information technology (IT) field. Technical expertise is one of the key competencies for effective performance of IT managers (Gramignoli, Ravarini, & Tagliavini, 1999; Katz, 2005; Rajadhyaksha, 2005). According to Byrd et al. (2004), chief information officers (CIO) perceive technical skills as important for the success of a company. Hebda, Vojak, Griffin, and Price (2007) suggested technical visionaries were internally motivated by a desire to work with innovative techniques.

Witnessing new ideas become reality and participating in the process can be a key motivator. Technically oriented professionals enjoy opportunities to exercise their technical competence and becoming one the company's technical experts (Katz, 2005). In studies of motivational behavior, competence in general had a positive effect on motivational levels (Deci & Ryan, 2000).

Four major trends in the IT field can have long-lasting implications on the skill sets of IT managers. The trends pertain to increased IT outsourcing of technical positions, hiring practices focused on business skills, increased technical competence of business units, and a significant drop in enrollment in IT programs (Anthes, 2006; Lai, 2006; Rao, Poole, Raven, & Lockwood, 2006; Rapoza, 2006a). The next generation of IT managers might not be able to participate in designing complex architectures and overseeing technical projects. The goal of the study was to determine if a relationship exists between the perceived technical competency of the IT manager and his or her motivational behaviors. The specific problem was that lack of opportunities to develop technical competencies in an IT environment could reduce motivation.

Organizational leaders need to understand what motivates technical individuals to perform and if current trends affect performance. Katz (2005) suggested technical professionals enjoyed challenges and innovative opportunities to learn and grow. Performance may improve for those technical individuals who enjoy their work and are motivated to perform. As mentioned by Katz, technical workers will strive to meet the demands of the job when the work is both challenging and an opportunity to grow (p.19).

The purpose of the quantitative, explanatory, correlational research study was to examine the correlation between perceived technical competence of IT managers and

their motivational behaviors. Middle managers from various IT organizations who participate in ZoomPanel completed a survey. Results of the study may be useful for leaders of IT management to understand motivation in an organization. Mcknight (2008) suggested that motivation may be lacking in IT and encouragement and motivation are necessary in accomplishing corporate goals. The enjoyment of performing the work becomes a source of intrinsic motivation (Barbuto, 2005). The leaders' enjoyment of their work may also inspire subordinates to look for enjoyment in their work. Understanding the possible relationship between perceived technical competence and intrinsic motivation may help IT leaders plan roles, responsibilities, and recognize subordinate actions.

Purpose of the Study

The purpose of the quantitative, explanatory correlational study was to examine the relationship between the motivational behaviors of IT managers and their perceptions of the manager's technical competencies. A quantitative approach was appropriate since the goal of the study was to identify and explain any relationship between the stated variables (Creswell, 2005). The variables in the study included the perceived technical competence of IT managers and their intrinsic motivational behaviors.

The study involved the distribution of a survey to specific members of an online market research panel, the Zoomerang ZoomPanel with opt-in members from across the United States and Canada. Demographics pertaining to the individuals' occupation determined eligibility. The qualifying participants were engaged in the information technology field. The target population for the study was middle managers in large U.S. corporations that work for IT companies and non-IT companies. By using an online

panel, the study was able to reach a sample that is reliable, engaged and representative of the target population (MarketTools, 2008). The ZoomPanel has more than 2.5 million participants and profiled across more than 500 attributes. Attributes considered in the current study included gender, the employer's type of organization, and employee's years of service. A non-random convenience sample of 62 IT middle managers produced the survey data for analysis to study perceived competence and intrinsic motivation. An objective of the current quantitative study was to examine the roles of the descriptive variables representing gender, years of experience and type of company as they intervene in the relationship between perceived technical competence and intrinsic motivation.

A survey instrument, based on the Intrinsic Motivation Inventory (IMI) and the Perceived Competency Scale (PCS) were the study's data collection tool. Caldwell (2006) successfully measured motivation in completing a programming course in college students with the IMI. Cueva (2006) used the IMI to study motivation and efficacy in young Hispanic children. Williams, Freedman, and Deci (1998) used the PCS to study patients' ability to manage glucose levels, and Williams and Deci (1996) used the PCS to study medical students and their ability to learn material from an interviewing course.

Significance of the Study

Technical competence in an organization can be significant in developing market opportunities. Producing a product or service effectively requires a level of technological knowledge. Technical competence is necessary to stay competitive, maintain innovation, and enter new markets or reach new customers (Tidd, Bessant, & Pavitt, 2005).

Motivation is an important factor in organizational effectiveness (Schmidt, 2007). As suggested by Schmidt, one of the roles of an IT manager in a large corporation is to

engage teams of IT specialists, communicate and direct technical departments, and assist leaders of business areas understand the value of technological advancements. Each activity adds value to the organization. Building strong relationships and credibility with IT employees and the business unit staff is an important factor in a technical field such as IT. IT managers perceived to be competent in their roles can have a positive effect on the many relationships within the IT organization. An IT manager who feels competent might be intrinsically motivated. In any leadership role, a high level of motivation is an important attribute since the observed behaviors of a leader can encourage subordinates and peers (Mcknight, 2008).

Current industry trends indicate to the next generation IT managers technical skills are becoming less important and consideration for future promotions might require less focus on technical experience (Anthes, 2006; Rapoza, 2006a). Continued outsourcing of technical jobs to offshore companies has left IT managers with the task of managing IT contracts as opposed to managing systems. The trends may significantly impact the technical skills of future IT managers, affect systems development timelines, limit exposure to new technology, and hinder the creative abilities of IT personnel to match business needs with the availability of technology tools.

Watts and Caldwell (2008) suggested individuals performed best when they satisfied the basic psychological needs of competence, autonomy, and relatedness. Quigley and Tymon (2006) offered insight about the contribution to career management of professionals of meaningfulness, competence, choice, and progress as components of intrinsic motivation. The current study was a unique approach to the problem by increasing the understanding of the perceived competency and motivation in IT middle

managers. The approach was unique by using validated instruments from the self-determination theory and applying them to the IT field. The purpose of the study was to examine the perceived competency and intrinsic motivation of IT managers using existing instruments.

Deci and Ryan (2002) believed competence in a specific field resulted in increased intrinsic motivation. This study extended the body of research to the field of IT, using validated measurement tools based on the self-determination theory. The goal was to understand the relationship between motivational behaviors of IT managers and their perceptions of the IT manager's technical competencies. The results of the current study have produced an original contribution since little research was available on perceived technical competence and the relationship to intrinsic motivation in the IT field.

Deci and Ryan (2002) have indicated competence and autonomy were key factors affecting intrinsic motivation. Deci and Ryan believed competence in a specific field resulted in increased intrinsic motivation. The perceived competence scale has been successful in measuring perceived competence (Williams et al., 1998), and the intrinsic motivation inventory has been used to measure motivation within college students (Caldwell, 2006) and Hispanic children (Cueva, 2006). The intent of this study was to use the intrinsic motivation instrument and the perceived competence scale to gain further insight on the relationship of these variables for IT managers.

Nature of the Study

Employees who are engaged in their work are more productive, offer more value to the company, and are committed to the success of the organization (Schmidt, 2007). In an IT environment, engagement and motivation of IT personnel may enhance the ability

to use technology and to demonstrate value to the organization. The quantitative correlational study involved identifying a relationship between perceived technical competency and intrinsic motivation.

Quantitative analysis is useful to describe or explain relationships among variables (Creswell, 2005). In this study, quantitative analysis was applicable to measure the relationship between two variables. The study involved quantitative analysis of perceived competence and intrinsic motivation across intervening variables like gender, age, years of service, and type of organization. Correlational design was appropriate in this study since the focus was on examining the association or relationship of one or more variables rather than in testing the impact of activities (Creswell, 2005). Correlational research was appropriate since statistical methods were applicable to calculate a correlation test.

A qualitative approach would be suitable for research carried out through open-ended, exploratory questions. Qualitative researchers derive meaning from the participants' narratives and do not test hypotheses (Creswell, 2005; Salkind, 2006). As described by Neuman (2005), a quantitative research focuses on variables while a qualitative study would focus on interactive processes or events.

Quantitative researchers gather data from experiments, surveys, or existing data sources and use existing statistical procedures to analyze the variables in question (Creswell, 2005). Experimental designs impose controls on the variables being studied (Salkind, 2006). Control groups can help build a stronger argument for the cause and effect of the variables. The purpose of the non-experimental quantitative correlational research was to determine if a relationship exists between perceived technical

competence and intrinsic motivation. Correlational research can assist with identifying relationships between two or more variables through statistical analysis (Salkind, 2006). The use of the Pearson's correlation provided further details on the relationship between the variables of interest. "Correlational research designs are quantitative designs in which investigators use a correlation statistical technique to describe and measure the degree of association (or relationship) between two or more variables or sets of scores" (Creswell, 2005, p.590). Quantitative studies are a narrow approach to studying the selected variables and the particular hypotheses in the design (Cooper & Schindler, 2006). Insight to the relationship of perceived competency and intrinsic motivation of IT managers has offered IT leaders a better understanding on how to define future management roles.

The variables of interest in the current study were perceived technical competence and intrinsic motivation. The basis of this study was the work of Deci and Ryan (2002) that described a subset of the theory of self-determination theory and called it cognitive evaluation theory (CET). According to CET, individuals have an innate need for competence, autonomy, and relatedness, and satisfying such needs can drive intrinsic motivation. Technical competency is a key competency for success in both IT and non-IT management positions (Katz, 1955). In IT, technical competencies develop as individuals obtain technical knowledge through education, training, and observation (Vathanophas & Thai-ngam, 2007).

IT personnel attempt to apply their knowledge in tasks defined by their particular role. The effects of current industry trends in IT might be to change how IT managers perform technical tasks. IT personnel have fewer opportunities to perform technical tasks, and nontechnical roles have become more important. Correlational analysis provided a

way to examine the relationship between perceived technical competence and motivational behaviors and assisted in understanding the effect of such relationship on IT managers.

The Intrinsic Motivation Inventory (IMI) is a multidimensional instrument used to assess an individual's interests, perceived competence, effort, value/usefulness, felt pressure and tension, and perceived choice of a given activity (Deci, 2007b). The device measures intrinsic motivation and self-regulation. The IMI comprises a series of subscales to measure how individuals internalize and self-regulate the activities they believe are important. The interest/enjoyment subscale is a self-reported measure of intrinsic motivation found within the IMI. "The perceived choice and perceived competence concepts are theorized to be positive predictors of both self-report and behavioral measures of intrinsic motivation, and pressure/tension is theorized to be a negative predictor of intrinsic motivation" (Deci, 2007b, ¶ 1).

Small modifications to the IMI instrument allow the alignment of questions with the activity or task under review. Many researchers have used the subscales relevant to the issues in their study. Some redundancy in the instrument exists, and shorter versions are available. In this study, the standard 22-item version determined the four subscales of interest/enjoyment, perceived competence, perceived choice, and pressure/tension.

The Perceived Competence Scales (PCS) is a 4-question instrument with one of highest face validity among instruments for assessing the constructs of SDT (Deci, 2006). Modifications to the PCS aligned the questions to the variables of the study regarding technical activities. The goal was to gain an understanding of the perceptions of IT managers relating to technical competency in the current environment.

The IMI and the PCS were appropriate data collection instruments to assess perceived technical competence and intrinsic motivation of IT managers. Descriptive and inferential statistics facilitated the identification of any distinction between years of experience, gender, and type of organization. The sample resulted from the population of IT managers who voluntarily participate in a survey panel referred to as ZoomPanel. ZoomPanel delivered the completed surveys from 62 IT middle managers of large corporations from the United States across the specified demographics.

Research Questions

Opportunities to develop technical competencies will continue to be a challenge for IT managers. The IT industry has experienced increased outsourcing of technical positions, hiring practices focused on business skills, and a significant drop in enrollment in IT programs (Anthes, 2006; Lai, 2006; Rao, Poole, Raven, & Lockwood, 2006; Rapoza, 2006a). As a result, the role and motivation of IT managers may be affected. The goal was to understand the relationship between perceived technical competency and intrinsic motivation of IT middle managers. The use of an online survey facilitated the assessment in the relationship between perceived competency and intrinsic motivation. The researcher also assessed years of experience, gender, and type of company as possible factors between perceived technical competency and intrinsic motivation. As suggested by Creswell (2005), intervening variables can transmit or mediate the effects on the relationship and statistical procedures can control the effects.

Research has shown self-determination theory and intrinsic motivation could be factors in performance, trust, and well-being in the work environment (Gagne & Deci, 2005). In the IT field, technical knowledge is one of the key competencies required to be

effective (Katz, 2005). Over time, workers gain explicit and tacit knowledge through experiences, driving intrinsic motivation. With knowledge, individuals perform activities with a sense of competence.

Little research was available in the area of perceived technical competence and motivation in IT managers. The current study added to the body of knowledge on motivation by examining any relationship between perceived technical competence and intrinsic motivation. Intervening variables like years of experience, gender, and type of company (i.e., IT company or non-IT company) were analyzed as possible factors. Analysis of Variance (ANOVA) tests helped to identify potential mean differences in intrinsic motivation and perceived competence scores across the intervening variables. A partial correlation helped explain the relationship between perceived technical competence and intrinsic motivation while controlling other variables. The following questions guided the study:

1. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations?

2. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled?

3. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of service are controlled?

4. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when type of company is controlled?

Hypotheses

The quantitative study was an investigation of the relationship between perceived technical competence and intrinsic motivation and the effect of intervening variables like gender, years of service, and type of company. Keller (2007) studied motivation toward exercise with independent variables such as frequency of exercise, gender, rank, age, and years in service. The goal was to understand whether a relationship between technical competence and intrinsic motivation might be different in companies focused on delivering IT products and services and companies that do not consider IT as a core competency. Research has shown an association between competency and intrinsic motivation (Deci & Ryan, 2002; Gagne & Deci, 2005), but few researchers have focused on such variables in the IT field. Data on perceived technical competency and intrinsic motivation in the IT field offered insight about the driving forces for IT personnel. Based on earlier research on competency and motivation, the hypotheses for the current study are as follows:

$H1_{0:}$ No relationship exists between perceived technical competence and intrinsic motivation for IT middle managers in large corporations.

$H1_{A:}$ A relationship exists between perceived technical competence and intrinsic motivation for IT middle managers in large corporations.

The current study obtained a better understanding of the relationship between perceived technical competence and intrinsic motivation by controlling for certain variables. Further analysis offered some specific insight about the variables under study.

$H2_{0:}$ No statistically significant difference exists between the relationship of perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled.

$H2_{A:}$ A statistically significant difference exists between the relationship of perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled..

$H3_{0:}$ No statistically significant difference exists between the relationship of perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled.

$H3_{A:}$ A statistically significant difference exists between the relationship of perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled.

$H4_{0:}$ No statistically significant difference exists between the relationship of perceived technical competence and intrinsic motivation for IT middle managers in large corporations when controlled for type of company.

$H4_{A:}$ A statistically significant difference exists between the relationship of perceived technical competence and intrinsic motivation for IT middle managers in large corporations when controlled for type of company.

In large organizations, employees from non-IT companies might differ in perceived technical competencies and motivational behaviors than employees from IT companies. IT companies depend on revenue from products and services that center around information technology. Non-IT companies depend on IT departments to deliver technological solutions to improve their competitiveness. Non-IT companies may have

core competencies in other areas such as manufacturing, finance, or marketing of services. Collecting information from IT managers from both two types of IT organizations extended the understanding of the relationship of perceived technical competency and intrinsic motivation.

Theoretical Framework

The theoretical framework of the study focused on two key areas of research. The first area included the competencies of effective managers, specifically IT managers. IT managers assist business leaders to become more productive by using information technology to simplify and automate processes and strengthen communication skills, business acumen, and an understanding of the value of technology (Koskinen & Pihlanto, 2006).

The second area of research concerned the self-determination theory (SDT). The core tenet of SDT is individuals have an innate need to feel a sense of autonomy, competence, and relatedness (Ryan & Deci, 2000). Individuals with a perception of competency are more likely to be intrinsically motivated. For the current study, the focus was the technical competency and its relationship to individuals' level of intrinsic motivation. Controlling for any effects by the intervening variables like years of service, gender, and type of organization were also part of the current study.

Understanding the motivating factors of IT personnel can help with role planning and work assignment. In an analysis of IT competencies and self-efficacy, Talja (2005) suggested the definition of technical knowledge was dependent on specific social constructs. Skills and competencies specific to IT specialists have become more common

in other professions (Duedahl et al., 2005). Understanding the relationship can be helpful for future IT leaders.

The conscious-competence learning model defined by Useem (2006) offers a framework for the process of learning a new skill. Individuals progress through stages, starting from unconscious incompetence to conscious incompetence, followed by conscious competence to unconscious competence. When actively participating in a task, an individual follows a learning process that develops into competency. Individuals who do not have opportunities to exercise their technical skill might not develop a sense of competence in their field. IT managers with opportunities to exercise specific technical skills develop a strong sense of competency. Current IT trends resulting in IT managers having fewer opportunities to participate in technical tasks can reduce technical competence in individuals.

Katz (1955) defined technical proficiency as one of three key skills necessary for success as a manager. The other two core skills are (a) human skills and (b) conceptual skills. IT managers with strong skills in each competency have a better chance of being successful in the role. Competency in technical skills can improve the quality of products and services of an organization.

Lee (2005) identified the following four critical IT skills: (a) technology management, (b) business skills, (c) interpersonal skills, and (d) technical skills. IT professionals possessing strong technical skills, along with interpersonal and business skills, are well prepared to be effective in today's work environment. Several researchers have emphasized the importance for IT professionals of possessing technical and management skills for competitive advantage (Jaska & Hogan, 2006; Reid & Crisp, 2007;

Thamhain, 2004; Wu, 2005). The agility of a firm to react to a changing environment is dependent on managerial and technical capabilities within IT (Tallon, 2008). Overemphasizing one skill set at the expense of the other can decrease organizational performance and the effectiveness of IT personnel.

SDT is a general theory of motivation developed through traditional empirical methods and with roots in organismic-dialectical meta-theory and the concept of basic needs (Ryan & Deci, 2000). Cognitive evaluation theory (CET) addresses social and environmental factors affecting intrinsic motivation. The focus of CET is the fundamental need to feel competent and autonomous in a particular activity. Organismic integration theory concerns the internalization of extrinsic motivators. Causality orientation theory describes individual differences in the extent to which people seek to be autonomous or tend toward self-determination. Basic needs theory extends on the concept of basic needs and the relation to health and well-being (Deci, 2007a).

According to the SDT model, relatedness and competence are fundamental psychological needs of every individual (Deci & Ryan, 2002). Individuals have basic innate needs to feel competent in the activities they perform, and the need to be competent is the basis for self-motivation. Understanding how individuals value an activity can explain their motivation, interest, and performance. "Perhaps no single phenomenon reflects the positive potential of human nature as much as intrinsic motivation, the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan & Deci, 2000, p. 70). Human beings strive to feel competent and avoid being incompetent.

A natural source of motivation is the feeling of efficacy. The goal of the current study was to understand if perceived technical competence drives intrinsic motivation in IT managers. Ryan and Deci (2000) supported a strong link between intrinsic motivation and the need for autonomy and competence. A changing IT environment places emphasis on non-technical skills, and understanding the relationship to intrinsic motivation will help IT leaders define future roles.

Definition of Terms

The following are operational definitions for a common understanding of terms and phrases used in this study:

Amotivation. Amotivation is a term used in self-determination theory to describe absence of motivation. Behaviors betray lack of intrinsic and extrinsic motivation (Ryan & Deci, 2000). In the current study, amotivation represented a particular stage within the self-determination continuum (see Figure 4). The continuum placed amotivation, or lack of motivation on the furthest left of the scale and intrinsic motivation is found on the furthest right of the scale.

Competency. In a work setting, competency is associated with performing a particular task successfully (Garman & Johnson, 2006). Employees gain knowledge and skills and develop a sense of competency in a task through experience. McClelland (1976) argued intelligence testing and academic grades were poor predictors of job performance. Testing for competency would produce results that are more accurate. Job competency represents the underlying motive, trait, or skill that a person uses to be effective or improve work performance (Boyatzis, 1982). The term competency can refer

to the characteristics of an effective organization. In this study, competency referred to the individual competencies unique to a particular job or position.

Extrinsic motivation. Extrinsic motivation comes from external factors such as money, rewards, or praise. The rewards offer a certain satisfaction external to the task and can drive an individual to perform the task. In the current study, the focus was on intrinsic motivation and understanding the difference was important. A person may be extrinsically motivated to perform a task when offered a particular external incentive for completing the work.

Intrinsic motivation. Intrinsic motivation comes from internal factors such as pleasure or a sense of satisfaction for completing the task. Enjoyment in a task is an example of a good predictor of intrinsic motivation. Drivers of intrinsic motivation include growth opportunities, challenges, collaboration, creative projects, or prestige (Brandi, 2007). In the current study, the focus was on intrinsic motivation at work. Specifically, IT workers may be intrinsically motivated to work on tasks that they enjoy, regardless of any incentive.

IT management. IT managers are individuals who oversee the various aspects of technology to assist with creation, storage, and flow of information for the company. IT managers align the goals and objectives of the IT departments with the business areas of the organization (Duedahl, Andersen, & Sein, 2005). IT managers can be involved in application development, hardware support, architecture design, or network management.

Middle managers assist with the operations of the company by transferring and storing of knowledge (Katz, 2004). Katz suggested that IT middle management is responsible for many radical innovative opportunities. A sample of IT middle managers

who work in IT departments of both IT companies and non-IT companies completed a survey in the current study. An IT company derives revenue from IT products and services. A non-IT company employs an IT department to assist the core business area that is outside of IT.

Organismic-dialectical meta-theory. Organismic-dialectical meta-theory rests on the assumption that humans are active, growth-oriented organisms with a natural tendency to perform effectively (Deci & Ryan, 2002). People naturally seek opportunities to improve themselves and become more competent in a specific field. Feeling autonomous and self-determined to improve oneself is the basis of the self-determination theory. In the current study, recognizing individual's needs to grow was important. Individuals have "innate tendencies toward psychological growth and development, who strive to master ongoing challenges and to integrate their experiences into a coherent sense of self." (Deci, 2007a, ¶ 2). For many IT managers, growth and development focuses on technology skills.

Skills. Some definitions consider the terms skills and competency synonymous. An individual may obtain a skill through formal or informal training or through opportunities to engage in the activity to develop experience. In the current study, the focus of skills was on technical skills of an IT manager. Gramignoli, Ravarini, and Tagliavini (1999) described the technical skills of an IT manager as the ability to develop cost effective software applications integrating data processing activities with business strategies.

Technical competence. Competency is result of performing a particular task successfully. Acquiring a particular skill is synonymous with being competent. Workers

who demonstrate a certain level of performance in a task are competent in the specific assignment. Technical competency referred to skills or abilities that are technical. In the current study, foundational skills necessary to be effective in the IT field include technical skills.

Assumptions

Assumptions concerning the participants are the IT managers would (a) volunteer because of a personal interest in the topic under study, (b) understand the context of the questions, and (c) provide honest responses. The use of a professional survey panel helped with the quality of the responses. The online panel "is actively managed using a series of usage and behavioral metrics to ensure optimum tenure, engagement, and representation" (MarketTools, 2008, p. 1).

Assumptions of the research study concerning the methodology were (a) the instruments used to survey the IT managers are valid tools to measure technical competency and intrinsic motivation, (b) the high validity of the survey instruments resulted in a successful measurement of the variables, (c) sufficient data was collected to accept or reject the hypotheses of the study, and (d) a minimum of 60 IT middle managers responded to the survey. The PCS (Deci, 2006) and the IMI (McAuley, Duncan, & Tammen, 1989; Tsigilis & Theodosiou, 2003) have been shown to be highly valid instruments.

Based on the current population of participants and the typical response rates of surveys, the desired sample size of 60 was obtainable. Eligible participants of ZoomPanel who opted-in voluntarily to participate in market research provided the target population. Zoomerang currently has approximately 1,500 participants profiled as IT managers.

Zoomerang was able to supply a sample of 62 responses of middle managers from large corporations from the 1,500 IT managers in the panel. In the current study, the definition of a large corporation was companies with 5,000 employees or more.

The rationale in the current study was the instruments would also be valid instruments in measuring perceived technical competency and intrinsic motivation of IT managers. The calculation of Cronbach alpha scores verified the reliability of the instruments. A Cronbach alpha score assessed the reliability and measured the degree to which the instruments reflect the same underlying constructs (Cooper & Schindler, 2006).

Scope of the Study

The scope of the study was the analysis of a possible correlation between perceived technical competence and intrinsic motivation of IT middle managers in large corporations. The study sample was limited to an online panel of IT middle managers from both IT companies and non-IT companies. Only IT middle managers working in the United States for large corporations participated. Zoomerang sent the survey to qualifying middle managers at various organizations that currently work within an IT department. The participants were active members of the ZoomPanel, and each member responded voluntarily to the survey. The IMI and the PCS were appropriate data collection instruments to assess perceived technical competence and intrinsic motivation of IT managers. Descriptive and inferential statistics facilitated the identification of any distinction between years of experience, gender, and type of organization.

Limitations of the Study

The number of potential IT managers available within the population represented an external limitation. The goal was to survey 60 IT middle managers. The participants might have entered the study with a predetermined bias on the subject matter or felt they do not want to take the time to conduct the survey. Experiences of the IT managers might have resulted in specific personal beliefs about work competencies and motivation. A limitation of the study was the reliability of the instruments used for data collection.

Self-imposed limitations included a limited scope of questions and a particular group of participants as population, Zoomerang panelists. The study was limited to those participants who are middle IT managers of large corporations that are willing to complete the survey. The quantitative approach to examine perceived competence and motivation produced a narrow examination of the topic.

Participation was limited to members of Zoomerang who considered themselves managers working within the information technology field. In a non-random convenience sample, participants are selected because they are willing and available (Creswell, 2005). Although the population was representative of the U.S. population across some demographics like gender, age, and income (MarketTools, 2007), the sample was one of convenience. Participants were from a group of individuals who are willing and available to participate in surveys. Members of this online organization may differ from IT managers who did not choose to belong to this organization. In the current study, the source of the sample was a target population of Zoomerang members who considered themselves IT middle managers within large U.S. corporations. The convenience sample still provided useful information for answering questions and hypotheses.

The two instruments in the current study used a Likert-type scale to collect information from the participants. Likert-type scales assign a numeric weight to each point along a scale (Salkind, 2006). The weighted scale limited the perceptions and feelings of the participants. Self-report instruments can lead to self-presentation and ego protection where respondents try to present a positive image of themselves (Neuman, 2005). An open-ended, qualitative questionnaire would allow the participants to describe their personal perceptions about the topic in detail (Creswell, 2005).

Non-experimental research does not set out or test any causal relationships between variables (Salkind, 2006). Correlational research focuses on relationships between variables, but does not imply cause and effect. In this non-experimental study, the focus was on the relationships between perceived technical competence and intrinsic motivation.

Delimitations of the Study

Access to participants, funding, and the overall size of the population can be factors in selecting the sample size (Creswell, 2005). Creswell stated that approximately 30 participants are necessary for a correlational study. In the current study, the sample size was limited to the amount of resources available. Zoomerang charged for each completed survey.

Probability samples allow the researcher to make inferences about the population (Creswell, 2005). Although the sample size exceeded the minimum number of participants for a correlational study, the sample was one of convenience and the results may not be generalizable. Including a larger, probability sample may produce a more

representative sample. The convenience sample still provided valuable insight to the questions and hypotheses.

Summary

The purpose of the study was to identify if a relationship between perceived technical skills and intrinsic motivation. The current trend in the IT industry is toward a significant change in the role of IT personnel. Companies continue to outsource technical tasks, implement hiring practices focused on non-technical skills, and witness a significant drop in enrollment in IT programs (Anthes, 2006; Lai, 2006; Rao et al., 2006; Rapoza, 2006a, 2006b). In some cases, managers enter the IT field with no technical experience (Lai, 2006). The result is less opportunity for managers to develop necessary IT skills. Technical competence is a required proficiency for IT managers and non-IT managers (Boyatzis, 1982; Katz, 2005; Shrout, 1971). Maintaining technical competency might improve the quality of products and services delivered by IT managers while boosting the level of enjoyment and motivation in the job. Early research on competency has shown intelligence was not the sole indicator of success (McClelland, 1976). Effective managers require key competencies in the areas of goal and action management, leadership, human resource management, directing subordinates, and specialized knowledge (i.e., technical skills) (Boyatzis, 1982).

According to self-determination theory (SDT), relatedness and competence are fundamental psychological needs of every individual (Deci & Ryan, 2002). The basis of SDT is individuals' basic needs to feel competent in the activities they perform as basis for self-motivation. Deci and Ryan (2000) determined lack of competency in a specific field could result in loss of motivation. Deci and Ryan's (2002) research indicated

competency was a key factor in affecting intrinsic motivation (Deci & Ryan, 2002). Understanding perceived technical competence in a changing IT environment might offer insight into motivation of IT managers.

The following chapter includes the literature review for the topics of technical competencies of IT managers and motivation. The literature highlights the importance of various competencies in effective IT management. The literature also highlights the relationship between competence, autonomy, and relatedness with intrinsic motivation (Deci & Ryan, 2002; Watts & Caldwell, 2008). Few studies indicated that there might be some relationship between perceived technical competence and intrinsic motivation of IT middle managers in large corporations. The purpose of this study was to examine this problem.

CHAPTER 2: REVIEW OF THE LITERATURE

The purpose of the quantitative correlational study was to examine the relationship between perceived technical competency and intrinsic motivation of IT managers. Organizations across the United States are experiencing significant changes in the function performed within IT groups (Lombardi, 2006) because of rapid technological advancements and the globalization of the workforce. Competent managers continue to have a desire and willingness to transform their skills and abilities to be effective in a changing world (Hebda, Vojak, Griffin, & Price, 2007). Such changes are affecting organizational structures, role assignment, performance criteria, and training needs. Human resource groups are interested in understanding management competencies and worker motivation to meet the needs of future roles and emerging jobs (Badawy, 2007; Kumpikaite & Ciarniene, 2008).

The literature review includes an historical overview of management competencies with a specific focus on technical competencies. Katz (1955) defined technical proficiency as one of three skills necessary for success. The other two skills required are human skills and conceptual skills. IT competency models suggest that IT managers with strong skills in each competency have increased chances of being successful in their role.

In a 2005 study, Rajadhyaksha (2005) identified 24 competencies in categories of technical skills, group problem-solving skills, managerial skills, and aptitude from a sample of 250 manufacturing executives in India. The study was able to assess the concept of management competencies in a 21st century world. The results of the

Rajadhyaksha's study confirmed technical competencies are one of the dimensions required to be an effective manager.

Trends in the IT industry such as increased outsourcing of technical positions, hiring practices focused on non-technical skills, and a significant drop in enrollment in IT programs (Anthes, 2006; Lai, 2006; Rao et al., 2006; Rapoza, 2006a, 2006b) can result in fewer opportunities for the next generation of IT managers to develop technical skills. While technical expertise continues to be a basic competency of IT managers, current trends in the industry could have adverse affects on the development of technical competencies.

Early research on competency has shown intelligence was not the sole indicator of success (McClelland, 1976). Effective managers require key competencies in the areas of goal and action management, leadership, human resource management, directing subordinates, and specialized knowledge (i.e., technical skills) (Boyatzis, 1982). Technical competency is a specific category of managerial competency (Katz, 1955). The literature review included material about past and present management competencies, specifically technical competency in the field of IT.

Germinal work on motivational theories is included in the literature review. A discussion of intrinsic and extrinsic motivators supplies part of the groundwork for the current study. In studies of motivational behavior, Deci and Ryan (2000) showed competence could positively influence motivational levels. The literature review includes studies about the foundations of motivation, the development of current theories and trends in the IT industry, and association between perceived competency and motivation levels.

Using validated measurement tools based on the self-determination theory, the goal of the current study was to extend the body of research to the field of IT. The perceived competence scale has been successfully used in other research to measure perceived competence (Williams et al., 1998), and the intrinsic motivation inventory has been used to measure motivation within college students (Caldwell, 2006) and Hispanic children (Cueva, 2006).

Prior studies have recognized the importance of technical competency in determining success or failure (Murphy, 2006). IT professionals who feel their technological curiosities are not met by interesting work will look elsewhere for employment (Mahatanankoon, 2007). Barbuto (2005) discovered positive correlations between leaders' motivations and their leadership behaviors. Few research studies have researched the relationship between motivation and competency within the IT field. The current study can deliver value to corporations experiencing drastic functional changes within their IT departments. IT workers are facing significant shifts in their defined responsibilities, and understanding factors of motivation can be valuable to IT and HR departments.

Documentation

The literature reviewed included a search of articles, dissertations, books, and journals on the topics of management competencies and motivation. The University of Phoenix online databases were key sources of foundational and current knowledge in the fields of management competency and motivation. The ProQuest database search resulted in 588 matches on competency and motivation and 55 matches on technical competency.

The EBSCOhost database resulted in 438 matches on competency and motivation and 170 matches on motivation. A search of doctoral dissertations and books resulted in 218 matches on the key words, competency, and motivation. The dissertations and book database produced 55 matches on technical competency.

Additional databases focused on IT management served as other sources for the research and included IT journals such as Information Resource Management, Information Systems Management, Journal of Management Information Systems, and Journal of Computer Information Systems. Research on motivational behavior produced articles in the Journal of Applied Psychology, Journal of Organizational Behavior, Psychological Review, and the Knowledge and Process Management.

Key word searches included competency, IT skills, IT capability, business skills, leadership skills, management skills, knowledge management, IT trends, education and technology, outsourcing, management behaviors, motivational behaviors, intrinsic motivation, measuring skills, performance, and productivity. The intent of the study was to understand the relationship between technical competency and motivation. Global outsourcing of IT services has affected many individuals working in the IT field, and IT personnel must change and adapt to the current strategies. The effects of current trends on motivation of IT personnel are not clear.

Competency

Competency is the ability to use the knowledge acquired through education or training and the ability to perform successfully in a particular job or function (Vathanophas & Thai-ngam, 2007). Competent employees are the main resource for an organization to acquire a competitive advantage. Organizational leaders must understand

the competency development process in order to obtain effective performance from employees. A competency model can help with defining competencies and clearly stating the requirements in a position within a job description.

An individual develops competency in a given task by maturing through a series of stages. The four stages of the conscious competence-learning model (Useem, 2006) define the process of learning a new skill from incompetence to competence. In the first stage known as unconscious incompetence, an individual is unaware of the skill or the need to be proficient in the skill. In the second stage known as conscious incompetence, the individual is aware of the incompetence in a skill and recognizes that developing competency in the skill is important to become effective.

In the third stage, or conscious competence, the person achieves awareness of the competence reached in a skill but consciously continues to develop the skill to stay effective. In the final stage, or unconscious competence, the person has mastered the skill and can perform without being conscious of the task. Becoming competent in a particular field is a learning process that requires opportunities to participate actively in the task or function.

Management Competency

The skills approach theory (Katz, 1955) included the following three categories of skills required to be effective as a manager: (a) technical, (b) human, and (c) conceptual. Technical proficiency refers to a specialized knowledge in a specific field. For example, an IT manager should have an understanding of various technological frameworks and architectures as well as an awareness of the tool sets necessary to work in specialized areas.

Human skills are the ability to work with superiors and subordinates in a team setting. IT managers must coordinate the efforts of others to work toward common corporate goals or deliver specific IT projects. One of the goals of the IT manager is to ensure subordinates focus on delivering IT solutions for the business needs of the customer. IT managers are responsible for delivering value-added IT support by seeing the needs of the company and introducing technology to affect the organization in a positive manner (Mastroberte, 2007).

Conceptual skills are the ability to recognize how an organization functions as a series of interrelated processes. IT managers must be able to determine the effect of changes in one system on other systems and coordinate the changes with other managers. Based on Katz's (1955) model, effective administrators must gain proficiency in each of the skill domains. The IT manager can benefit from conceptual insights and develop administrative competencies.

The competency model by Boyatzis (1982) as shown in Figure 1 includes the following three core areas of competency for effective performance: (a) job demands, (b) organizational environment, and (c) individual competence. A worker achieves job competency by obtaining the skills and the body of knowledge necessary to perform tasks within an organization. Boyatzis defined competence as the required skills, knowledge, behaviors, and attitudes resulting in a high level of job performance. Aligning organizational needs with individual skills and abilities can increase effectiveness.

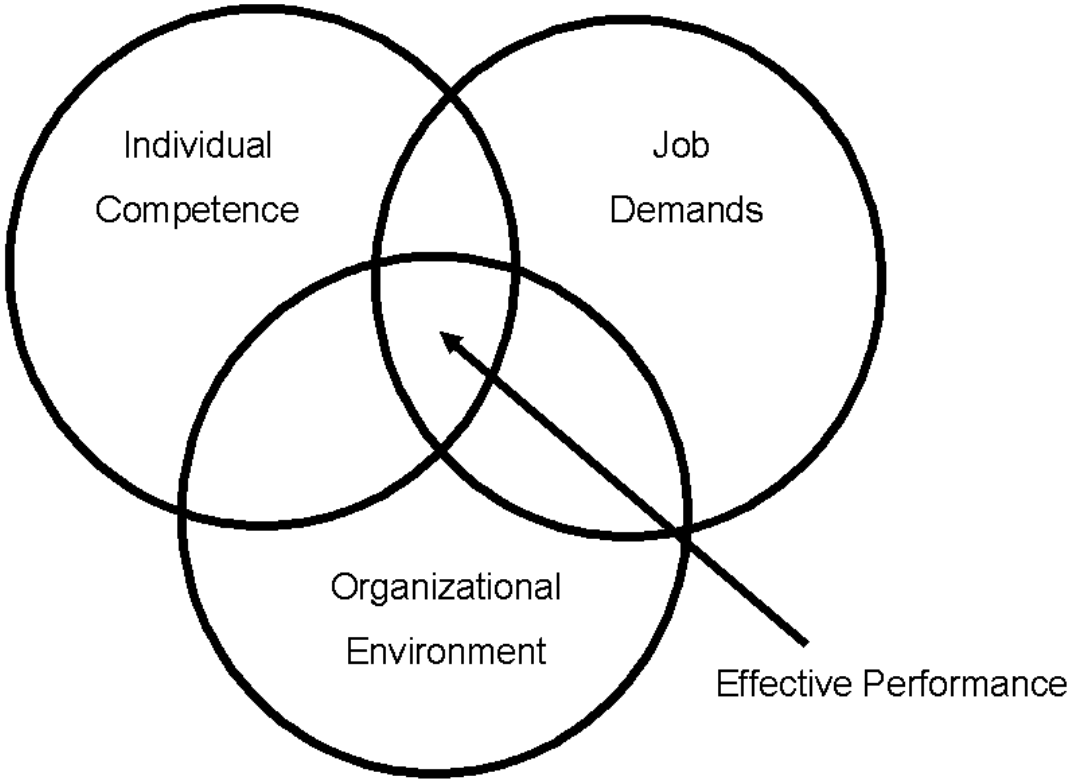


Figure 1. Boyatzis (1982) competency model.

The perceived competency of managers can have a significant effect on their performance. Alman (2006) assessed perceived management competencies of cardiac rehabilitation professionals and found managers recognized the importance of technical, human, and conceptual skills. Other researchers supported such findings (Garman, Burkhart, & Strong, 2006; Linney, 2007). In Alman's study, the majority of managers deemed all three skills as equally important. Perceived technical competency can play an equally important part in the effectiveness of IT managers. Understanding perceived skills from the IT managers' point of view offered insight into the IT managers' sense of value in the company and can help develop effective processes to drive productivity.

Historical Development of Technical Competency

Information technology first became useful in the accounting and finance areas of companies where data manipulation was intensive. IT workers developed systems on large-scale computers to process the transactions automatically, where hundreds of clerks used to complete. Information technology began the new information age, requiring a new set of specialized knowledge and technical skills to process information electronically (Shrout, 1971).

The introduction of computers into business processes created the need for systems professionals who were competent in data processing and process mapping. "In planning for information flow, it is essential for information systems analysts to understand the principles, capabilities, and potentialities of computers as well as their limitations." (Shrout, p. 98). Companies required workers capable of working with the latest technological equipment and with skills in programming used to develop systems to improve business processes. Understanding the new workforce of information technicians became a field of interest.

Shrout (1971) studied the first generation of systems professionals to identify their competencies. Shrout recognized knowledge of computer systems as well as communication skills were most effective in good system development. Business behaviors and needs have changed since the advent of the computer, and the emergence of competent systems personnel is necessary to stay competitive (Shrout, 1971).

Managers of departments focused on the technical aspects of a business understand the importance of staying informed of innovative changes in the area of expertise. For example, an important aspect of engineers is their level of technical

competence to design and develop new products and solutions. Instrumental competence (i.e., technical knowledge), strategic competence (i.e., economic and political knowledge), and communicative competence (i.e., an understanding of how society works with technology) are three core competencies of engineers in dealing with the introduction of new technologies (Ravesteijn, De Graaff, & Kroesen, 2006).

IT managers with strong core competencies can visualize potential usages of technology for the betterment of the company. Being competent from the IT perspective refers to IT-related knowledge and experience developed over time to enable IT personnel to be effective in their roles. Two distinct important forms of knowledge are tacit and explicit knowledge (Polanyi, 1967). Explicit knowledge refers to formal and systematic knowledge whereas tacit knowledge is the outcome of the use of knowledge. Tacit knowledge is the sense of understanding knowledge and developing an awareness of the skills necessary to perform the task. Tacit knowledge is difficult to share since the knowledge usually comes from experience (Polanyi, 1967).

As IT managers becomes engaged in their role, they start acquiring knowledge. Over time, the experiences of implementing new systems and working through the challenges of new technology lead to the development of perceived competence. As areas of information technology grow and become more sophisticated, the IT departments became an integral part of the business process (Bassellier & Benbasat, 2007).

IT personnel required more than technical skills. Cross-functional competencies became a key component in adding value. IT companies and non-IT companies recognize the importance of multiple competencies and the links of such business competencies to business value (Devaraj & Kohli, 2003). Researchers have identified a need for technical,

business, and soft skills for individuals entering the IT field (Bailey & Mitchell, 2006; Wellington, 2005). The potential benefit from IT investments might not be realized when the technicians implementing solutions lack any one of these core competencies.

Aligning the correct skill sets with projects can help with the success of technology implementations. IT project development requires people with soft and technical skills (Dingsoyr, Djarraya, & Royrvik, 2005; Goles, Hawk, & Kaiser, 2008; Singh, 2005; Wu, 2005) to ensure the successful launch of new systems. Changes in IT architectures and advancements in technology require IT managers to upgrade their skills continuously.

Rabhi, Yu, Dabous, and Wu (2007) highlighted the complexity involved in introducing a technology such as a service-oriented architecture to meet the tremendous growth in communications and information sharing. Rabhi et al. maintained new skill requirements were constantly required and IT workers needed to absorb, master, and control the new technologies. The ability to apply new technologies to the business process requires abstract thinking and problem-solving skills. IT managers must update their knowledge of technological trends and understand the advantages and disadvantages of the technology to be effective managers.

Some leaders in IT departments can be too technical. Organizations can place too much emphasis on implementing the technology rather than understanding the benefits of the technology to the business areas of the organization (Peppard, Ward, & Daniel, 2007). Focusing solely on the latest technology without considering the needs of the business can result in system implementations difficult to use or misaligned with the business process. Companies willing to invest in new technology are fitting environments

for individuals who enjoy the challenge, but the focus must remain on the business goals.

Viitala (2005) surveyed the perceived development needs of managers and claimed leadership and supervisory skills were the areas where development was the most urgent. Viitala ranked general business skills very high, followed by technical skills. Technical skills were less urgent but considered a personal development need in the upcoming years.

IT Competency Models

IT competency structures include areas such as application development, architectural knowledge, business analysis, and database design. The designs of competency models assist with training and develop IT personnel to be effective in development and support of IT systems. Diverse learning areas are important to ensure IT graduates have the skills and proficiency to be effective. Key areas include (a) foundations in the physical and mathematical concepts relative to IT; (b) understanding of IT systems; (c) methodology for deploying IT systems; (d) effectively using IT to solve problems and improve decision making; and (e) background in legal, ethical, and security implications to IT (Keith & Judd, 2006). Well-prepared IT graduates have developed competencies in analytical problem solving, technology and architecture, application development, and systems integration.

Gramignoli et al. (1999) described an IT manager as someone with the ability to develop cost effective software applications integrating data processing activities with business strategies. IT managers should have a deep knowledge base in technology, good customer relationships, communication with technical support groups, and vendor management. Technical skills, along with leadership skills and strategic thinking skills

translate into effective management of IT. As shown in Figure 2, to be effective at managing IT requires both business and technical competencies (Gramignoli et al., 1999).

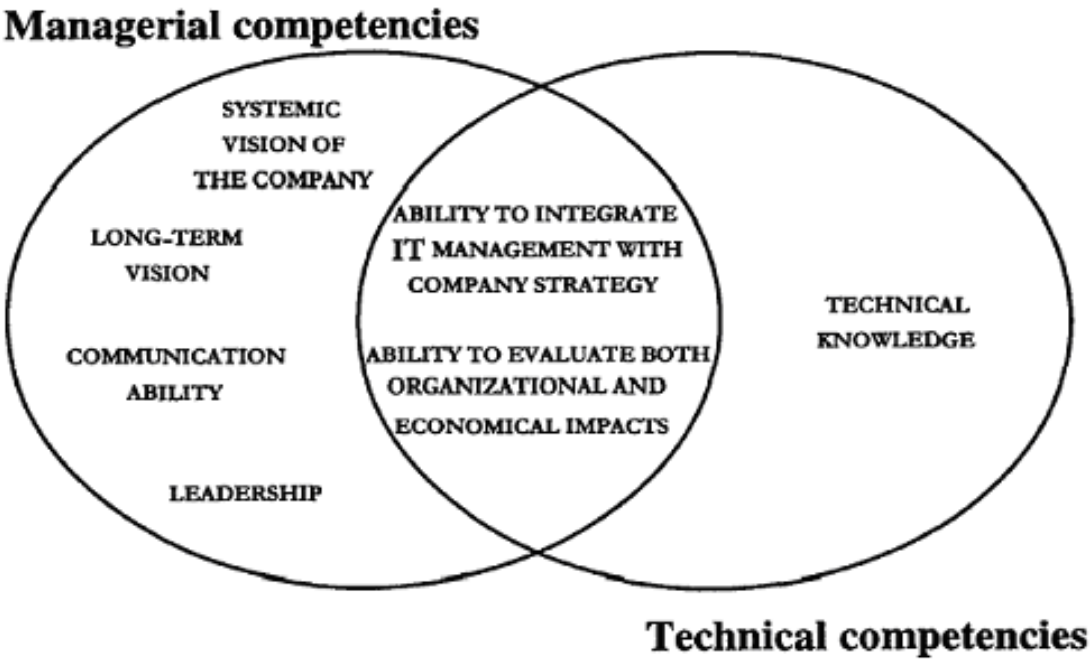


Figure 2. Effective IT management competencies (Gramignoli et al., 1999).

Dawes and Helbig (2007) supported the importance of technical and business skills and defined seven competency groups covering the IT spectrum. General management skills, IT competencies, and leadership skills are required to manage staff and relationships in an IT-oriented field. Infrastructure skills include the ability to work with networks, security, and support services. Web computing involves the ability to design and implement Web applications. Systems and database competencies assist in developing the components supporting the systems. Technical support services employees have the skills necessary to support end-user computing. IT management skills focus on creating values from information content. Legacy technology skills are necessary for maintaining mainframe programming and systems support.

Naqvi (2004) defined IT competencies as the possession and development of skills to a level of proficiency. Naqvi described three broad development approaches focused on developing an understanding data structures and information usage. The traditional approach (TA) starts with basic word processing and leads to spreadsheets and graphics, and finally databases.

The TA approach is useful in developing basic IT skills to support business applications. A less common approach referred to as the spreadsheet first approach (SFA) starts with spreadsheets and graphics, followed by word processing and possibly databases. The information systems approach (ISA) begins with building an understanding of databases followed by spreadsheets and graphics, ending with word-processing. The focus of the ISA approach is on developing an understanding of a wide range of data, an approach more successful in systems development.

Rajadhyaksha (2005) used a model with four factors to assess technical managers. The factors are (a) technical skills, (b) problem solving skills, (c) technical leadership ability, and (d) people management. The model included visualization and a quest for learning and gaining knowledge. The results of Rajadhyaksha's study supported the need for technical skills in managers.

In the various approaches to addressing IT competencies, previous researchers emphasized the importance of multifaceted skills necessary to deliver value to the business community (Dawes & Helbig, 2007; Gramignoli et al., 1999; Katz, 1955). In an environment where organizations are becoming flatter, managers with multiple skills are more effective. The developers of managerial and technical competency models

consistently describe the need for IT managers to seek technical solutions to business problems while enabling managers to work with the business community effectively.

IT Trends Affecting Competency

As technical IT managers have become integral to the business process, strong IT skills have helped with making operations more efficient. IT competency models clearly define behavioral and technical skills, but trends in the marketplace may affect the development of technical skills and the supply and demand of technical personnel.

The current IT community leaders measure technical competency with standardized certification exams. IT professionals must have specific important skills in the areas of technical competency, architecture, security, and hardware and software skills (Lee, 2005). IT managers have reported workers with certifications were able to adapt quickly to changing technologies and to communicate clearly to customers, improving customer perceptions of IT. Research has shown employers still seek workers with technical certifications to make the company more competitive in the marketplace (Venator, 2006). Schwarzkopf, Mejias, Jasperson, Saunders, and Gruenwald (2004) recognized technical training was an essential component in employment, but research has indicated only 19% of organizations viewed IT training as a worthwhile investment.

Managing IT skill sets is a challenge since employees value training opportunities while employers must understand the value of the investment. Gallivan, Truex, and Kvasny (2004) examined job advertisements of IT professionals and found the market continued to demand IT professionals with strong IT skills. Although IT positions are still in demand, the type of skills needed have changed. Many positions in IT focus on project management and business consulting skills (Vinaja, 2006).

Outsourcing

W. R. King (2004) maintained continued outsourcing redefined IT positions within non-IT firms. Firms continuing to outsource require employees with a combination of business knowledge and technical understanding to fill new roles such as contract managers, technology strategists, or business liaisons. Fulbright and Routh (2004) took a more scientific approach by defining the concept of the vendible line. The vendible line separates positions that are highly probable for outsourcing from strategic positions.

According to W. R. King (2004), companies will continue to outsource many technical roles while the remaining functions will require a variety of new competencies. Fulbright and Routh recommended a new model for IT course curriculums with IT skill competencies including IT core skills (e.g., programming, networking, databases, and web technologies) and project management as well as general business knowledge and general education and communication skills (see Figure 3). Fulbright and Routh suggested the new curriculum would better prepare IT graduates for today's market to remain above the vendible line.

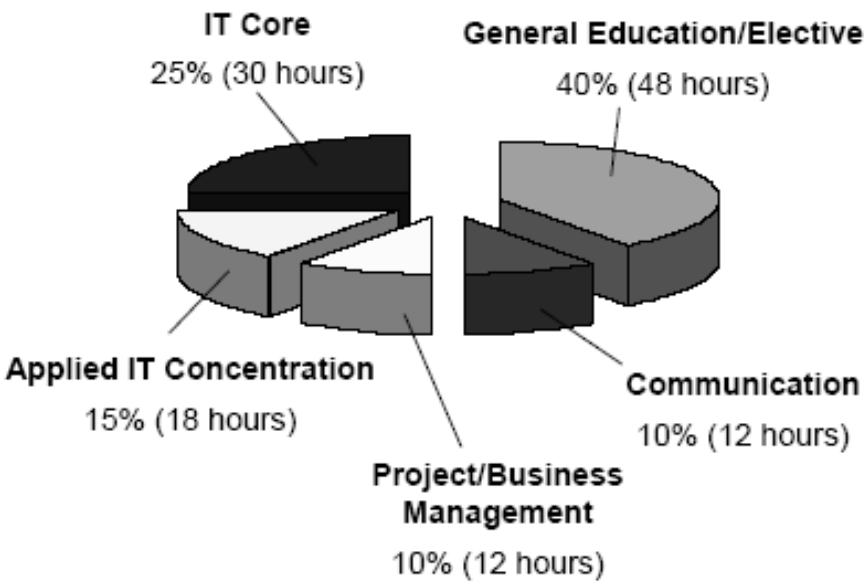


Figure 3. IT curriculum model (Fulbright & Routh, 2004).

Although technical skills still seem to be an important competency of IT managers, current research indicated technical skills were absent in the list of critical skills necessary to keep in-house technicians (Dix, 2006). According to Dix, top skills areas include project management skills, business process knowledge, and industry knowledge but not technical skills. Outsourcing managers consistently attempt to downplay technical knowledge and place a higher importance on business knowledge. Varon (2006) identified a number of business skills as core to successful IT operations (e.g., industry knowledge, project management expertise, business process knowledge) but found no corresponding technical skill with the same level of importance.

A concern has emerged that IT outsourcing could lead to loss of technical and business knowledge (Willcocks, Hindle, Feeny, & Lacity, 2004). Willcocks et al. suggested control over IT strategy might be outsourced. As outsourcing firms gain tacit knowledge of the systems and business process, in-house workers become less valuable

for the process. Keeping IT skills current, and keeping informed of business strategies is critical for IT managers. IT managers who possess a breadth of skills and competencies are more effective.

Luftman and Kempaiah (2007) offered a different view and stated outsourcing could create a demand for high tech individuals. Organizations outsourcing non-critical components of IT take advantage of the savings and reinvest the money in new IT initiatives requiring both advanced technical and business skills. Nelson, Ahmad, Martin, and Litecky (2007) recognized the importance of developing the right IT skills in house as the trend to outsource jobs continues. Maintaining IT skills in new technologies will continue to be important although IT managers refrain from reacting to the latest fads in technology and introduce new technology only when the technology aligns with the business strategies.

IT Education and Enrollment Trends

Aken and Michalisin (2007) indicated the enrollment in IT programs had significantly dropped since 2001. Statistics Canada (2006) reported overall enrollment in Canadian universities had increased, yet the enrollment in IT-related fields had dropped by 22.8% between 2001-2002 and 2004-2005. Although the economic outlook for IT graduates looks promising, findings in a recent study by the Computing Research Association indicated the number of newly-declared computer science majors fell from 15,958 in 2000 to 7,915 in 2007 (Perelman, 2008a).

Students majoring in IT seem to believe jobs and opportunities are lacking because of outsourcing activities (Locher, 2007). Concern over the outsourcing of entry-level IT positions might explain drops in enrollment. The enrollment downward trend

continues in spite of the Department of Labor's prediction that IT would be one of the fastest growing professions in the second decade of the 21st century. Many IT executives find it difficult to fill IT positions and consider retaining and attracting IT personnel a major concern (Vizard, 2007).

Students are confused about the different IT programs available. The Association for Computing Machinery (ACM), the Association for Information Systems (AIS), the Institute of Electrical and Electronics Engineers (IEEE), and the Association for Information Technology Professionals (AITP) recognize five different academic curricula within IT (Aken & Michalisin, 2007). The curricula are (a) computer engineering, (b) computer science, (c) information systems, (d) information technology, and (e) software engineering.

The programs offer distinct curricula for separate career paths in the IT field. Aken and Michalisin (2007) attempted to compare the competency skills specified as learning objectives in the programs with the skills exhibited by new hires. Trying to determine which technical skills are most suited for an individual's interest and most applicable for today's job market can be confusing and might be a factor in career selection for students. Schools can gain a competitive advantage by developing well-rounded curricula that meet the needs of the industry and result in more hiring opportunities for graduates.

One common factor of the IT education curriculums is a high emphasis on technical skills. The educational community clearly perceives strong technical skills as important when entering the workforce. Technical skills are critical to success, especially

in entry-level positions. Students receive mixed messages between what educators claim is important and what the business community considers important.

Growth in Project Management Skills

In assessing the critical behavioral competencies of IT managers and the effect of outsourcing, Vinaja (2006) highlighted project management skills as a skill in global demand. An important factor in management effectiveness is project management competencies. Stokes (2004) referred to the five dimensions of critical competencies required to be effective as a project manager, director, CIO or any other leader within IT. Core competencies include knowledge, understanding, skills, attitudes, and values.

Verma (2004) maintained IT project management required a combination of technical skills, organizational behaviors, and business abilities to deliver a project effectively. Verma measured the perceived IT skill set, IT experience, and IT education and found a weak relationship between technical skills and project management success. The findings highlighted the fact that, while many IT skills were present, some skills were more suited to a project than others were.

Increased Focus on Non-Technical Skills

Traditional skills for IT personnel include a strong technical background, but in today's market, a demand for IT professionals with strong business skills and communication skills exists, with less emphasis on technical competencies. Organizational and managerial skills have also become increasingly important (Byrd et al., 2004). The trend is to place an emphasis on business acumen and require IT managers to understand business strategy (IT staffing, 2005). A survey by the Meta Group found that eight out of ten IT departments realized that building strong relationships with their

business partners is a major success factor (Lindsay, 2006). IT managers cannot continue to define themselves as technical managers, they must evolve and transform into more business-oriented roles or face marginalization within their organization (Gomolski, 2006). Many researchers have claimed emotional intelligence was an important trait for management effectiveness (Cook, 2006; Heiken, 2007) although other research failed to find any relationship between emotional intelligence and leadership effectiveness (Smith, 2006).

New roles and responsibilities overlapping with roles associated with the business community define IT department personnel. IT has reinvented itself by outsourcing routine work and spending more time on business process redesign, focusing on IT-enabled business projects, and analyzing the role of IT in IT finance (Fanning, 2007; J. King, 2007). Business knowledge has become more important, and technical knowledge has become less important.

Given the ever-changing nature of technology, the competency of IT personnel is critical to the continued strategic value of IT. Finding the correct balance between business and IT skills continues to be a priority (Sankey, 2005). Employers have demanded an increased focus on soft skills in the IT curriculum in higher education (Beard, Schwieger, & Surendran, 2007). Although developing soft skills early in the education process is important, the challenge is to ensure technical skills are not affected. Developing strong competencies in all areas can ensure that new hires are prepared for the IT roles that await them.

IT Savvy Business Community

The integration of computers and software tools into the business areas has

created a need for end-user skills in technology. Duedahl et al. (2005) recognized the importance of business managers to develop IT competency. Managers who understand IT are equipped to use IT resources more effectively. The valuable competencies of a productive business manager include an understanding of system development and project management and the ability to access information.

According to Bassellier and Benbasat (2007), sharing of IT knowledge with the business community and business knowledge with the IT community can improve the partnership between organizations. Bassellier and Benbasat's findings showed cross-functional knowledge gained between business and IT personnel could be a valuable determinant for IT project success. Business customers are becoming much more comfortable with IT and the role it plays in the business environment.

Users are becoming more involved in complex IT decisions. A strong relationship between IT professionals and business users is critical to using technology effectively and driving a competitive advantage (Ott, 2004). Ott described a relationship model known as the balanced trading behavior model, recognizing the importance of businesses savvy users taking responsibility of new projects and IT personnel delivering expertise, knowledge, and experience in system development. With business managers gaining a better understanding of the role of IT, the importance of IT managers to stay informed of technical trends is even more critical. Individuals with a technical background tend to earn respect based on technical knowledge and accomplishments.

The trends in the IT field indicate educators, some researchers, and some industry practices continue to perceive IT skills as important. CIOs are aware technical skills remain the most important skills for IT staff (Nash, 2007). Trends, such as outsourcing

and shift to business skills, dictate that technical skills are becoming less important. The IT job forecasts further highlight variability in the IT market. Technical job forecasts provided by the Bureau of Labor Statistics show strong growth in some computer-related categories like computer systems analysts and information systems managers and a large decline for programmers in the upcoming years (Perelman, 2008b).

IT competency models reflect the importance of well-rounded IT managers, but without the opportunities to develop technical competencies, IT managers may be less productive. IT managers enter the field of IT because of a deep interest in technology. Employees not offered opportunities to develop from a technical standpoint might lack motivation in their new role.

Motivation

Motivation is a psychological need to act in a specific way. Motivation directs energies toward a goal or a task. Managers value high motivation levels in employees, knowing motivation is the precursor to mobilizing others to act (Ryan & Deci, 2000). Motivation influences productivity and performance.

Introducing technology requires employees with the specific skills, training, and motivation to streamline processes in the work environment (Kumpikaite & Ciarniene, 2008). As suggested by Kumpikaite and Ciarniene, productivity improvements in operations are the result of introducing technology in company processes. Technology has allowed companies to become leaner and more flexible. Technology also requires people who are motivated and appropriately skilled.

In a study involving online learning, van der Merwe (2007) showed weak motivation resulted in poor performance. Motivation is a combination of energy,

direction, and persistence, and motivation can be a factor in improving creativity. Researchers have offered evidence people were more creative when motivated by factors such as interest, enjoyment, satisfaction, or the challenge of the work (Amabile & Kramer, 2007).

Watts and Caldwell (2008) suggested individuals performed best when they satisfied the basic psychological needs of competence, autonomy, and relatedness. Quigley and Tymon (2006) offered insight about the contribution to career management of professionals of meaningfulness, competence, choice, and progress as components of intrinsic motivation. Intrinsically motivated people are generally more content with the career they chose.

Understanding the behaviors of individuals satisfying personal needs was the underlying basis of the current study. IT managers enjoy the technical aspects of their job and find such tasks motivating (Badawy, 2007). The association between competency and motivation is an important factor in the choice of IT as a career path. Individuals who are emotionally interested in a particular subject tend to look for opportunities that align with the interest (Akbulut & Looney, 2007).

Self-efficacy as perceived capabilities is considered a driving force in successful performance. Job expectation or knowing that a career is possible is a factor in the selection of a given school major. Workers given opportunities to learn, participate in innovative techniques, and get involved in challenging tasks can help motivate individuals to stay in IT. The goal of the research study was to determine if a correlation exists between perceived technical competency and intrinsic motivation of the IT manager.

Motivational Theories

Need theory defines how physiological needs drive behaviors and motivations. Maslow (1943) presented the need structure from lowest or simple needs to higher more complex needs. At the lowest level, Maslow's hierarchy of needs includes the foundational forces of motivation in people. Motivation to work is directly related to needs being met at each level. Physiological needs motivate individuals to work for basic needs like food, shelter, and water. The work environment satisfies the basic needs through income. According to Maslow's hierarchy, people advance from physiological needs to needs of safety and security. Benefits and job security meet the safety needs.

Individuals have their social needs met through the relationships created at work, at company parties, or in committees. Recognition and praise result in meeting the self-esteem needs. Fulfilling an individual's self-actualization needs requires matching of knowledge, skills, and abilities with challenging tasks (Maslow, 1943).

Vroom (1964) developed the expectancy theory and proposed an individual was motivated to act a certain way based on the expectation of a positive outcome. The expectancy of the individual is the understanding that a particular behavior will result in a particular outcome. The individual weighs the reward (i.e., valence), the level of performance (i.e., expected work effort), and an understanding that a reward will be received at the completion of the task (i.e., instrumentality). The following formula, Valence x Expectancy x Instrumentality = Motivation, represents the expectancy theory. Many IT personnel enjoy the technical aspects of their role. A technology person considers gaining technical knowledge and having an opportunity to apply technology to real-world situations as rewards (Vroom, 1964).

Furthering Maslow's (1943) hierarchal need theory, Alderfer (1969) suggested managers should realize that employees attempt to satisfy multiple needs simultaneously. Unlike Maslow, Alderfer did not assume lower level needs must be satisfied before addressing higher-level needs and defined the ERG theory with the concepts of existence, relatedness, and growth. The existence category groups both the physiological and safety needs of Maslow's theory. The social and esteem needs are grouped in the relatedness category, and self-actualization is in the growth category. Growth needs are met when individuals have opportunities to be creative and to exercise the competencies they have acquired. Managers must understand individuals' behaviors can target multiple needs at various levels within the hierarchy.

McGregor (1957) defined theory X and theory Y, offering two opposing viewpoints of human behavior. In theory X, workers are lazy, and authoritarian behavior is a requirement to motivate and coerce workers to perform. In theory Y, workers want to do well and can be motivated through a nurturing and supportive management style.

In the two-factor theory, Herzberg (1966) separated the factors affecting job satisfaction and dissatisfaction in an employee's work environment. Herzberg referred to the two-factory theory as the motivation-hygiene theory in which some hygiene (i.e., necessary) factors must be present in a work setting to motivate the worker (e.g., pay, benefits, job security, and positive working environment). As described by Maslow's (1943) hierarchy of needs, the necessary factors should be primary concerns before applying any motivators such as recognition, responsibility, opportunities, and advancement. Intrinsic motivation can drive performance from satisfactory to superior levels of effectiveness.

McClelland (1976) believed workers' needs varied in strength. In the needs-based motivational model, workers perceived needs may differ from person to person. Individuals place varying degrees of emphasis on the need of achievement, the need for power, and the need for affiliation. McClelland was especially interested in achievement motivation. Managers with a high need for achievement set difficult but achievable goals. McClelland's theories in achievement motivation are similar to Herzberg's (1966) motivation-hygiene theory in that achievement-motivated people are interested in recognition, advancement, and increased responsibility.

McClelland and Burnham (2003) extended the theory, recognizing managers were most effective when they focused their efforts on influencing others to perform. Building power is the result of influencing others rather than demonstrating individual achievements. Managers who influence their direct reports generate in the employees a greater sense of responsibility and a stronger sense of focus on the company goals. Managers who oversee technically oriented personnel may be more influential if perceived technically competent than managers who are not perceived technically competent.

Intrinsic and Extrinsic Motivation

Intrinsic motivation occurs when internal factors inspire individuals to act. Intrinsically motivated individuals perform tasks because they have a passion to do so, and they do not require external incentives. Conversely, extrinsic motivators are tangible rewards to drive action. A common practice is to use extrinsic motivation in the workplace to motivate employees. Offering merit increases, promotion, or bonus are examples of extrinsic motivation.

Thatcher, Liu, Stepina, Goodman, and Treadway (2006) recognized that hygiene factors (i.e., extrinsic motivators) are important, but intrinsic motivation can positively affect IT workers' attitudes and behaviors and have a direct effect on job satisfaction. Intrinsic motivation can be less expensive to develop, and in some cases more effective than extrinsic methods. For example, IT workers tend to enjoy the challenges of working with new technologies in technically oriented fields. Individuals who enter the IT field look forward to opportunities to implement the latest technologies without external motivators. Challenging work can be a factor in creating intrinsically motivated workers.

Roberts, Hann, and Slaughter (2006) examined the interrelationships between motivation, participation, and performance with Open Source Software (OSS) developers, offering insight about the motivating factors of IT personnel. Roberts et al. found the following:

> On one hand, intrinsic motivations are likely to be important as contributors have a high degree of autonomy and self-determination and are valued for their competence. On the other hand, the OSS community provides extrinsic motivations such as reputation or status. (p. 986)

Although extrinsic rewards can be motivating, technical workers enjoy the challenge of working with leading edge technologies as a way to demonstrate personal worth in the corporation (Katz, 2005). In most cases, IT managers enjoy a specific amount of technical aspect to their role at a company. Technical employees in general enjoy challenging and innovative work because it offers opportunities for growth and development.

Self-Determination Theory (SDT)

In the self-determination theory, a distinction exists between autonomous motivation and controlled motivation. "Intrinsic motivation is an example of autonomous motivation" (Deci & Ryan, 2002, p. 334). Individuals are intrinsically motivated to perform tasks in which they feel competent. Deci and Ryan suggested competence and autonomy were key factors affecting intrinsic motivation. Events resulting in an increase of perceived competence can result in an increase of intrinsic motivation. Deci and Ryan separated intrinsic and extrinsic motivational factors within SDT theory, recognizing that individuals were intrinsically motivated when they felt a sense of choice in performing a task. Human beings have a natural tendency to develop and grow (Ryan & Deci, 2000) and they are motivated to develop a certain level of competency in a given task.

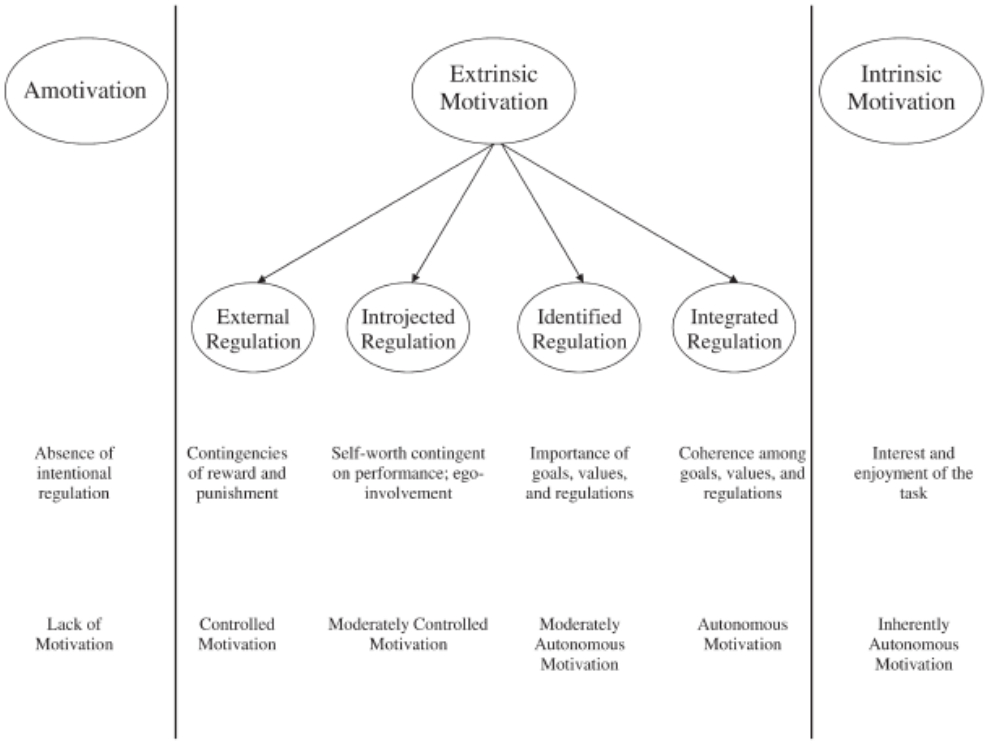


Figure 4. Self-determination continuum (Gagne & Deci, 2005).

The focus of SDT is on self-motivated behavior. The basis of the theory is the recognition that individuals have a physiological need to be competent in a field. According to Ryan and Deci (2000), SDT addresses "the investigation of people's inherent growth tendencies and innate psychological needs that are the basis for their self-motivation and personality integration, as well as for the conditions that foster those positive processes" (p. 68).

Competence, relatedness, and autonomy drive intrinsic motivation. Gagne and Deci (2005) summarized the SDT continuum (see Figure 4) from amotivation or the lack of self-determination to intrinsic motivation or self-determined motivation. Gagne and Deci proposed internalization occurred when individuals experienced a sense of relatedness and competence. A component of SDT is cognitive evaluation theory.

Cognitive Evaluation Theory (CET)

Combining extrinsic and intrinsic rewards can have positive and negative effects on motivation. The CET includes descriptions of the various effects of extrinsic rewards on intrinsic behaviors (Gagne & Deci, 2005). People are more intrinsically motivated to complete a task when they feel competent for the task and in control of the task. The focus of CET is to understand what makes a task enjoyable to an individual. The level of enjoyment can drive self-motivation.

The learning process taking place in performing the task can be a motivator in itself. A sense of pleasure is noticeable from developing a particular competence in a field (Deci & Flaste, 1995; Deci & Ryan, 2002). Based on CET, challenging activities, feeling of competence and autonomy are important for intrinsic motivation. IT managers

commonly observe such phenomena because IT personnel enjoy introducing new and challenging technologies into a business setting.

Motivation and IT Managers

The current study can deliver value to corporations experiencing drastic functional changes within their IT departments. IT workers are facing significant shifts in their defined responsibilities, and understanding factors of motivation can be valuable to IT and HR departments. Problem solving continues to be a key attribute of IT personnel. IT workers enjoy introducing new technology to solve current issues in the business community. According to Thomas (2002), it is human nature to need a purpose and a sense of meaningfulness. Jenkins (2006) claimed competence, relatedness, and autonomy were significant factors in making work enjoyable. Given that competence, relatedness, and autonomy meet the basic needs of feeling valued, IT managers can find a sense of purpose and value within an organization by using their technical competencies to approach real-world problems and find solutions for the business community.

IT managers perceive the role of IT as technical consultant to businesses. Without a sense of purpose and value attributed to technical competence, the motivation of IT employees decreases. Competence is an intrinsic reward driving motivation and commitment to a goal (Thomas, 2002). The purpose of the current study was to determine if an IT manager's technical competence and intrinsic motivation are correlated.

Motivation and Competency in a Changing IT World

Trends relating to hiring practices, outsourcing, and skill development in the IT industry will continue to introduce new challenges (Goles, Hawk, & Kaiser, 2008) and possibly affect the performance of IT departments. With the changes occurring in the

industry, understanding motivational needs is important. The changing role of IT managers might result in an alignment issue between the core competencies of IT managers and the tasks assigned to the managers based on their newly defined role.

In a study on the failure rate of new hires, Murphy (2006) recognized technical competence was one of the competencies in determining success or failure of new hires. IT workers who feel their contribution matters, who enjoy their work, and who feel competent will more likely feel a connection with the organization. Satisfaction in a role, being competent, and feeling in control can influence participation. IT managers who are intrinsically motivated can drive organizational performance. Salary and benefits will always be important, but opportunities for fulfillment must receive consideration. Technical tasks can allow IT managers to demonstrate synergy between new technologies and business processes.

In a maturing market, with cost cutting measures throughout the industry and less company loyalty, the management of intrinsic motivation is a crucial step in keeping good workers (Thomas, 2002). The biggest gains might come from improving intrinsic rewards such as making work fulfilling. Barbuto (2005) discovered positive correlations between leaders' motivations and their leadership behaviors. Organizational leaders offering formal training and development of the IT staff contribute to performance and career satisfaction. IT professionals look for work opportunities to fulfill their technological curiosities or will look elsewhere for employment (Mahatanankoon, 2007).

The current study involved a correlational analysis between perceived technical competency and intrinsic motivation. The study also addressed any differences between IT workers at IT companies and IT workers at non-IT companies. IT managers address

the other organizations as customers. IT managers take pride in servicing their customer group by defining solutions to problems in the core areas of the business. In a service-based economy, engineers must adapt technology to the conditions of society and become socio-technical (Lemaitre, Le Prat, De Graaf, & Bot, 2006). The role of an IT manager is very similar to the role of an engineer. IT managers offer specialized skills in a business environment. Quesenberry and Trauth (2007) found IT workers felt a sense of achievement and self-fulfillment working on IT projects. Offering opportunities to develop technical competencies may result in performance improvements of IT managers.

Conclusion

Many previous researchers indicated they considered technical competency crucial for IT managers (Dingsoyr et al., 2005; Gramignoli et al., 1999; Lee, 2005; Shrout, 1971). A competent manager feels more connected with the work performed and develops a sense of appreciation for the effort required when introducing new technologies to the department (Katz, 2005). One of the challenges for many IT managers is keeping current with technological advancements and finding ways to add business value through the implementation of technology, but the challenge can fulfill a need for many IT managers. Technical professionals are motivated when they experience the need to perform the task (Badawy, 2007).

Leaders cannot always motivate people solely with extrinsic rewards. Identifying individuals' needs is important to motivate them, and offering opportunities that lead to skills development and technical competency may relate to employees' intrinsic

motivation. Individuals who enter the field of IT enjoy the challenge of new technology and enjoy searching for business solutions through various technical applications.

Many IT individuals receive a psychological boost when performing technical tasks. The intrinsic reward is the enjoyment of solving an issue and demonstrating competence. Although extrinsic motivators such as increased pay, or bonuses can appear to motivate individuals, but studies have shown extrinsic motivation could undermine intrinsic motivation and result in loss of autonomy (Deci & Flaste, 1995). "Self-motivation, rather than external motivation, is at the heart of creativity, responsibility, healthy behavior, and lasting change" (Deci & Flaste, 1995, p. 11). Extrinsic motivators can make individuals feel they are performing the task solely for the external reward. Intrinsic motivators offer a greater sense of fulfillment.

Corporations require IT managers to possess strong technical competencies and business acumen to better align IT goals with business objectives (Sankey, 2005). According to Sankey, IT workers find it difficult to maintain technical skills while improving on their business competencies. Trends identified in the literature pertain to increased IT outsourcing, hiring practices, and a focus on business skills, potentially limiting opportunities for IT managers to develop a sense of technical competency.

The studies reviewed indicated competence and autonomy were key factors affecting intrinsic motivation (Deci & Ryan, 2002). Deci and Ryan believed competence in a specific field resulted in increased intrinsic motivation. Little research is available on perceived technical competence and the relationship to intrinsic motivation in the IT field. This study extended the body of research to the field of IT, using validated measurement tools based on the self-determination theory. Other studies have

successfully used the perceived competence scale to measure perceived competence (Williams & Deci, 1996; Williams et al., 1998), and the intrinsic motivation inventory has been used to measure motivation within college students (Caldwell, 2006) and Hispanic children (Cueva, 2006).

Summary

Trends relating to hiring practices, outsourcing, and skill development in the IT industry may continue to affect the performance of IT departments. With the changes occurring in the industry, understanding motivational needs is important. Satisfaction in a role, feeling competent, and being in control may influence participation. IT managers, who are intrinsically motivated, will drive organizational performance (Gottschalg & Zollo, 2007). When people participate in activities they find interesting, they participate on their own volition (Gagne & Deci, 2005). To improve the effectiveness of IT departments, the manager should understand the motivating factors of today's IT professionals.

Prior studies have recognized the importance of technical competency in determining success or failure (Murphy, 2006). IT professionals will look elsewhere for employment if they feel technological curiosities are unfulfilled (Mahatanankoon, 2007). Barbuto (2005) discovered positive correlations between leaders' motivations and their leadership behaviors. Perceived competence and a feeling of autonomy are predictors to positive intrinsic motivation (Gagne & Deci, 2005). The need to feel competent in a particular position is associated with a need to experience different challenges and to seek opportunities to grow through varied opportunities.

Gagne and Deci (2005) offered the concept of organimistic need to feel competent and in control. Self-determination theory (SDT) concerned the innate need to master a particular skill. IT managers who do not experience the types of foundational activities that allow for the exercise of technical skills might feel less capable and less effective. Previous literature included research on the correlation of competencies and motivation among athletes, students, and workers (Caldwell, 2006; Cueva, 2006; Gagne & Deci, 2005). Minicucci (2002) used the Perceived Competence Scale (PCS) to understand perceived competence and motivation to stop smoking. Little research is available on the relationship between motivation of IT managers and perceived technical competency. The purpose of the study was to examine the correlation between perceived technical competency and intrinsic motivation and address any differences based on intervening variables like gender, years of service or type of organization.

Extending the body of knowledge with research on the perceptions of IT managers can help organizations in various ways. Management effectiveness, knowledge management strategies, the designing of training programs, and improved employee retention are areas that can benefit from improved understanding. Managing the inventory of technical skills within a company is important to ensure hiring and retaining the best people with appropriate skills aligned with specific software development projects (Dingsoyr et al., 2005).

Chapter 3 includes details of the methods used to measure perceived competence and intrinsic motivation in IT managers. A quantitative correlational design facilitated the determination of a relationship between perceived competence and intrinsic motivation. Chapter 3 includes a discussion of the research methodology and the appropriateness of

the design and details about the population, sampling frame, geography, instrumentation, data collection and analysis, and validity and reliability of the instrumentation.

CHAPTER 3: METHOD

The purpose of the non-experimental quantitative correlational research was to determine if a relationship exists between perceived technical competence and intrinsic motivation among IT middle managers in large corporations. A quantitative approach was appropriate since the goal of the study was to identify and explain any relationship between the stated variables (Creswell, 2005). The variables in the study included the perceived technical competence of IT managers and the intrinsic motivational behaviors. The study findings offered insight into IT leadership trends and behavioral of managers.

The current study involved the distribution of the survey to specific members of an online market research panel, the Zoomerang ZoomPanel with opt-in members from across the United States. Information technology managers represented the qualifying participants. The target population for the study was middle managers in large U.S. corporations that work for IT companies and non-IT companies. By using an online panel, the current study was able to reach a target population that was representative of the U.S. census across certain demographics like gender, age, and income (MarketTools, 2008). A non-random sample of 62 IT middle managers produced survey data for analysis to study perceived competence and intrinsic motivation.

A survey instrument, based on the Intrinsic Motivation Inventory (IMI) and the Perceived Competency Scale (PCS) was the data collection tools. A correlational design was appropriate to examine relationships or structures using subcategories of the data (Cone & Foster, 2005). Parametric inferential statistical methods helped determine if correlations exist between subgroups within the sample. The current study used the Pearson correlation coefficient to measure the linear relationship between two variables.

Research has shown a correlation between competency and intrinsic motivation (Ryan & Deci, 2000). This study examined the relationship among these variables within IT managers in large corporations. Chapter 3 includes explanations of the methodology used to examine IT managers' perceptions and intrinsic motivation. Included are comments on the appropriateness of the selected design, research questions, population, sampling frame, geography, instrumentation, data collection and analysis, and validity and reliability of the instrumentation.

Research Method and Design Appropriateness

Research Methods

Quantitative research methods are appropriate when the goal is to describe relationships among variables. Quantitative research studies typically use large sample sizes with a focus on objective measures (Neuman, 2005). Quantitative research is appropriate to address specific, narrow questions with a numerical scale and statistical methods for data analysis (Creswell, 2005). In a qualitative approach, questions are open-ended. Qualitative research methods examine human behaviors focusing on interaction and processes on fewer cases. Tools such as interviews, case studies, and ethnography assist with the collection and assimilation of information (Salkind, 2006). The purpose of the current study was to use a quantitative research method to describe the relationship between perceived competency and intrinsic motivation for IT middle managers.

Research Designs

A correlational research design is appropriate when researchers attempt to study a relationship among two or more variables (Creswell, 2005). A correlational design provided a framework for studying any possible relationship between perceived technical

competence and intrinsic motivation. Descriptive research assesses and describes the characteristics of an existing phenomenon (Salkind, 2006). Historical research compares the current and past events, usually with primary sources. The most appropriate approach to determining a relationship among variables is a correlational study. Correlations can reflect both positive and negative relationships. The design of choice for the current study was quantitative correlational.

A prediction was not the intent in the current study. In a prediction design, the research measures the predictor variable at one point in time, and the criterion variable at a later point in time. The goal of a prediction design is to forecast future performance or behavior (Salkind, 2006). In the current study, a quantitative correlational design measured each variable at the same time. A qualitative design would be useful for studying how people think, talk, or behave (Creswell, 2005). Qualitative studies usually involve few individuals, and deal with understanding a relatively unknown subject area (Creswell, 2005; Salkind, 2006). In the current study, the intent was to study specific, quantifiable variables.

The basis of the study was the foundational research of Deci and Ryan (2002) on self-determination theory (SDT). SDT is a theory of motivation developed from the assumption that people are active organisms with innate needs to feel competent (Deci, 2007a). A subset of SDT theory known as the cognitive evaluation theory addresses the more specific need for competence and autonomy as key drivers to intrinsic motivation (Deci & Ryan, 2002).

A primary variable in the current study was the intrinsic motivation of the IT manager. Intrinsic motivation involves participating in activities for the enjoyment of

performing the tasks. The Intrinsic Motivational Inventory (IMI) is an instrument developed for assessing perceived competence, value, and perceived choice (see Appendix A). The IMI is considered a multidimensional instrument used in various studies to measure intrinsic motivation and self-regulation (Deci, 2007b).

The second primary variable was the perceived technical competence of the IT manager. The Perceived Competence Scale (PCS) is a short survey with high face validity among instruments designed to assess constructs in the self-determination theory (Deci, 2006) such as perceived technical competence (see Appendix B). Dr. Edward Deci, the author of the PCS survey, allows for slight modification of the instrument to address competence in the field under study (see Appendix C).

Other descriptive variables considered in this study included gender, the employer's type of organization, and employee's years of experience. The study examined the roles of the variables representing gender, years of experience and type of company as they intervene in the relationship between competence and motivation. Demographic variables captured the gender of the participant, and type of employer using a nominal scale (see Appendix D). Nominal scales are appropriate to group values in to two or more categories (Cooper & Schindler, 2006). Ratio scales describe variables with equal intervals and have an absolute zero (Salkind, 2006). In the current study, years of experience represented a ratio scale.

Appropriateness of Design

Research has shown a correlation between competency and intrinsic motivation (Ryan & Deci, 2000). Motivating employees to improve organizational performance and to align individual performance with corporate goals is a critical component to success

(Gottschalg & Zollo, 2007). A high level of technical skills is necessary to implement technological solutions for increased organizational performance. The purpose of the study was to examine the relationship of perceived technical competence and intrinsic motivation of IT middle managers.

Comparison to other Designs

An explanatory quantitative correlational design was appropriate to study the relationship between perceived competence and intrinsic motivation. With the quantitative correlational design, researchers rely on correlation statistics to describe and measure associations among variables (Creswell, 2005). The focus was to examine if the variables covary. In experimental designs, researchers focus on determining causation. The purpose of the current study was to explore the relationship between perceived competence and intrinsic motivation, without interest in causality or prediction. The design selected was not predictive correlational. There was no prediction of the future outcomes based on any variables.

An explanatory correlational research design is appropriate to determine the degree of covariance between two variables (Creswell, 2005). The following characteristics are common in explanatory correlational studies: (a) the researcher is interested in correlating two or more variables, (b) data collection occurs at one point in time, (c) data collection consists of information from a single group of participants for each variable, (d) data analysis involves correlation statistical tests, and (e) conclusions are the results of the statistical tests. The current study did not attempt to control or manipulate the variables, only to measure the relationship among variables. Conversely, a prediction research design facilitates the identification of variables that positively predict

other variables (Creswell, 2005). In the current study, the explanatory correlational design was appropriate to obtain insight on the relationship between perceived technical competence and intrinsic motivation of IT managers.

Correlational Analysis

The correlation coefficient measures how much two variables covary (Neuman, 2005). The value *r*, also called rho, represents the Pearson correlation coefficient; one of the most commonly used measures of linear relationship between two variables. As suggested by Creswell (2005), the Spearman rho (rs) correlation coefficient can be useful for nonlinear data. Partial correlation statistical analysis was useful in determining the amount of variance explained by intervening variables. The purpose of multiple regression statistics is to predict future values by examining combined relationships of independent variables to predict a single dependent variable. Multiple regression statistics was not the intent of the current study. The intent of the study was to use the Pearson correlation to measure a linear relationship between perceived technical competency and intrinsic motivation of IT middle managers.

Research Questions

The quantitative study was an analysis of the relationship between perceived technical competence and intrinsic motivation. Consideration was given to years of experience, gender, and type of company as potential intervening factors between perceived technical competency and intrinsic motivation. Although previous research indicated an association existed between competency and intrinsic motivation, no quantitative researcher has examined competency and intrinsic motivation in the IT field.

The following questions guided the research in developing an understanding of perceived technical competence and intrinsic motivation:

1. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations?

2. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled?

3. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled?

4. What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when the type of company is controlled?

Based on earlier research on competency and motivation, the hypothesis for the current study was as follows:

$H1_{0:}$ No relationship exists between perceived technical competence and intrinsic motivation for IT middle managers in large corporations.

$H1_{A:}$ A relationship exists between perceived technical competence and intrinsic motivation for IT middle managers in large corporations.

The relationship between perceived technical competence and intrinsic motivation may differ between the various categories of individuals. An analysis of the relationship across these groupings offered some specific insight about the variables under study.

$H2_{0:}$ No statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled.

$H2_{A:}$ A statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled.

$H3_{0:}$ No statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled.

$H3_{A:}$ A statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled.

$H4_{0:}$ No statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when type of company is controlled.

$H4_{A:}$ A statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT for IT middle managers in large corporations when type of company is controlled.

Employees from non-IT companies might experience different perceived technical competencies and motivational behaviors than employees from IT companies. IT companies depend on revenue from products and services that center around information technology. Non-IT companies depend on IT departments to deliver technological solutions to improve their competitiveness. The intent of the study was to

understand if the relationship among the primary variables differed between the two types of IT organizations.

Population

The target population was part of a member group retrieved from a database managed by the Zoomerang Corporation (MarketTools, 2007). Zoomerang Corporation is a subsidiary of MarketTools Inc., a management company for an online marketing and research service. Zoomerang has delivered successful results for many major corporations (Anonymous, 2007).

Participants voluntarily join Zoomerang's ZoomPanel and are encouraged to complete surveys with offers of points redeemable for gifts. Zoomerang maintains up-to-date profile information for various demographics. ZoomPanel members have granted permission to participate in research studies and can cancel the membership at any time (see Appendix E).

Mattila (2006) used Zoomerang to define sample populations of IT workers in a study of burnout, job satisfaction, and organizational commitment in IT workers. Zoomerang's membership is more than 2.5 million members, and profiled across more than 500 attributes (MarketTools, 2008). The company manages hundreds of up-to-date demographics like gender, geographic distribution, age, household Income, occupational title, and functional area (MarketTools, 2007). The target population for the study was IT middle managers who are employees of large companies. A sample of 62 individuals who are IT middle managers from large corporations produced survey data for analysis using descriptive and inferential statistics to study perceived competence and intrinsic

motivation. Business and occupation attributes from the profile information determined IT managers working for IT companies and IT managers working for non-IT companies.

Sampling Frame

The ZoomPanel database has approximately 10,000 IT workers, a number including approximately 1,500 managers or executives. ZoomPanel includes opt-in members from across the United States, covering many demographics such as gender, income, types of business, and roles within an organization (MarketTools, 2007). Demographic variables and engagement in an information technology field dictated the selection of qualifying participants. Employer demographics determined type of company and size of the company.

Qualifying IT managers in the ZoomPanel database received the opportunity to complete the survey. The selection process ended once 62 participants have responded. Creswell (2005) stated that a target population is a group of individuals with common characteristics. In the current study, the participants were IT middle managers from large U.S. corporations. The sample included equal representation of respondents across the descriptive variables. Zoomerang collected sufficient survey responses from each of the descriptive categories.

Zoomerang ensured at least 60 responses from IT middle managers. ZoomPanel has a sampling process called TrueSample that ensures the study responses are real, unique, and engaged (ZoomPanel, 2008). ZoomPanel offered a sample balanced to the U.S. Census across the required segments. Extensive profiling across over 500 attributes provides access to low incident groups. The costs of each response were approximately

$60, resulting in a total cost of $3,600. A confidence interval of 5% would have required over 300 respondents and tripled the cost.

The sample was one of convenience and the results may not be generalizable. Including a larger, probability sample may produce a more representative sample. For a target population of 1,500 potential respondents, with a confidence level of 95% and a confidence interval of 10%, the sample population should be at least 91 respondents (National Statistical Service, 2008). For the current study, Zoomerang selected a convenience sample of IT middle managers who are members of the ZoomPanel.

Only IT middle managers from large U.S. companies who participate in the Zoomerang online panel were included in the current study. The online panel delivered sufficient access to IT middle managers in various organizations. IT middle managers who do not work for large U.S. companies did not participate in the study because they do not have the same experiences in terms of perceived technical competency and intrinsic motivation. Including them in the study may have yielded inaccurate information.

In probability sampling, researchers select individuals who are representative of the population whereas in non-probability sampling, the researcher selects participants who are willing and available (Creswell, 2005). The ideal sample size for the study would have been determined with a sample size calculator. In this case, the selected participants were willing and available and agreed to participate in surveys of this nature. As suggested by Creswell (2005), the sample should include approximately 15 participants in each group and approximately 30 participants for a correlational study. The intent of

producing a sample to 62 responses was to allow for a significant amount of participants in each group while minimizing costs.

Large samples can help minimize both Type I and Type II errors (Howell, 2007). Type I errors consist of finding relationships in the data that do not exist while Type II errors consist of not finding a relationship in the data when one exists. The sample size of 62 participants helped minimize Type I and Type II errors.

Informed Consent

Members of the ZoomPanel voluntarily opt-in to participate in various marketing research studies. Member can opt-out and cancel their membership by logging on to the secured Web site and selecting the cancellation option. A fundamental ethical principle of social research is to ensure participants voluntarily participate and understand what is required (Neuman, 2005).

An introductory paragraph informed the readers of the purpose of the study, the voluntary nature of participation, and the option to decline participation. In the current study, members of the ZoomPanel who qualified received an email requesting to participate in the survey. The potential participants did not receive the survey until they were introduced to the study and have provided informed consent as detailed out in Appendix F. The participant gave consent by clicking a check box stating they understand the conditions of the survey and gave consent to use the information in the study. Appendix F contains the informed consent form and process. Following the consent, the participant checked a second check box, stating they accepted to participate. The participants were able to withdraw or decline at any time without consequences. The

researcher's contact information was available to the potential participant (see Appendix F).

Confidentiality

The prospective participants in the research are members of a panel of opt-in members referred to as the ZoomPanel. A professional online marketing research company referred to as MarketTools Incorporated operates the ZoomPanel. MarketTools adheres to the guidelines set for by the Council of American Survey Research Organizations (CASRO) and is a licensee of the TRUSTe Privacy Program (MarketTools, 2006). Zoomerang agreed not to disclose any confidential information to any third party and employees and consultants are bound by confidential obligations (see Appendix G). Zoomerang hosted the survey using a secured website, but did not access information unless consented by the user for technical support (Markettools, 2009). Survey data was secured and only accessible by the researcher.

All replies were completely confidential, and only the survey data requested was available to the researcher. Personal information about the ZoomPanel members was not available to the researcher. ZoomPanel holds a Safe Harbor certification. Risks of misinterpretation of information and identity theft have increased with the advent of electronic databases (Soma, Rynerson, & Beall-Eder, 2004). According to Soma et al. (2004), Safe Harbor certification is a U.S. response to the more stringent European Union data protection directives. The certification ensures U.S. companies adhere to data protection standards in e-commerce activities in the European community. The U.S. Department of Commerce has developed a framework approved by the European Commission for evaluating a company's data security policies (Export.gov, 2008).

Any person using the ZoomPanel site must be 18 years old or older (MarketTools, 2006). Specific demographic profile information from members assists with targeting relevant market research surveys. Each survey request is clearly marked to indicate the source is from ZoomPanel. At any time, members can easily opt-out of the program (MarketTools, 2006). ZoomPanel protects the anonymity of the members by securing access to the personal information. Only the researcher had access to the information and no connection between the responses and personal information existed. The respondents agreed to participate and consented to use the information for the study. The researcher collected the data, stored the information in a secured Microsoft Excel spreadsheet, and analyzed the data using the EZAnalyze software and SPSS 14. The personal files are stored in a password-protected file on the researcher's computer. The researcher will destroy the detail information after 3 years.

Geographic Location

The population for the current study was limited to members of the ZoomPanel from the United States and the sampling frame consisted of middle managers within the IT field from large corporations. The ZoomPanel has at least 1,500 IT managers as members. The selection of 62 opt-in members came from various regions across United States.

Instrumentation

People feel engaged if asked to share what they think and how they feel (Stone, 2006). Asking participants to participate through anonymous online survey tools such as Zoomerang.com can be useful in getting valuable feedback to pertinent questions. Survey research and correlational research rely on surveys to sample many respondents who

answer the same questions (Neuman, 2005). The instruments used in the current study have been tried and tested by other research studies and were used to gather quantitative data pertaining to IT managers' perceived competence and level of intrinsic motivation.

The Intrinsic Motivation Inventory (IMI) is a multidimensional instrument used to assess individuals' interest, perceived competence, effort, value/usefulness, felt pressure and tension, and perceived choice of a given activity (Deci, 2007b). Caldwell (2006) used the IMI to measure motivation within college students in completing a programming course. Cueva (2006) used the IMI to study motivation and efficacy in young Hispanic children. The IMI consists of a series of subscales addressing how individuals internalize and self-regulate the activities they consider important. The interest/enjoyment subscale is a self-reported measure of intrinsic motivation.

The authors of the IMI permit small modifications to the instrument or the use of selected subscales relevant to a specific study. The modifications for the current study consisted of adapting the instrument to the population of IT managers. The IMI has some redundancy, and shorter versions are available. In the current study, participants received the standard 22-item version with the four subscales of interest/enjoyment, perceived competence, perceived choice, and pressure/tension.

The Perceived Competence Scales (PCS) is a 4-question instrument with high face validity for assessing the constructs of self-determination theory (SDT) (Deci, 2006). Williams et al. (1998) used the PCS to study patients' ability to manage glucose levels, and Williams and Deci (1996) used the PCS in studying medical students and their ability to learn material from an interviewing course. Minor modifications to the questions are

acceptable. In the current study, slight modifications ensured the survey questions apply to technical activities.

The goal of the research was to understand the perceived technical competency of IT managers. The modified PCS questions specifically measured perceived technical competency (see Appendix B). Dr. Deci granted permission to use and modify the questionnaires (see Appendix C). The IMI and the PCS were appropriate for the assessment of perceived technical competence and intrinsic motivation of IT managers.

Multiple researchers have examined the validity of the IMI and have reported high validity (McAuley, Duncan, & Tammen, 1989; Tsigilis & Theodosiou, 2003). According to Caldwell (2006), the overall scale is internally consistent with a Cronbach alpha coefficient of .85. Li et al. (2008) reported a Cronbach alpha coefficient of .82 as a measure of internal consistency and reliability. In a study of children's intrinsic motivation, an adaptation of the IMI instrument exhibited a Cronbach alpha coefficient of .89 (Song & Grabowski, 2006).

The standard, 22-item version consists of the subscales of interest/enjoyment, perceived competence, perceived choice, and pressure/tension. The interest/enjoyment subscale is a self-report measure for assessing intrinsic motivation. The perceived choice and perceived competence subscales are positive predictors of intrinsic motivation whereas the pressure/tension subscale is a negative predictor of intrinsic motivation.

The Perceived Competence Scale (PCS) has high face validity among instruments designed to assess the constructs of the self-determination theory (Deci, 2006). Studies have used the instrument to assess a participant's feelings of competence (Williams & Deci, 1996; Williams et al., 1998). "The alpha measure of internal consistency for the

perceived competence items in these studies was above 0.80" (Deci, 2006, ¶ 3). Evidence from earlier research studies indicates the reliability of the two instruments warrants their use in this study.

The PCS and the IMI surveys included an introduction page that aligned the instruments with the variables. A pilot group participated in the survey. A convenience sample of 10 IT managers completed the survey and commented on the experience. The respondents were encouraged to suggest any changes that might make the introduction clearer. A Cronbach alpha score can assess reliability and measure the degree to which the instruments reflect the same underlying constructs (Cooper & Schindler, 2006). The current study illustrates the Cronbach alpha scores for the pilot and the sample that assisted with measuring the reliability (see Table 1).

Data Collection

An online survey generated data pertaining to the variables in the current study. Survey techniques are a common tool in quantitative research, making it possible to ask numerous questions of many people in a short period (Neuman, 2005). ZoomPanel has a sampling process called TrueSample that ensures the responses are real, unique, and engaged (ZoomPanel, 2008). Respondents only received the survey once. ZoomPanel did not have access to the data collected.

The survey instruments use a Likert-type scale to gather information about the specific variables. Likert-type items can provide an ordinal measure of a person's attitude (Neuman, 2005). These types of scales are usually built with four to eight categories. Combining several Likert-type scale questions to measure a single construct is acceptable.

One 7-point Likert-type scale was used to evaluate perceived competence and intrinsic motivation with anchors of 1 (*not at all true*), 4 (*somewhat true*), and 7 (*very true*). The Likert-type scale is a variation of a summated rating scale allowing respondents to express a favorable or unfavorable attitude toward the object of interest (Cooper & Schindler, 2006). In the current study, the two instruments combined in one survey appropriately captured perceived technical competency and intrinsic motivation data. The respondents selected a numerical score reflecting their overall favorability toward the measures.

A Web-based data collection design facilitated the administration of the survey. A Web-based solution offered respondents easy access and flexibility to complete the survey and provided the researcher access to the raw data in electronic form. Zoomerang maintained the anonymity of the participants. The Zoomerang services offered access to participants on an online Web site. The qualified members received a Web site link by e-mail for the completion of the survey.

The contract with Zoomerang was to supply a minimum of 60 conveniently selected respondents who are IT middle managers of large corporations. The services under the contract included the selection of participants, contacting the qualified list, hosting the survey, collecting the results, and securing the information. Before completing the survey, the participants agreed to join the current study.

The Web-based survey was appropriate for three reasons. First, as ZoomPanel members, the respondents were familiar with the environment and the presentation of the survey. The target population had participated in at least one online survey when asked to supply demographic information during the enrollment process. Second, the questions

required discrete, numeric responses which are easy to handle through a Web interface. The online method limited errors resulting from data translation. The online Web site functionality involved electronic data collection and storage. Third, the objective of the current study was to reach out to a sample of IT middle managers from various industries. Zoomerang's members include a community of IT employees categorized as middle managers.

Data Analysis

The objective in quantitative correlational research is to use statistical procedures to determine the strength of the relationship between two variables (Creswell, 2005). Zoomerang collected the data from the survey and provided the data in a format readable by Microsoft Excel. Using an Excel add-on called EZAnalyze, descriptive statistics and inferential statistics offered some insight to the stated variables. SPSS was appropriate for calculations that are more complex.

The EZAnalyze tool is a powerful extension to the Excel menu bar, offering most of the basic descriptive statistics (i.e., mean, median, standard deviation, and range) (Poynton, 2005). The tool includes advanced features such as correlation, *t* tests for one sample, independent samples, and paired samples, chi square, and repeated and single factor ANOVA. These functions are common tests used to validate hypotheses. The ANOVA statistic was useful in determining if any of the descriptive variables like gender, years of experience, and type of company influence the relationship between perceived technical competence and intrinsic motivation. Partial correlations controlled for any affects by the intervening variables like years of experience, gender, and type of organization.

Descriptive statistics determined the mean, median, standard variation within variables. Inferential statistics aided with testing hypotheses and determined the existence of relationships. Inferential statistics offered a precise way to infer results from the sample to the population (Neuman, 2005). The Pearson correlation coefficient is a parametric test used to measure the strength of any relationship between variables (Cooper & Schindler, 2006). Certain assumptions for parametric statistical analysis require that the observations must be independent, observations result from normally distributed populations, the populations should have equal variances, and interval scales are optimal for performing arithmetic operations. "The popular Likert scale illustrates a scale with theoretically equal intervals among responses" (Creswell, 2005, p. 168). The researcher aggregated and averaged the IMI subscale scores to derive a single intrinsic motivation score (Li, Lee, & Solmon, 2008). The PCS score is obtainable by averaging the responses on the four items (Deci, 2006). The scoring of the instruments generated measures that are equivalent to an interval scale score.

Sampling error can occur when the sample is not representative of the target population. In the current study, a non-random sample of the target population participated in the survey. Some bias toward those who were willing to participate in surveys may have existed since some of the participants selected by Zoomerang may have refused to complete the survey. Since everyone opted in to receive surveys, the participants differed in unknown ways from nonmembers of Zoomerang and thus may not be representative of IT members outside of the population of Zoomerang members. The expectation was that the variability in the responses was low since the target population comprises a specific group of individuals.

Validity and Reliability

Creswell (2005) described the term validity as the ability to draw reasonable conclusions of the population using the sample results. Validity can also be obtainable when a measure accomplishes its claims (Cooper & Schindler, 2006). Consistency of the instrument is a key factor in determining validity. The current study used instruments that are valid in a series of prior research studies (McAuley, Duncan, & Tammen, 1989; Tsigilis & Theodosiou, 2003; Williams & Deci, 1996).

Internal validity requires careful design of the experiment (Cooper & Schindler, 2006; Creswell, 2005). Some threats to internal validity include the period to complete the test, the selection of subjects, and the scoring of the instrument. The current study maintained internal validity by using an instrument that has historically shown a strong correlation amongst the variables. All participants received the survey simultaneously. The timing and completion of the survey occurred for all participants within a period of a week. This mitigated any effects of timing on the survey. All participants had an opportunity to complete the survey. This limited the issues in the selection process of the subjects. The scoring of the instrument limited errors by using discrete values with a common Likert-type scale. The collections of data occurred electronically and minimized any error in manually transferring information.

External validity is the ability of the experiment to be generalizable to other samples (Cooper & Schindler, 2006). The current study studied a sample of IT managers using valid instruments that have been effective with other samples. Several researchers have used the Intrinsic Motivation Inventory (IMI) to measure intrinsic motivation (Caldwell, 2006; Cueva, 2006). Salkind (2006) suggested that one way to ensure

extraneous variables would not be a factor is to use a homogeneous population. This study sampled a population that all participated in online surveys.

Multiple researchers have examined the validity of the IMI and have reported high validity (McAuley, Duncan, & Tammen, 1989; Tsigilis & Theodosiou, 2003). According to Caldwell (2006), the overall scale is internally consistent with a Cronbach alpha coefficient of .85. Li et al. (2008) reported a Cronbach alpha coefficient of .82 as a measure of internal consistency and reliability. In a study of children's intrinsic motivation, an adaptation of the IMI instrument exhibited a Cronbach alpha coefficient of .89 (Song & Grabowski, 2006).

The Perceived Competence Scale (PCS) has high face validity among instruments designed to assess the constructs of the self-determination theory (Deci, 2006). Other studies have been successful using the instrument to assess a participant's feelings of competence (Williams & Deci, 1996; Williams et al., 1998). "The alpha measure of internal consistency for the perceived competence items in these studies was above 0.80" (Deci, 2006, ¶ 3). Evidence from earlier research studies indicated the reliability of the two instruments and warranted their use in the current study.

Summary

A quantitative correlational study was involved in determining the relationship between perceived technical competence and intrinsic motivation in IT managers. The analysis revealed any potential differences in results between years of service, gender, and the type of organization. The participants came from research panel from Zoomerang. Zoomerang selected participants to reflect diversity across various demographics.

Two measurement tools facilitated data collection in the current study to determine any relationship between perceived competency and the intrinsic motivation within IT managers. Creswell (2005) stated the correlational design was appropriate to measure the degree of association between two variables (Creswell, 2005). A study of perceived competence and intrinsic motivation indicated how the variables influenced each other. Slight modifications to the Perceived Competence Scale (PCS) focused the questions on perceived competence in the IT domain. Other researchers have used the PCS instrument in various healthcare studies (Williams & Deci, 1996), but there has been little research in the field of IT management.

The Intrinsic Motivation Inventory (IMI) is a multidimensional tool developed to assess a participant's perceived competence, value, and perceived choice of a particular task. Other researchers have used the IMI to examine students' learning and performance in computer programming courses (Caldwell, 2006). Tsigillis (2005) and Li et al. (2008) have used the IMI to study intrinsic motivation in the field of athletics. The goal for the current study was to survey the IT managers at non-IT organizations and IT organizations to determine if a relationship exists between perceived competence and intrinsic motivation.

As a field research endeavor, the study had greater external validity but lower internal validity than a laboratory experiment (Neuman, 2005). Previous researchers have documented the validity and reliability of the chosen instruments. The survey questions targeted IT managers, and the questions focused on technical tasks. The design of the current study logically aligned with the specific problem and the theoretical framework outlined in chapter 2.

The data collection and data analyses techniques offered sufficient insight to address the research questions. A non-random sample of IT middle managers completed the surveys. A large sample size and random selection of respondents increased the generalizability of the results to the target population, but cannot be confirmed. The sample was limited to those who participate in the Zoomerang online panel.

Replication of the current study with the same unique population would likely produce similar results. Generalizing the results to a larger population group outside the panel membership might be more difficult because IT managers who participate in online panels exhibit unique attributes. In order to generalize the results of the current study to all IT managers in the U.S., an investigation of the unique attributes of the sample population would be necessary. Chapter 4 is a report of the current study findings with details of the analysis.

CHAPTER 4: RESULTS

Chapter 4 includes the results of the study. The purpose of this quantitative, explanatory, correlational study was to examine the possible relationship between the motivational behaviors of IT managers and their perceptions of their technical competencies. The chapter includes the data collection procedure, the selected participants who volunteered, pilot procedures, and the instrumentation used to gather the data. The data analysis includes descriptive statistics, preliminary research findings using inferential statistics that include an analysis of variance (ANOVA) and correlation analyses. Statistics were generated using EZAnalyze (Poynton, 2005) and SPSS version 14.0 software (SPSS, 2009). EZAnalyze statistical software is freeware that extends the functionality Microsoft EXCEL. The chapter concludes with a review of the research questions and an assessment of the hypotheses.

Data Collection Process

Two validated instruments were the basis for measuring intrinsic motivation and perceived competence. The instruments consisted of Likert-type scales to measure the variables in question. The current study used three demographic questions to capture the gender and years of experience of the respondent, as well as the organization type of the employer. An introductory paragraph described the research study. Prior to viewing the survey, the potential participants were required to offer an informed consent and an acceptance of participation.

Online Survey Process

An online survey system from Zoomerang allowed for the hosting of the study (Zoomerang, 2007). The initial step required entering the survey questions into a survey-

building tool supplied by Zoomerang. Scripting logic allowed for the flow of the survey to offer opportunities to exit from participating if the respondent could not meet the terms of the study. To ensure completeness of the questionnaires, each question was required. If a participant missed a question, the software prompted the user to complete the question. The pilot process was helpful in providing useful feedback to the flow of the survey and indicated any potential concerns.

Zoomerang distributed the online survey to a targeted member list from an online market research panel known as the ZoomPanel. Zoomerang contacted certain individuals based on demographic questions of (a) type of company, (b) size of company, and (c) role of the individual. The process permitted inclusion of an online panel that is reliable, engaged, and representative of the target population (MarketTools, 2008). The ZoomPanel has more than 2.5 million participants profiled across more than 500 attributes.

Zoomerang contacted approximately 160 qualified IT managers via email to request participation in the survey. Zoomerang used a sampling process called TrueSample that ensured the responses are real, unique, and engaged (ZoomPanel, 2008). Panelists must pass a rigorous screening process to qualify. Respondents only received the survey once.

Data Collection

The survey was available to the contacted participants for a period of 4 days. After 4 days, 63 individuals had responded to the request. One individual did not accept the conditions and 62 completed the survey. As stated in the contract, Zoomerang closed the survey once the limit of 60 surveys was complete. Two additional responses were

collected prior to the survey being closed, resulting in 62 completions. If the survey had been available for a longer period, other qualified members may have responded. The amount of funding available for the research limited the sample to 60.

A feature within the tool allowed for the export of a comma-delimited file of all participant responses. Data were coded for analysis; men were coded 1 and women coded 2; for type of organization, *IT company offering IT products and Services* was coded as 1, and *NonIT company with an IT department* was coded as 2.

Pilot Test

The pilot consisted of a convenience sample of 10 respondents. IT managers from various industries reviewed the survey instrument. The selected IT managers reviewed the survey and offered feedback and recommendations for improvement on the experience. The respondents suggested some minor changes to the opening paragraphs but felt the questions were clear and easily understood. The pilot scores offered an opportunity to test the reliability of the instruments. The Cronbach's alpha score for the IMI and PCS were .77 and .78 respectively. Table 1 presents the Cronbach's alpha for all subscales.

Table 1

Cronbach's Alpha Scores for Survey Instrument Subscales

Subscale	Pilot Survey	Complete Sample
	$N = 10$	$N = 62$
Interest Enjoyment	.88	.87
Perceived Competence	.87	.80
Perceived Choice	.88	.81
Pressure / Tension	.30	.78
IMI overall	.77	.80
PCS	.78	.89

Instrumentation

The instrument consisted of 22-questions based on the Intrinsic Motivation Inventory (IMI) and 4-questions based on the Perceived Competency Scale (PCS). Other studies have successfully used the PCS to measure perceived competence (Williams & Deci, 1996; Williams et al., 1998), and the IMI has been used to measure motivation within college students (Caldwell, 2006) and Hispanic children (Cueva, 2006). Scores from survey instruments are reliable if the results are stable and consistent (Cooper & Schindler, 2006; Creswell, 2005). Cronbach's alpha tests internal consistency (Creswell, 2005). As stated by Cooper and Schindler (2006), Cronbach's alpha measures the degree to which instrument items are homogeneous and consistent with underlying constructs.

Testing the reliability of both instruments ensured the consistency of the responses. An assessment of the PCS and IMI subscales using Cronbach's alpha scores are available in Table 1. Based on these results, the Cronbach alpha scores for these

instruments were reliable and consistent in measuring the variables. Cronbach's alpha scores ranged from .78 through .87 for the study sample. The pressure/tension subscale had a low reliability for the pilot study, but this may have been a result of the small sample size.

Data Recording

The IMI includes the following four subscales: interest/enjoyment, perceived competence, perceived choice, and pressure/tension. The average of the item scores for the associated items determines the score for each of the IMI subscales. Item responses for questions 2, 9, 11, 14, 19, 21 are reversed by subtracting 8 from the score (see Appendix A). The PCS assesses how competent people perceive themselves in relation to a particular task (Deci, 2006). The average of the four questions determines the PCS score (see Appendix B).

Descriptive Statistics

Table 2 presents the descriptive statistics for the variables representing the years of IT experience, the IMI subscales and the PCS scores. Two software packages, EZAnalyze and SPSS 14.0 were useful tools to generate the results. The scores for each variable resulted in no skew more than twice the standard error of skewness.

Table 2

Descriptive Statistics: Dependent Variables

	Years in IT	Interest enjoyment	Perceived Competence	Perceived Choice	Pressure /tension	PCS
Mean	16.18	5.31	5.88	4.77	2.99	6.28
Median	15.00	5.43	5.80	4.80	2.80	6.50
Mode	10.00	5.71	5.80	5.20	2.00	7.00
SD	7.72	1.00	0.78	1.23	1.17	0.76
Range	35.00	3.71	3.00	5.40	4.40	3.00
Min	3.00	3.29	4.00	1.60	1.00	4.00
Max	38.00	7.00	7.00	7.00	5.40	7.00
Skew	.54	-.06	-.37	-.08	.17	-1.27
SE Skew	.60	.30	.30	.30	.30	.30

Demographics

In addition to completing the IMI and PCS surveys, the participants reported their gender, years of IT experience, and the employer's type of organization. Of the 62 respondents, 10 were female and 52 were male (see Figure 5). Eighteen respondents worked for IT companies, while 44 respondents worked within IT departments at nonIT companies. Of the participants identified as working for an IT company, 89% were male and 11% were female. For those participant identified as working for nonIT companies, 82% were male and 18% were female. This is consistent with Zoomerang's panel of IT professionals, which is 83% male (Zoompanel IT professionals, 2009).

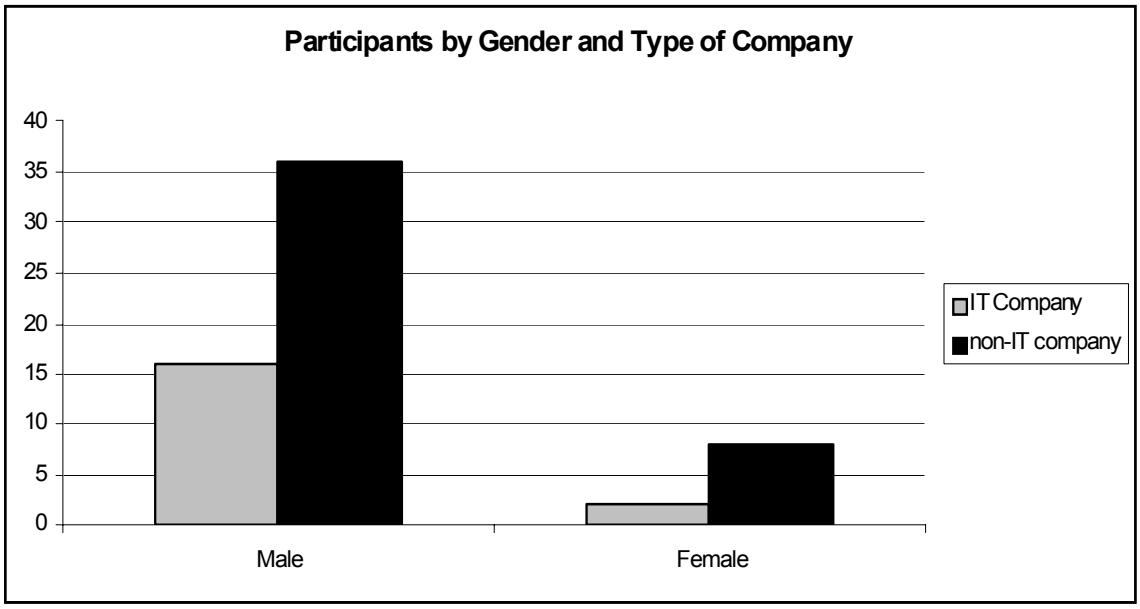


Figure 5. Participants by gender and type of company.

Figure 6 displays the frequency of distribution of years of IT experience for the respondents by gender. The average years of experience in IT is 16.2 with a median of 15. The number of years working in IT ranges from 3 years of experience to 38 years of experience. The standard deviation is 7.7. Sixty eight percent of the values fall within one standard deviation of the mean, while 98% of the values fall within two standard deviations of the mean.

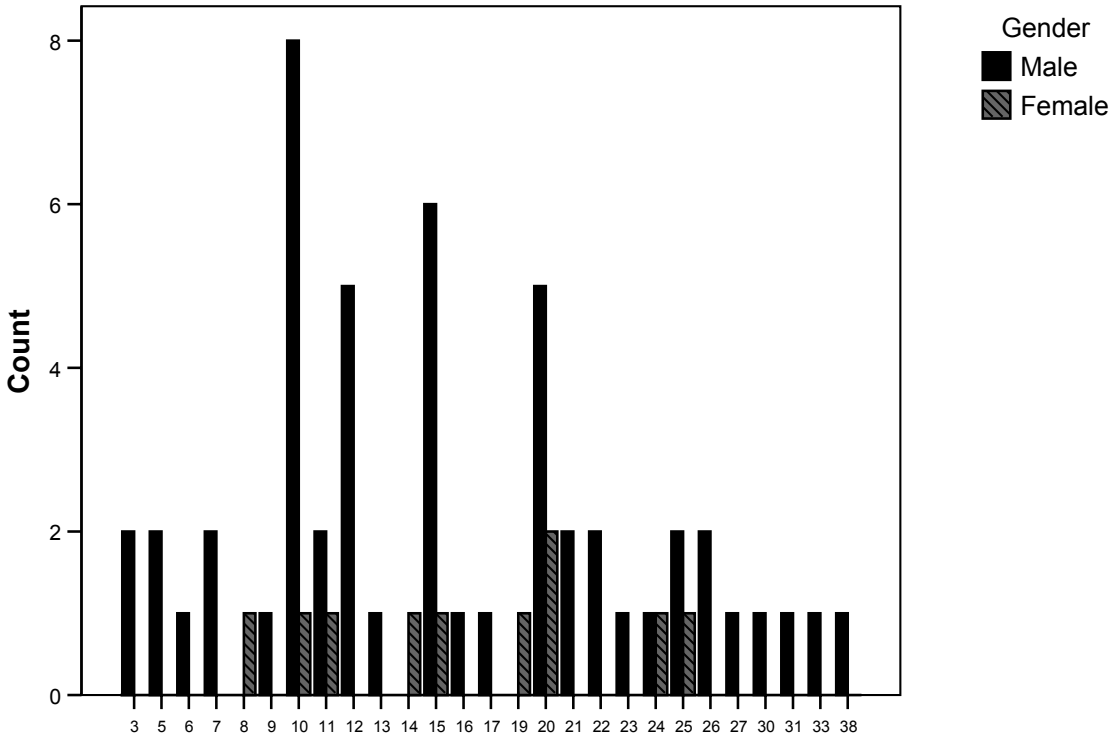


Figure 6. Years of experience in IT by gender.

Preliminary Analysis

The IMI instrument consists of four subscales. The interest/enjoyment subscale is used to assess intrinsic motivation (Deci, 2007b). "The perceived choice and perceived competence concepts are theorized to be positive predictors of both self-report and behavioral measures of intrinsic motivation, and pressure/tension is theorized to be a negative predictor of intrinsic motivation" (Deci, 2007b, ¶ 1).

The purpose of the preliminary analysis was to examine the mean differences of the interest / enjoyment subscale and the PCS score between gender, type of company, and years of experience. Two categories represented the years of experience. *Over 15 years of experience* and *15 years of experience and under* separated the responses into two categories. ANOVA scores allows for an examination of the differences across

means. As stated in Creswell (2005), ANOVA can produce statistical results to determine the influence of independent variables.

ANOVA Scores and the Interest Enjoyment Subscale

Results indicated a significant difference between women (n = 10, M = 5.91, SD = .795) and men (n = 52, M = 5.19, SD = 1.01) on the Interest Enjoyment subscale, $F(1, 60) = 4.58$, p = .04 (see Table 3 and Table 4). No significant difference was found between respondents working for IT companies (n = 18, M = 5.35, SD = 0.93) and respondents from nonIT companies (n = 44, M = 5.29, SD = 1.05) on the Interest Enjoyment subscale, $F(1, 60) = .04$, p = .84 (see Table 5 and Table 6). No significant difference was found between those respondents with over 15 years of experience (n = 27, M = 5.52, SD = 1.06) and the respondents with 15 years of experience or less (n = 35, M = 5.15, SD = 0.94) on the Interest Enjoyment subscale, $F(1, 60) = 2.12$, p = .15 (see Table 7 and Table 8).

Table 3

Descriptive Statistics: Interest Enjoyment by Gender

Gender	*N*	*M*	*SD*
Female	10	5.91	.80
Male	52	5.19	1.01

Table 4

ANOVA: Interest Enjoyment by Gender

Source	*df*	*F*	*p*
Between Groups	1	4.58	.04
Within Groups	60		
Total	61		

Table 5

Descriptive Statistics: Interest Enjoyment by Type of Organization

Type	*N*	*M*	*SD*
IT company	18	5.35	.93
NonIT company	44	5.29	1.05

Table 6

ANOVA: Interest Enjoyment by Type of Organization

Source	*df*	*F*	*p*
Between Groups	1	4.58	.84
Within Groups	60		
Total	61		

Table 7

Descriptive Statistics: Interest Employment by Years of Experience

Type	*N*	*M*	*SD*
Over 15	27	5.52	1.06
Under 15	35	5.15	0.94

Table 8

ANOVA: Interest Enjoyment by Years of Experience

Source	*df*	*F*	*p*
Between Groups	1	2.12	.15
Within Groups	60		
Total	61		

ANOVA results for the Perceived Competence Scale (PCS)

Results indicated no significant difference between women ($n = 10$, $M = 6.45$, $SD = 0.58$) and men ($n = 52$, $M = 6.25$, $SD = 0.78$) on the PCS scale, $F(1, 60) = .58$, $p = .45$ (see Table 9 and Table 10). No significant difference existed between respondents working for IT companies ($n = 18$, $M = 6.29$, $SD = 0.71$) and respondents from nonIT companies ($n = 44$, $M = 6.28$, $SD = 0.78$) on the PCS scale, $F(1, 60) = .004$, $p = .95$ (see Table 11 and Table 12). No significant difference between those respondents with over 15 years of experience ($n = 27$, $M = 6.29$, $SD = 0.79$) and the respondents with 15 years of experience or less ($n = 35$, $M = 6.28$, $SD = 0.74$) on the PCS scale, $F(1, 60) = .002$, $p = .97$ (see Table 13 and Table 14).

Table 9

Descriptive Statistics: PCS by Gender

Type	*N*	*M*	*SD*
Female	10	6.45	0.58
Male	52	6.25	0.78

Table 10

ANOVA: PCS by Gender

Source	*df*	*F*	*p*
Between Groups	1	.58	.45
Within Groups	60		
Total	61		

Table 11

Descriptive Statistics: PCS by Type of Organization

Type	*N*	*M*	*SD*
IT company	18	6.29	0.71
NonIT company	44	6.28	0.78

Table 12

ANOVA: PCS by Type of Organization

Source	*df*	*F*	*p*
Between Groups	1	.004	.95
Within Groups	60		
Total	61		

Table 13

Descriptive Statistics: PCS by Years of Experience

Type	*N*	*M*	*SD*
Over 15	27	6.29	0.79
Under 15	35	6.28	0.74

Table 14

ANOVA: PCS by Years of Experience

Source	*df*	*F*	*p*
Between Groups	1	.002	.97
Within Groups	60		
Total	61		

Research Question

The ANOVA results display the possible influence of the intervening variables. The following question guided the next part of study:

What is the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations?

Intervening variables of (a) years of experience, (b) gender, and (c) type of company (i.e., IT company or nonIT company) were considered. Research has shown self-determination theory and intrinsic motivation could be factors in performance, trust, and well-being in the work environment (Gagne & Deci, 2005). Little research is available in the area of perceived technical competence and motivation in IT managers.

Hypotheses

The purpose of the quantitative study was to address the relationship between perceived technical competence and intrinsic motivation and the effect of intervening variables of gender, years of experience, and type of company. The results from the study are useful in establishing the degree of association between perceived technical competency and intrinsic motivation. Scatter plots were prepared to compare each of the IMI subscales to the PCS scores.

Salkind (2006) noted a weak correlation exists for *r*-values between .2 and .4. A moderate correlation exists for *r*-values between .4 and .6. A strong correlation exists for *r*-values between .6 and .8. A very strong correlation exists for *r*-values between .8 to 1.0 (Salkind, 2006).

Hypothesis 1

The intent of the first hypothesis was to address the first research question pertaining to the relationship between perceived technical competence and intrinsic motivation without considering gender, years of experience or type of company. In this study, intrinsic motivation was measured using the interest enjoyment subscale from the IMI instrument. Perceived technical competence was measured using two different

scales: perceived competence subscale from the IMI instrument and the perceived competence scale (PCS).

$H1_0$: No relationship exists between perceived technical competence and intrinsic motivation for IT middle managers in large corporations.

$H1_A$: A relationship exists between perceived technical competence and intrinsic motivation for IT middle managers in large corporations.

A significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and perceived competence, $r = .68$, $p < .001$. Approximately 46% of the variance was explained, $r^2 = .46$. Based on the results, a significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and PCS, $r = .55$, $p < .001$. Approximately 30% of the variance was explained, $r^2 = .30$. The null hypothesis that there is no relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations is rejected. Figures 7 and 8 illustrate the relationships.

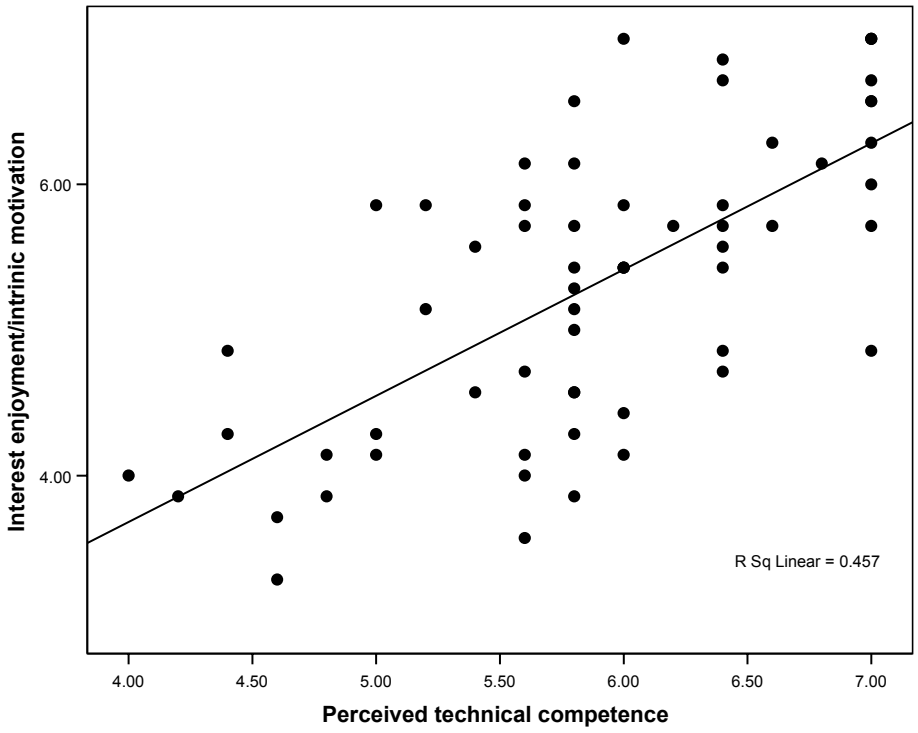


Figure 7. Scatterplot between intrinsic motivation and perceived technical competence (IMI subscale).

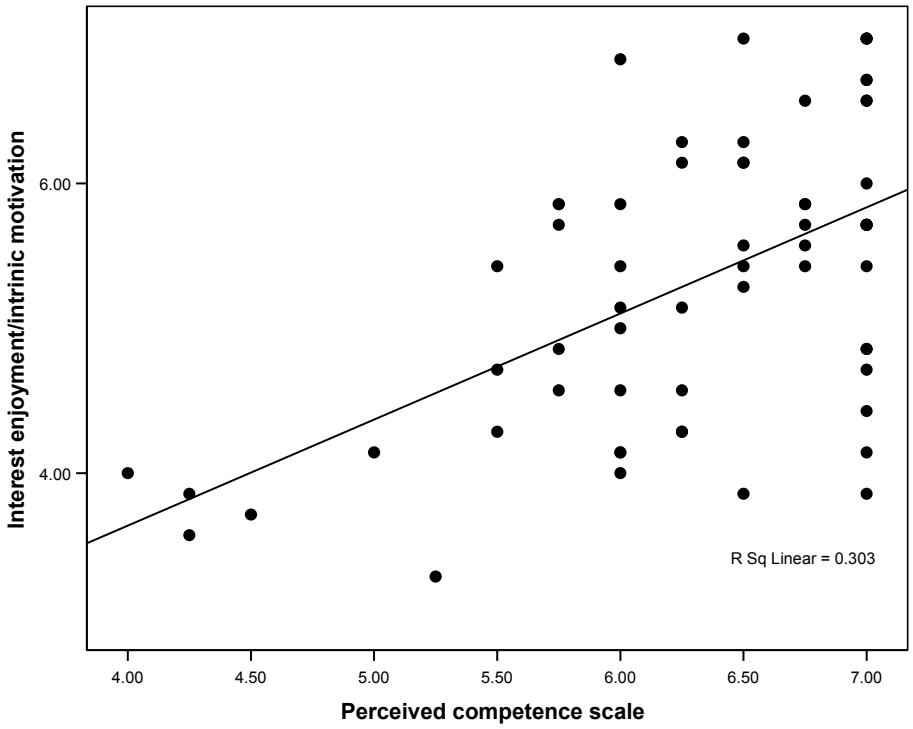


Figure 8. Scatterplot between intrinsic motivation and perceived technical competence (PCS).

Hypothesis 2

The intent of hypothesis 2 was to assess the second research question that pertains to the relationship between perceived technical competence and intrinsic motivation based on gender.

$H2_0$: No statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled.

$H2_A$: A statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled.

A significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and perceived competence, $r = .66$, $p < .001$. Approximately 43% of the variance was explained, $r^2 = .43$. There was little change in the r and r^2 values, indicating that gender had no influence on the relationship between intrinsic motivation as measured by interest enjoyment and perceived competence.

A significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and PCS, $r = .55$, $p < .001$. Approximately 30% of the variance was explained, $r^2 = .30$. There was no change in the r and r^2 values, indicating that gender had no influence on the relationship between intrinsic motivation as measured by interest enjoyment and perceived competence. The null hypothesis that there is no relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when gender is controlled is rejected. Figures 9 and 10 illustrate the relationships with gender highlighted.

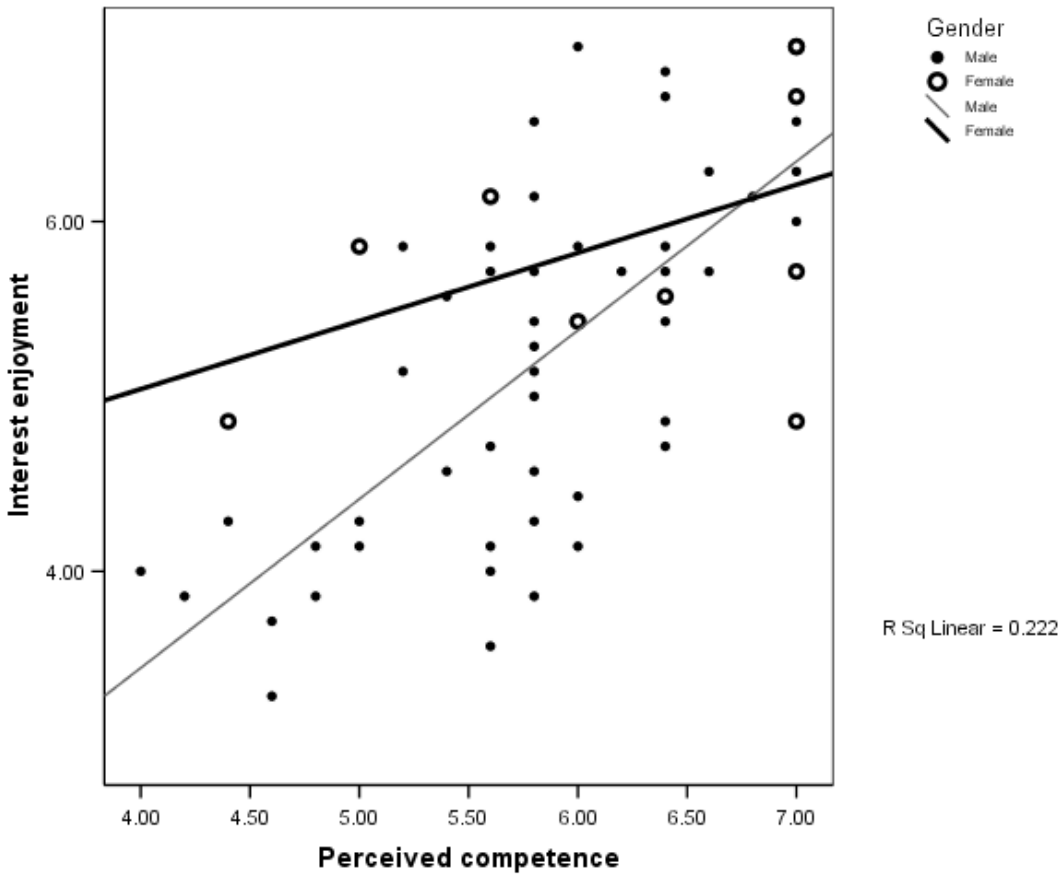


Figure 9. Scatterplot between intrinsic motivation and perceived technical competence (IMI) by gender.

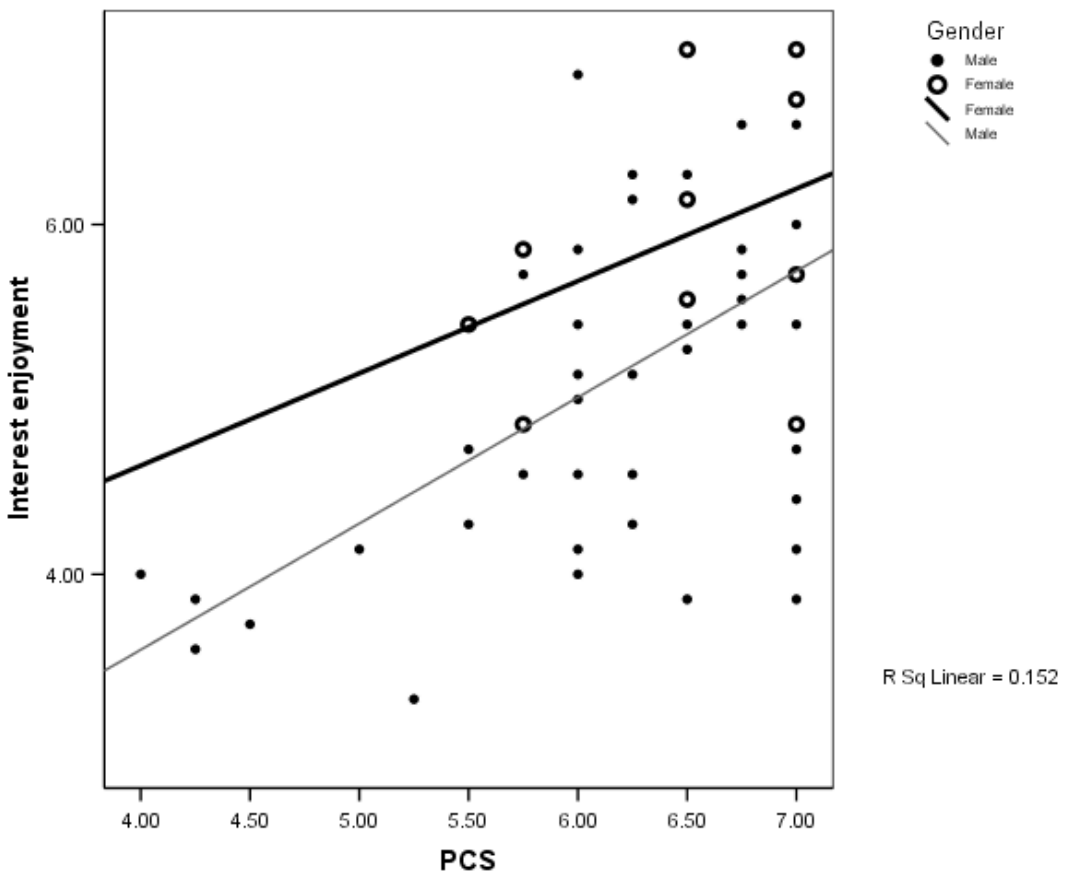


Figure 10. Scatterplot between intrinsic motivation and perceived technical competence (PCS) by gender

Hypothesis 3

The intent of hypothesis 3 was to assess the third research question that pertains to the relationship between perceived technical competence based on years of experience. The analysis included partial correlation coefficients for hypotheses 3, 4, and 5. Partial correlation coefficients measure the linear relationship between two variables while controlling for the effects of a third variable. Although gender and type of organization are nominal level variables, they are acceptable for use in correlations because they have only two levels (Pedhazur, 1997).

$H3_0$: No significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled.

$H3_A$: A statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled.

A significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and perceived competence, $r = .66$, $p < .001$. Approximately 43% of the variance was explained, $r^2 = .43$. There was little change in the r and r^2 values, indicating that years of experience had no influence on the relationship between intrinsic motivation as measured by interest enjoyment and perceived competence.

A significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and PCS, $r = .56$, $p < .001$. Approximately 31% of the variance was explained, $r^2 = .31$. There was little change in the r and r^2 values, indicating that years of experience had no influence on the relationship between intrinsic motivation as measured by interest enjoyment and perceived competence. The null hypothesis that there is no relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when years of experience are controlled is rejected. Figures 11 and 12 illustrate the relationships with years of experience highlighted.

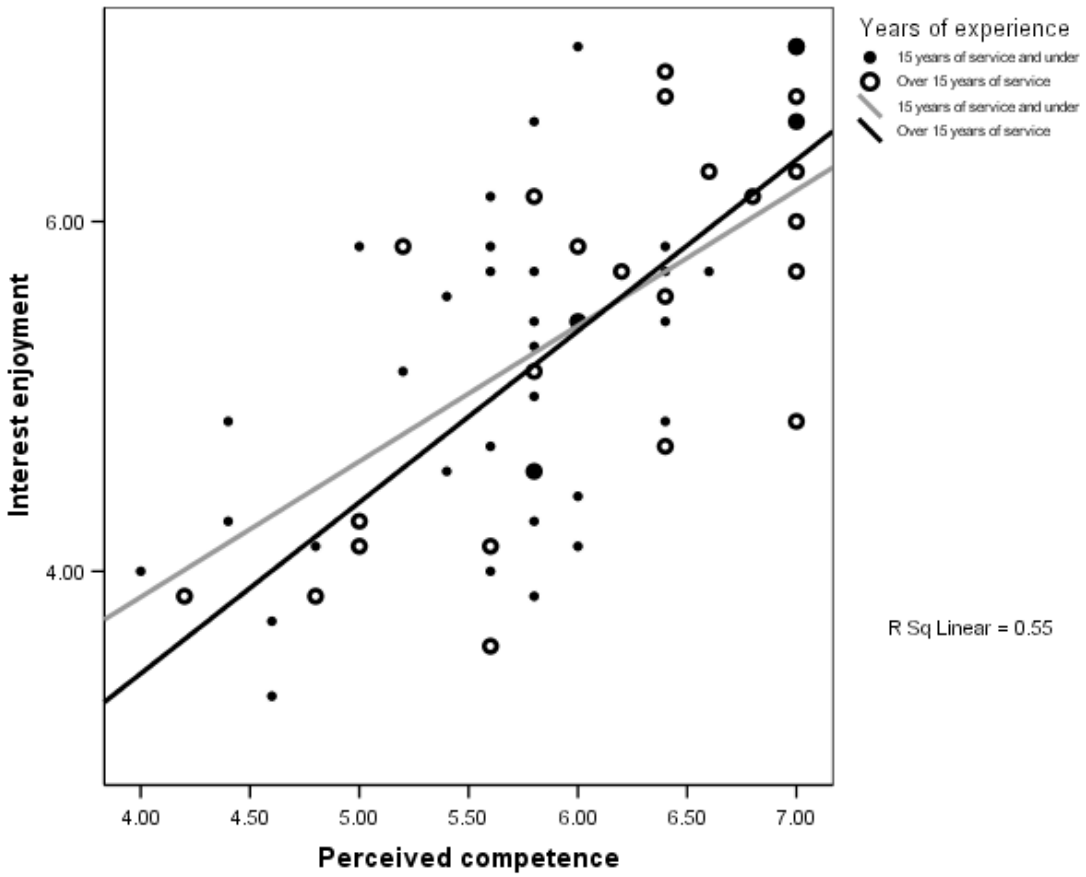


Figure 11. Scatterplot between intrinsic motivation and perceived technical competence (IMI) by years of experience.

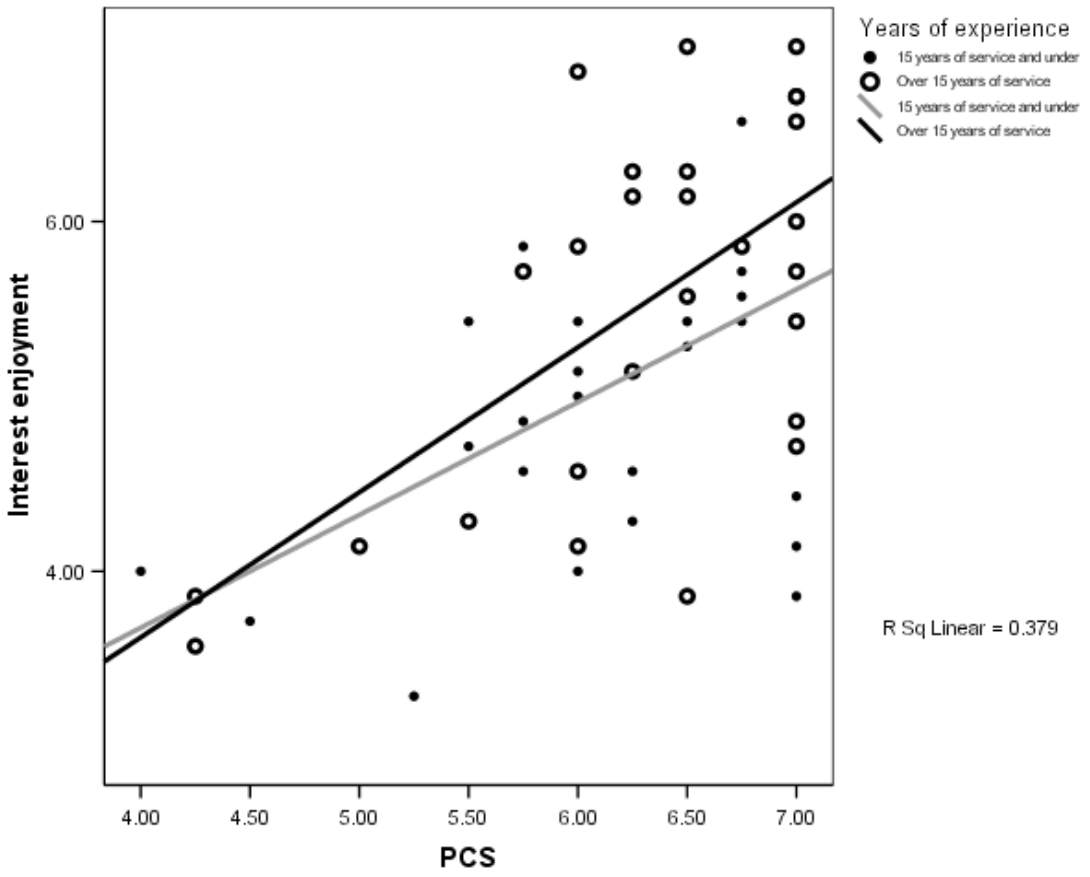


Figure 12. Scatterplot between intrinsic motivation and perceived technical competence (PCS) by years of experience.

Hypothesis 4

The intent of hypothesis 4 was to assess the fourth research question that pertains to the relationship between perceived technical competence based on type of organization.

$H4_0$: No statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT middle managers in large corporations when type of company is controlled.

$H4_A$: A statistically significant difference exists in the relationship between the perceived technical competence and intrinsic motivation for IT for IT middle managers in large corporations when type of company is controlled.

A significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and perceived competence, $r = .68$, $p < .001$. Approximately 46% of the variance was explained, $r^2 = .46$. There was little change in the r and r^2 values, indicating that type of organization had minimal influence on the relationship between intrinsic motivation as measured by interest enjoyment and perceived competence.

A significant, positive relationship exists between intrinsic motivation as measured by interest enjoyment and PCS, $r = .55$, $p < .001$. Approximately 30% of the variance was explained, $r^2 = .30$. There was little change in the r and r^2 values, indicating that type of organization had no influence on the relationship between intrinsic motivation as measured by interest enjoyment and perceived competence. The null hypothesis that there is no relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when type of organization is controlled is rejected. Figures 13 and 14 illustrate the relationships with type of company highlighted.

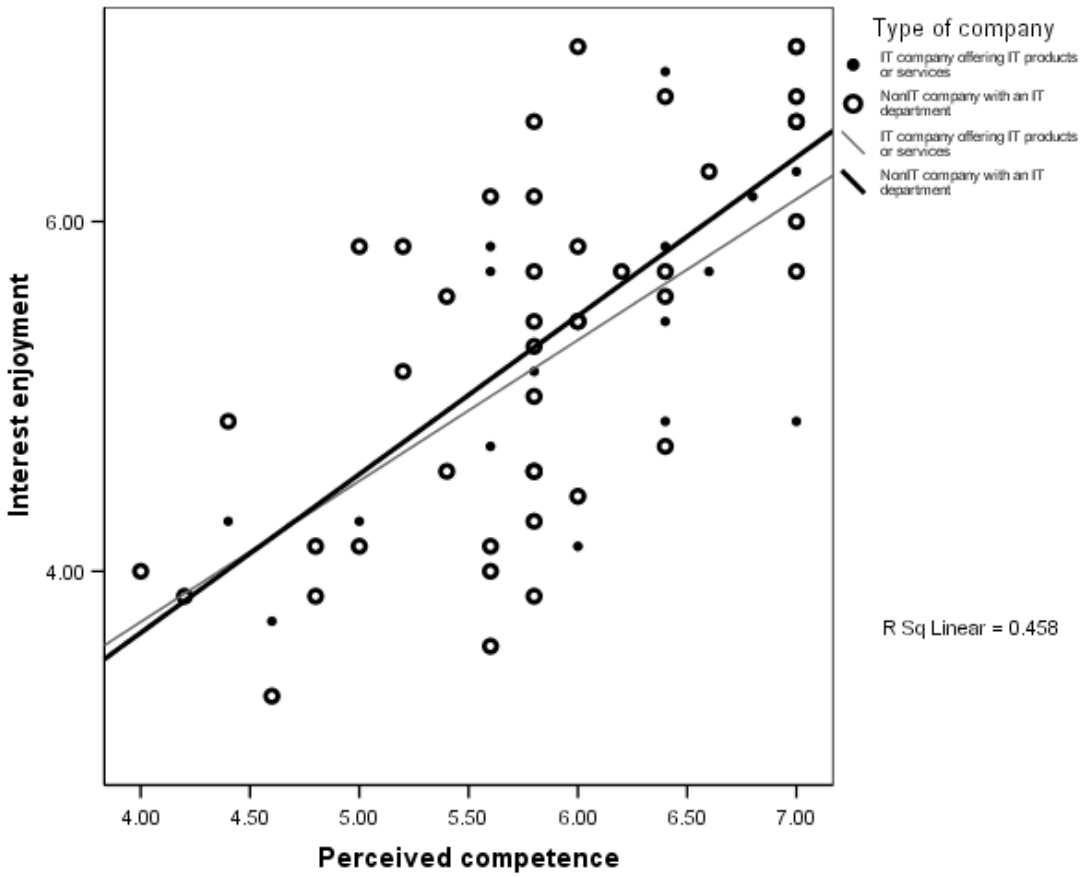


Figure 13. Scatterplot between intrinsic motivation and perceived technical competence (IMI) by type of company.

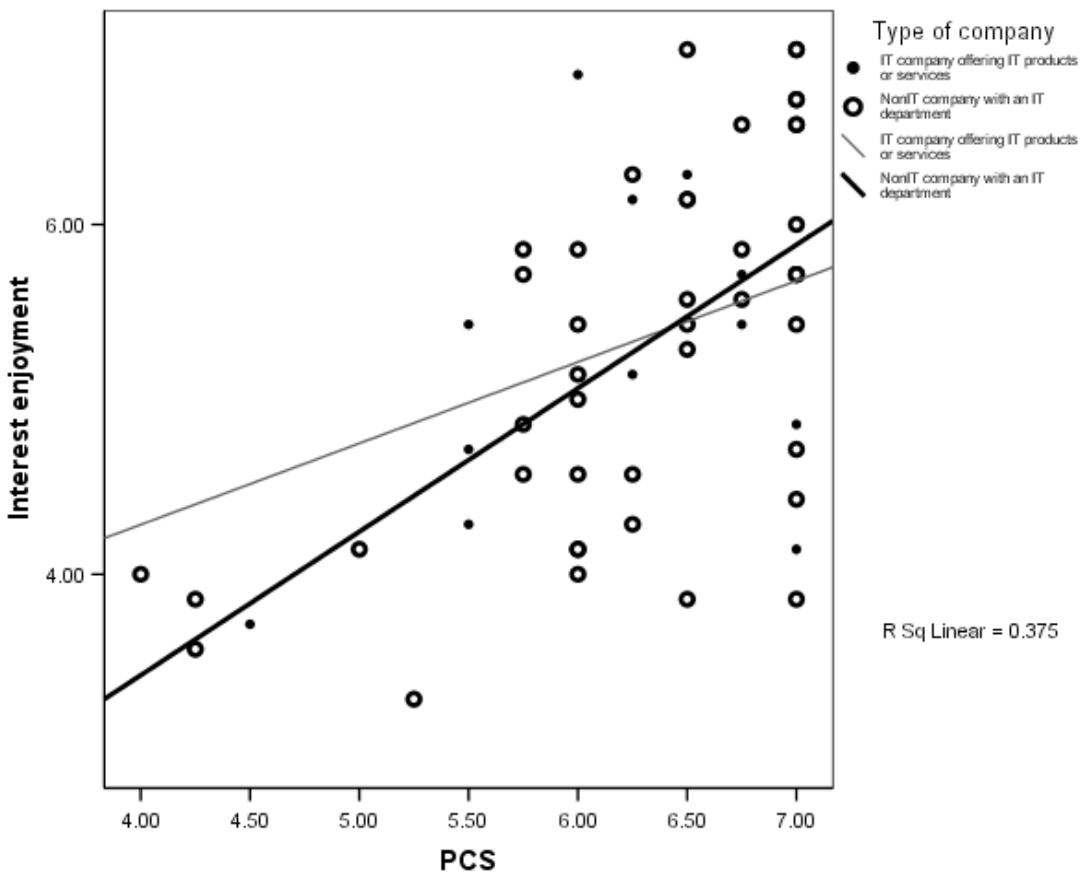


Figure 14. Scatterplot between intrinsic motivation and perceived technical competence (PCS) by type of company.

Summary

The results of the research derived from the survey data collected are presented in chapter 4. Online survey tool from Zoomerang allowed for the collection of survey data from a sample of members of ZoomPanel. Chapter 4 included the process of collecting data and recording the information. Details were offered on the pilot process and the instrumentation used in the survey. Descriptive statistics and demographic details offered additional information on the sample.

Preliminary analysis revealed the possible relationship between intrinsic motivation and perceived technical competence of IT middle managers. Within the context of the research questions, all four hypotheses were rejected. The results strongly indicate a possible relationship between intrinsic motivation and perceived technical competence. Included in chapter 5 is a discussion of the results and the implications to IT leadership.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

The purpose of this quantitative correlational research study was to examine the relationship between perceived technical competence and intrinsic motivation of Information technology (IT) middle managers from large U.S. corporations. As suggested by Hebda et al. (2007), internal motivation for technical visionaries results from a desire to work with innovative techniques. The study involved a quantitative analysis to examine the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations.

A quantitative correlational method was appropriate to reach this goal. The analysis included examining the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations when controlling for gender, age, years of experience, and type of organization. The following subtopics are included in chapter 5: (a) a summary of the literature pertaining to technical competency of IT personnel, (b) the relationship of competency and motivation, (c), a summary of the selected sample, (d) an interpretation of the results, (e) the implications for leaders, and (f) recommendations for future research.

Summary of Technical Competency for the IT Manager

Previous researchers emphasized the importance of multifaceted competencies necessary to deliver value to the business community (Dawes & Helbig, 2007; Gramignoli et al., 1999; Katz, 1955). Technical competency is just one of the key requirements for effective IT managers (Boyatzis, 1982; Katz, 2005; Shrout, 1971). The current research indicated the importance of the relationship between perceived technical competency and intrinsic motivation.

Individuals are more intrinsically motivated and perform at their best when they satisfy the basic psychological needs of competence, autonomy, and relatedness (Quigley & Tymon, 2006; Watts & Caldwell, 2008). The implications of this study may assist with improving the quality of products and services by providing an understanding of IT managers' enjoyment and level of motivation in their technical work.

Opportunities to develop technical competencies will continue to be a challenge for IT managers. Declining enrollment in technical programs, increased use of outsourcing models, and the recent emphasis on developing business-savvy IT managers can result in less opportunity for IT managers to develop technical skills (Anthes, 2006; Lai, 2006; Rao et al., 2006; Rapoza, 2006a). The findings from this study may offer important information to industry leaders to assist in understanding the behaviors of IT managers in a dynamic environment.

Summary of Motivation and Competence

In studies of motivational behavior, competence in general has a positive effect on motivational levels (Deci & Ryan, 2000). Armour (2006) reported IT personnel enjoy the challenges of technology and the opportunity to stay current with technological trends. Motivating employees to (a) improve organizational performance and (b) align individual performance with corporate goals is critical to success (Gottschalg & Zollo, 2007). As indicated in the SDT, people have an innate need for competence, autonomy, and relatedness, which are all factors of intrinsic motivation (Deci & Ryan, 2002; Gagne & Deci, 2005). The results of this study extended the field of study pertaining to self-determination by recognizing a significant relationship between intrinsic motivation and perceived technical competence within IT managers in large U.S. corporations.

Sample

The Zoomerang online survey system was able to reach a targeted list of IT managers working in the U.S. from the panel of IT members. A convenience sample of 62 IT managers responded from a population of 160 qualified IT managers. The ZoomPanel database has approximately 1,500 IT workers who are classified as managers or executives. The intent of using the Zoomerang online survey system was to select IT managers working for large U.S. corporations. By selecting Zoomerang as the source of the sample, a reliable, representative sample across the required attributes was possible.

Of the 62 respondents, 16% were female and approximately 84% were male; this distribution was consistent with the total population of IT professionals in the Zoomerang panel (ZoomPanel IT professionals, 2009). Years of IT experience ranged from 3 years to 38 years. For the 62 respondents, 29% of the individuals worked for IT companies, while 71% worked for nonIT companies. The use of Zoomerang allowed access to a reliable sample that included participants in each demographic category. The participants offered valuable responses across the demographic variables in the study. The goal was to assess the relationship between perceived technical competence and intrinsic motivation while holding the gender, years of experience, and type of company constant. The diversity of the sample allowed the assessment of any effects of intervening variables.

Interpretation of the Results

Preliminary Statistics

A skewed distribution is a frequency distribution that is not normally distributed (Neuman, 2005). A skew that is more than twice the standard deviation of skew is nonnormal. None of the variables were skewed; no skewness scores were more than

twice the standard error of skewness. The interpretation of the results suggests that there is no skewness in the variables being studied and the use of ANOVA statistics and Pearson coefficient is appropriate.

Cronbach's alpha scores demonstrated the reliability and consistency of the instruments in measuring perceived competence and intrinsic motivation in IT managers. The alpha scores were consistent with the results of other studies (Deci, 2006; Li et al, 2008; Song & Grabowski, 2006). The high Cronbach's alpha scores (see Table 1) for each of the scales supports the reliability and use of the instruments in the current study. The scores from Table 1 indicate acceptable internal consistency for both instruments. Future studies could use the IMI and the PCS instruments to assess perceived technical competence and intrinsic motivation of IT middle managers in large U.S. companies.

Analysis of Variance: Interest Enjoyment

The purpose of using the Analysis of variance (ANOVA) was to assess differences across the means. A significant difference exists between men and women on the interest enjoyment subscale. The mean score for interest enjoyment was significantly higher for women. Women scored .72 higher than men in the Interest Enjoyment subscale. The Interest Enjoyment scores ranged from 3.29 to 7.0. The Interest Enjoyment subscale ranged from 1.0 to 7.0. In the introduction of the survey instrument, the participants reviewed the instructions, which had them think of an IT-related, technical task that they completed to help deliver value to the business community. The mean score for the Interest Enjoyment subscale was 5.31 and a median of 5.43. The scores indicate that IT managers enjoy technical tasks. Based on the results, women are significantly more intrinsically motivated when completing value-added technical tasks than are men.

ANOVA scores between types of company resulted in no significant difference on the Interest Enjoyment subscale. Employees of IT companies scored .06 higher than employees of nonIT companies. The implications are that interest enjoyment (intrinsic motivation) does not significantly differ based on type of company.

ANOVA scores between years of experience resulted in no significant difference on the Interest Enjoyment subscale. Employees with over 15 years of experience scored .37 higher than employees with under 15 years of experience. Based on the results of the study, intrinsic motivation does not significantly differ for IT managers of large U.S. companies, based on years of experience.

Analysis of Variance: Perceived Competence

In review of the ANOVA scores for the Perceived Competence Scale scores, there were no significant differences across the means between gender, type of company, or years of experience. The participants responded to four questions with respect to their perceived ability to handle technical tasks that drove business value in their current role. The PCS scores range from 4.0 to 7.0. The PCS scale ranged from 1.0 to 7.0. The mean score for the Perceived Competence subscale was 5.88 and a median of 5.80. The mean score for the PCS was 6.28 and a median of 6.50. The scores indicated that participants believe to value technical competence in their role as an IT manager.

Based on the results of the study, women scored .2 higher than men on the PCS score. Employees of IT companies scored .01 higher on the PCS score. Mean scores differed by .01 between respondents with over 15 years of experience compared to those with less than 15 years of experience. In review of the results, perceived competence of

IT managers in large U.S. companies does not significantly differ based on gender, type of company, or years of experience.

Hypotheses Testing

The purpose of the four hypotheses was to test the relationships between perceived technical competence and intrinsic motivation across gender, type of company, and years of experience. A goal of the study was to generate the Pearson correlation scores for the interest/enjoyment subscale, the perceived competence subscale, and the PCS scale. Partial correlations were useful in testing the effect of the intervening variables.

The purpose of hypothesis 1 was to examine the relationship between perceived technical competence and intrinsic motivation for IT middle managers in large corporations. A significant, positive relationship between intrinsic motivation as measured by interest enjoyment and perceived competence, $r = .68$, $p < .001$. A significant, positive relationship also existed between intrinsic motivation as measured by interest enjoyment and PCS, $r = .55$, $p < .001$.

These results suggest that IT managers who perceive themselves more competent at a technical task are more intrinsically motivated. Prior to answering the questions in the IMI instrument, the context of the questions was set by asking respondents to think of an IT-related, technical task they completed that helped deliver value to the business community. The implications of these results suggest that IT managers value their technical competence in adding business value to the corporation. IT business value refers to the effects of IT efforts on organizational performance. IT business value can

result in productivity enhancements, improved profitability, cost savings, or a competitive advantage (Devaraj & Kohli, 2003).

The purpose of hypotheses 2, 3, and 4 was to examine the relationship between perceived technical competence and intrinsic motivation when holding intervening variable like gender, type of organization, and years of experience constant. A significant relationship exists between perceived technical competence and intrinsic motivation when holding intervening variables constant. In addition, there was little change in the variance explained when controlling for gender, type of organization, and years of experience, indicating these variables had no significant effect on the relationship between perceived technical competence and intrinsic motivation. Although there is the possibility that other factors could intervene in the relationship between perceived technical competence and intrinsic motivation, the results of the study strongly suggest that gender, type of organization, and years of experience are not factors.

Implications to Leaders of IT managers

Many business leaders understand the link between behavior and the desire to motivate achievement (Deci & Flaste, 1995). Leaders may exercise various approaches to drive motivation in subordinates. Extrinsic rewards may not always be enough to motivate individuals. Leaders who understand the importance of intrinsic motivation can design jobs that are interesting, allow for more autonomy in decision-making, and offer more choice to the employee (Deci & Flaste, 1995).

The results of this study indicated the moderate to strong relationship between the IMI subscales and perceived competence. The first implication to leadership is the awareness of the fundamental human need to feel competent in all positions. IT middle

managers may be required to perform roles and responsibilities that are misaligned with their core competencies. Barbuto (2005) discovered positive correlations between leaders' motivations and their leadership behaviors. Empowered leaders are those who allow subordinates to meet their needs to (a) be autonomous, (b) be competent, and (c) achieve a sense of relatedness in their specific roles (Deci & Ryan, 2002). For leaders of IT managers, opportunities to develop technical competencies may be a significant factor in driving intrinsic motivation.

Perceived competence results when a person masters a challenging task (Deci & Flaste, 1995). For IT personnel, technical tasks can be both challenging and rewarding. In addition to challenging opportunities, individuals enjoy the autonomy to master the task. As suggested by Deci and Flaste (1995), competency is a key factor in the enjoyment of the activity. Leaders of IT managers should recognize the importance of developing all competencies in their subordinates.

Implications to Organizations

Intrinsic motivation is at the heart of creativity and healthy behavior (Deci & Flaste, 1995). Leaders of healthy organizations involve individuals in their responsibilities and encourage self-motivation in employees. For organizations that include IT managers, perceived technical competence could be a factor in driving internal motivation. Technical professionals such as IT workers can be demanding, require autonomy, and driven by the nature of their work. As suggested by Hebda, Vojak, Griffin, and Price (2007) technical visionaries were internally motivated to work with innovative techniques. IT professionals enjoy challenges and keeping current with the

new ideas in their field (Barry, 2007). Deci and Ryan (2000) determined that lack of competency in a specific field could result in loss of motivation.

Understanding the relationship between perceived technical competence and intrinsic motivation may be helpful in driving effective IT organizations. The results of the current study indicate a strong correlation between intrinsic motivation and perceived technical competence for IT managers in large corporations. IT organizations that recognize this relationship should consider the importance of technical knowledge in IT managers. The foundations of an effective IT manager are a strong background in technology along with an understanding of business processes (Koskinenen & Pihlanto, 2006). Opportunities to develop technical skills may lead to more motivated individuals. Motivating employees to improve organizational performance is a critical component to success (Gottschalg & Zollo, 2007).

Perceived competence results when a person attempts a challenging task (Deci & Flaste, 1995). For IT managers, these tasks may include those that are technical tasks. The PCS mean of 6.28 and median of 6.50 on a scale of 1 to 7 indicated that IT managers feel strongly about their perceived technical competence. The interest enjoyment questions highlighted the fact that IT managers enjoy technical tasks, and find technical tasks interesting. An IMI score of 5.31, and median 5.43 on a scale of 1 to 7 indicated that IT managers in the study found technical tasks enjoyable.

Understanding how individuals value an activity can explain their motivation, interest, and performance (Ryan & Deci, 2000). Human beings strive to feel competent and avoid being incompetent. Based on the results of the study, a significant relationship exists between perceived technical competence and intrinsic motivation. Organizational

leaders designing roles and responsibilities of IT department leaders may consider this relationship. The implication of the current research is that IT middle managers rated perceived technical competency as highly valuable as well as enjoyable.

Recommendations for Future Research

Other areas of the organization could benefit from the results of the current study. Technical leaders, like leaders in engineering or accounting, may also be motivated to work on challenging technical tasks. Senior managers may gain further understanding of middle managers who transition from technician to manager in other areas of the organization. The changing of an employee's role to a manager level may require new managerial competencies, but consideration should be given to the motivation factors of an IT individual.

Future researchers should assess intrinsic motivation and perceived competence prior to performing a task and after an individual has mastered the task. The researchers should focus on the effects of mastering a technical challenge and the change in motivation. Future researchers using a larger representative sample could also repeat the study to validate the results. Another expansion of this study could be to recognize the effect on motivation when technical competency is absent.

Further studies could focus on the challenges in the workplace and the association with satisfying intrinsic needs. Opportunities to grow and face challenges are ways the need for competence are met (Deci & Ryan, 2002). Although it is not always possible to be performing exciting tasks all the time, some growth opportunities can enhance the experience for workers. Measuring an employee's level of intrinsic motivation in the workplace when offered challenging opportunities would offer further insight in this

field. A quantitative analysis was one approach to the problem. A qualitative study may also offer value to leaders by providing insight on managers' perceptions of competencies and level of intrinsic motivation. Future qualitative research may focus on information from respondents regarding their perceptions of technical tasks and the motivation behind those tasks.

The effects of extrinsic rewards on the relationship of between perceived technical competency and intrinsic motivation would also offer future value. An extrinsic reward does not always solve the problem. Deci and Flaste (1995) suggested that extrinsic rewards might actually undermine the intrinsic motivation and reduce the sense of choice. Paying individuals to perform a task can appear to be coercisive. Further studies could assess the effects of pay increases, bonuses, or improved benefits on the relationship of perceived competence and intrinsic motivation.

Conclusion

The focus of the current study was the relationship between perceived technical competence and intrinsic motivation of IT managers in large U.S. companies. The correlational analysis indicated a moderately strong relationship between the perceived technical competence and intrinsic motivation of the specified sample. The results further indicated that gender, type of company, and years of experience had little influence on the relationship between the perceived technical competence and intrinsic motivation.

Technical competence is necessary to stay competitive, maintain innovation, and enter new markets or reach new customers (Tidd, Bessant, & Pavitt, 2005). Opportunities to develop technical competencies will continue to be a challenge for IT managers. Declining enrollment in technical programs, increased use of outsourcing models and the

recent emphasis on developing business-savvy IT managers can result in less opportunity for IT managers to develop technical skills. Technical competency is just one of the key requirements for effective IT managers (Dawes & Helbig, 2007; Gramignoli, Ravarini, & Tagliavini, 1999; Katz, 1955) and less opportunities to develop technical competencies may result in reduce motivation of employees.

Organizational leaders need to understand what motivates technical individuals to perform. Katz (2005) suggested technical professionals enjoyed challenges and innovative opportunities to learn and grow. Including technical growth opportunities for IT managers may result in improved performance, and better solutions. Matching technology to business processes requires multifaceted skills (Pamecha, 2006). An IT manager with various competencies may lead to highly motivated individuals who are performing effectively in their role.

Leaders should be aware of managers' competencies, development, and learning issues (Viitala, 2005). Leaders should realize how perceived competencies drive the motivation of the individuals in the field of IT. The current study may help in defining roles and responsibilities within an IT organization that will position organizations to compete by considering the driving factors in motivation. The data findings are an important indicator to motivational behavior and driving effective IT organizations.

REFERENCES

Akbulut, A. Y., & Looney, C. (2007). Inspiring students to pursue computing degrees. *Communications of the ACM, 50*(10), 67-71.

Aken, A., & Michalisin, M. D. (2007). The impact of the skills gap on the recruitment of MIS graduates. *Proceedings of the Special Interest Group on Computer Personnel Research Annual Conference archive,* 105-111. Retrieved July 30, 2007, from http://portal.acm.org/citation.cfm?id=1235025

Alderfer, C. (1969). An empirical test of a new theory of human needs. *Organizational Behavior and Human Performance, 4*, 142-175.

Alman, R. E. (2006). A survey of perceived managerial competencies of cardiac rehabilitation professionals in a hospital setting. *Journal of Cardiopulmonary Rehabilitation, 26*(4), 263.

Amabile, T. M., & Kramer, S. J. (2007). Inner work life. *Harvard Business Review, 85*(5), 72-83.

Anonymous. (2007). *Zoomerang success stories.* Retrieved December 29, 2007, from http://info.zoomerang.com/company/sstories.htm

Anthes, G. (2006). Computer science looks for a remake. *Computerworld, 40*(18), 26-28.

Armour, P. G. (2006). The learning edge. *Communications of the ACM, 49*(6), 19-22.

Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology, 34*(10), 2045-2068.

Badawy, M. K. (2007). Managing human resources. *Research Technology Management. Arlington*, *50*(4), 56-74.

Bailey, J., & Mitchell, R. B. (2006). Industry perceptions of the competencies needed by computer programmers: Technical, business, and soft skills. *The Journal of Computer Information Systems, 47*(2), 28-34.

Barbuto, J. E. (2005). Motivation and transactional, charismatic, and transformational leadership: A test of antecedents. *Journal of Leadership and Organizational Studies, 11*(4), 26-40.

Barry, T. (2007). Europe's business brains: poorly led and leaving. *Industrial and commercial training, 39*(2), 113-115.

Bassellier, G., & Benbasat, I. (2007). Assessing the contributions of business and IT knowledge to the development of IT/business partnerships. *Proceedings of the Special Interest Group on Computer Personnel Research Annual Conference,* 203-206. Retrieved August 2, 2007, from http://portal.acm.org/citation.cfm?id=1235044&dl=ACM&coll=ACM

Beard, D., Schwieger, D., & Surendran, K. (2007). Incorporating soft skills into accounting and MIS curricula. *Proceedings of the Special Interest Group on Computer Personnel Research Annual Conference,* 179-185. Retrieved August 14, 2007, from http://portal.acm.org/citation.cfm?id=1235040

Boyatzis, R. (1982). *The competent manager: A model for effective performance*. Boston, MA: Wiley.

Brandi, J. (2007). Motivate people. *Sales & Service Excellence, 7*(8), 4.

Byrd, T. A., Lewis, B. R., & Turner, D. E. (2004). The Impact of IT personnel skills on IS infrastructure and competitive IS. *Information Resource Management, 17*(2), 28-63.

Caldwell, E. R. (2006). A comparative study of three instructional modalities in a computer programming course: Traditional instruction, Web-based instruction, and online instruction (Doctoral dissertation, University of North Carolina at Greensboro, 2006). *Dissertation Abstracts International.* (UMI No. 3227694)

Cone, J. D., & Foster, S. L. (2005). *Dissertations and theses from start to finish* (2nd ed.). Washington, DC: American Psychological Association.

Cook, C. R. (2006). Effects of emotional intelligence on principals' leadership performance (Doctoral dissertation, Montana State University, 2006). *Dissertation Abstracts International.* (UMI No. 3206272)

Cooper, D. R., & Schindler, P. S. (2006). *Business research methods* (9th ed.). New York: McGraw-Hill.

Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd ed.). Columbus, Ohio: Merrill Prentice-Hall..

Cueva, C. (2006). An achievement motivation program for young minority students utilizing cognitive-behavioral techniques (Doctoral dissertation, Texas A&M University - Corpus Christi, 2006). *Dissertation Abstracts International.* (UMI No. 3233955

Dawes, S. S., & Helbig, N. (2007). Building government IT workforce capacity: A competency framework. *Proceedings of the 8th annual international conference on Digital government research, 228*, 254-255.

Deci, E. L. (2006). *Perceived competence scales.* Retrieved August 1, 2007, from http://www.psych.rochester.edu/SDT/measures/comp.html

Deci, E. L. (2007a). *Self-determination theory.* Retrieved August 1, 2007, from http://www.psych.rochester.edu/SDT/theory.html

Deci, E. L. (2007b). *Intrinsic Motivation Inventory (IMI).* Retrieved August 1, 2007, from http://www.psych.rochester.edu/SDT/measures/intrins.html

Deci, E. L., & Flaste, R. (1995). *Why we do what we do*. London: Penguin Books.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11,* 227-268.

Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY: University of Rochester Press.

Devaraj, S., Kohli, R. (2003). Performance impacts of information technology: Is actual usage the missing link. *Management Science, 49*(3), 273-289.

Dingsoyr, T., Djarraya, H. K., & Royrvik, E. (2005). Practical knowledge management tool use in a software consulting company. *Communications of the ACM, 48*(12), 96-100.

Dix, J. (2006, May 22). Job skills for the new IT. *Network World, 23*(20), 38.

Duedahl, M., Andersen, J., & Sein, M. K. (2005). When models cross the border: Adapting IT competencies of business managers. *Proceedings of the Special*

Interest Group on Computer Personnel Research Annual Conference, 40-48. Retrieved October 1, 2008, from http://portal.acm.org/citation.cfm?id=1055983

Export.gov. (2008). *Safe Harbor Announcement - July 31, 2008.* Retrieved October 17, 2008, from http://www.export.gov/safeharbor/Safe_Harbor_Announcement.asp

Fanning, E. (2007). Re-inventing IT from supporting player to strategic partner. *Computerworld, 41*(8), 23.

Fulbright, R., & Routh, R. L. (2004). How information technology professionals keep from being outsourced or offshored. *Proceedings of the Conference on Information Technology Education,* 188-193. Retrieved August 6, 2007, from http://portal.acm.org/citation.cfm?id=1029580

Gagne, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior, 26*(4), 331-362.

Gallivan, M. J., Truex, D. P., & Kvasny, L. (2004). Changing patterns in IT skill sets 1988-2003: A content analysis of classified advertising. *Database for Advances in Information Systems, 35*(3), 64-87.

Garman, A. N., & Johnson, M. P. (2006). Leadership competencies: An introduction. *Journal of Healthcare Management, 51*, 13-17.

Garman, A. N., Burkhart, T., & Strong, J. (2006). Business knowledge and skills. Journal of Healthcare management, 51(2), 81-86.

Gartner (2005). *Analysts Examine The Future of The IT Organization During Gartner Symposium/ITxpo, October 17-21, in Orlando.* Retrieved December 3, 2008, from http://www.gartner.com/it/page.jsp?id=492204.

Gibson, S. (2005). IT work force gap looming. *eWeek, 22*(48), 37.

Goles, T., Hawk, S., & Kaiser, K. M. (2008). Information technology workforce skills: The software and IT services provider perspective. *Information Systems Frontiers, 10*(2), 179-195.

Gomolski, B. (2006). New roles ahead for IT. *Communication News, 43*(12), 6.

Gottschalg, O., & Zollo, M. (2007). Interest alignment and competitive advantage. *Academy of Management Review, 32*(2), 418-437.

Gramignoli, S., Ravarini, A., & Tagliavini, M. (1999). A profile for the IT manager within SMEs. *Proceedings of the 1999 ACM SIGCPR conference on Computer personnel research,* 200-208. Retrieved August 3, 2007, from http://portal.acm.org/citation.cfm?id=299513.299677&coll=GUIDE&dl=GUIDE&CFID=7033892&CFTOKEN=83117943

Hebda, J. M., Vojak, B. A., Griffin, A., & Price, R. L. (2007). Motivating technical visionaries in large American companies. *IEEE Transactions on Engineering Management, 54*(3), 433-444.

Heiken, S. E. (2007). The perceived relationship between emotional intelligence and leadership effectiveness in school teachers: A comparison of self ratings with those of superiors and reports (Doctoral dissertation, Wilmington College Delaware, 2007). *Dissertation Abstracts International. (*UMI No. 3246674)

Herzberg, F. (1966). *Work and the nature of man*. Cleveland, OH: World Publishing.

Howell, D. C. (2007). *Statistical methods for psychology* (6th ed.). Belmont, CA: Thomson.

IT staffing report: An examination of IT staffing needs, priorities and recommendations for the future. (2005). *CIO Executive council*. Retrieved September 6, 2007, from https://www.cioexecutivecouncil.com/pub/content/itstaffing_execsumm.pdf

Jaska, P. V., & Hogan, P. T. (2006). Effective management of the information technology function. *Management Research News, 29*(8), 464.

Jenkins, D. A. (2006). Examining the relationships between the satisfaction of basic psychological needs, employee well-being, and commitment (Doctoral dissertation, Carleton University, 2006). *Dissertation Abstracts International.* (UMI No. MR13415)

Katz, R. (1955). Skills of an effective administrator. *Harvard Business Review, 33*(1), 23-33.

Katz, R. (2004). *The human side of managing technological innovation* (2nd ed.). New York: Oxford University Press.

Katz, R. (2005). Motivating technical professionals today. *Research Technology Management, 48*(6), 19-28.

Keith, B., & Judd, T. (2006). Assessing students' proficiency in information technology. *Assessment Update, 18*(5), 5-6.

Keller, K. P. (2007). Intrinsic and extrinsic motivation for exercise among Navy Reserve personnel (Doctoral dissertation, University of Phoenix, 2007). (UMI No. 3253110)

King, J. (2007). Reimagining the IT department. *Computerworld, 41*(8), 24-25.

King, W. R. (2004). Outsourcing and the future of IT. *Information Systems Management, 21*(4), 83-84.

Kolbasuk Mcgee, M. (2007). CIOs see trouble in a skimpy U.S. tech talent pipeline. *Information Week, 1*(157), 37.

Koskinen, K. U., & Pihlanto, P. (2006). Competence transfer from old timers to newcomers analyzed with the help of the holistic concept of man. *Knowledge & Process Management, 13*(1), 3-12.

Kumpikaite, V., & Ciarniene, R. (2008). New training technologies developing human resources. *Economics & Management*, *9*(2), 93-94.

Lai, E. (2006). Business skills tip hiring scale. *Computerworld, 40*(14), 1-14.

Lee, C. K. (2005). Analysis of skill requirements for systems analysts in Fortune 500 organizations. *The Journal of Computer Information Systems, 45*(4), 84.

Li, W., Lee, A. M., & Solmon, M. (2008). Effects of dispositional ability conceptions, manipulated learning environments, and intrinsic motivation on persistence and performance: An interaction approach. *Research Quarterly for Exercise and Sport, 79*(1), 51-61.

Lemaitre, D., Le Prat, R., De Graaf, E., & Bot, L. (2006). Editorial: Focusing on competence. *European Journal of Engineering Education, 31*(1), 45-53.

Lindsay, N. (2006). Bridging the gap. *Information Age.* Retrieved from http://www.information-age.com/search/292251/bridging-the-gap.thtml

Linney, G. (2007). Communication skills predict success. *Physician Executive, 33*(4), 72-75.

Locher, M. (2007). IT education: Where have all the young geeks gone; Low enrollments in computer science and engineering programs mean few students are choosing

technology careers. Five experts in IT education and training suggest ways to reverse the trend. *CIO, 20*(15), 1.

Lombardi, R. (2006). IT shops face fuzzy future. *ComputerWorld Canada*, *22*(3), 1.

Luftman, J., & Kempaiah, R. M. (2007). The IS organization of the future: The IT talent challenge. *Information Systems Management, 24*(2), 129-138.

Mahatanankoon, P. (2007). The effects of post-educational professional development activities on promotion and career satisfaction of IT professionals. *Proceedings of the Special Interest Group on Computer Personnel Research Annual Conference,* 9-14. Retrieved August 12, 2007, from http://portal.acm.org/citation.cfm?id=1235003

MarketTools. (2006). *ZoomPanel privacy policy.* Retrieved January 4, 2008, from http://www.zoompanel.com/privacy.asp

MarketTools. (2007). *ZoomPanel. Profile reference book.* Retrieved December 26, 2007, from http://www.markettools.com/resources/files/MT_ProfileBook.pdf

MarketTools. (2008). *Zoomerang Sample.* Retrieved December 13, 2008, from http://www.markettools.com//pdfs/resources/DS_Zoomerang.pdf

MarketTools. (2009). *Privacy Polciy.* Retrieved February 12, 2009, from http://www.markettools.com/privacy/

Maslow, A. (1943). A theory of human motivation. *Psychological Review, 50*(4), 370-396.

Mastroberte, T. (2007). A day in the life of an IT manager. *Convenience Store News, 43*(2), 35-36.

Mattila, R. R. (2006). The relationship between burnout, job satisfaction, turnover intention, and organizational commitment in IT workers (Doctoral dissertation, Capella University, 2006). *Dissertation Abstracts International. (*UMI No. 3206570)

McAuley, E., Duncan, T., & Tammen, V. V. (1989). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: A confirmatory factor analysis. *Research Quarterly for Exercise and Sport, 60*, 48-58.

McClelland, D. C., & Burnham, D. H. (2003). Power is the great motivator. *Harvard Business Review, 81*(1), 117-126.

McClelland, D. C. (1976). *A guide to job competency assessment*. Boston, MA: McBer and Company.

McGregor, D. M. (1957, April 9). *The human side of enterprise. Adventures in thought and action: Proceedings of the Fifth Anniversary Convocation of the School of Industrial Management*, M.I.T., Cambridge, MA. Cambridge, MA: Technology Press.

McKnight, W. (2008). The Art of Leadership in IT. *DM Review, 18*(10), 48. Retrieved December 5, 2008, from ProQuest Computing database. (Document ID: 1565005601).

Minicucci, D. (2002). Perceived practitioner motivation for smoking cessation intervention: Applying Gadow's moral framework for nursing to self-determination theory (Doctoral dissertation, University of Rochester School of Nursing, 2002). *Dissertation Abstracts International. (U*MI No. 3045861)

Murphy, M. (2006). Leadership IQ study: Why new hires fail. *Public Management, 88*(2), 33-34.

Naqvi, S. J. (2004). Introducing information systems approach for acquiring IT competence needed for business applications. *Journal of Information Systems Education, 15*(1), 79-86.

Nash, K. S. (2007). CIOs: I.T. workers need better tech skills. *CIO Insight,* 5. Retrieved from http://www.cioinsight.com/c/a/Past-News/CIOs-IT-Workers-Need-Better-Tech-Skills/

National Statistical Service. (2008). *Sample size calculator.* Retrieved April 9, 2008, from http://www.nss.gov.au/nss/home.NSF/pages/Sample+size+calculator

Nelson, H. J., Ahmad, A., Martin, N. L., & Litecky, C. R. (2007). A comparative study of IT/IS job skills and job definitions. *Proceedings of the Special Interest Group on Computer Personnel Research Annual Conference,* 168-170. Retrieved August 15, 2007, from http://portal.acm.org/citation.cfm?id=1235038

Neuman, W. L. (2005). *Social research methods: Qualitative and quantitative approaches* (6th ed.). Upper Saddle River, NJ: Pearson Education.

Ott, J. (2004). Power to the customer: After all these years of working on the IT/business relationship, many organizations are still not getting it right. Maybe it's time we challenged our business customers to become more savvy. Downsview: *CIO Canada, 12*(12), para. 1-6. Retrieved September 2, 2008, from *CBCA Complete* database.

Pamecha, A. (2006). Outsourcing your franchise applications and IT systems. *Franchising World, 38*(3), 60-63.

Pedhazur, E. J. (1997). *Multiple regression in behavioral research: Explanation and prediction* (3rd ed.). Fort Worth, TX: Harcourt Brace College Publishers.

Peppard, J., Ward, J., & Daniel, E. (2007). Managing the realization of business benefits from IT investments. *MIS Quarterly Executive, 6*(1), 1-12.

Perelman, D. (2008a). *CS degree interest plummeted since 2000.* Retrieved March 14, 2008, from http://www.eweek.com/c/a/Careers/CS-Degree-Interest-Plummeted-Since-2000/

Perelman, D. (2008b). *Tech job sector growing at record paces through 2016.* Retrieved March 1, 2008, from http://www.careers.eweek.com/c/a/News/Tech-Job-Sector-Growing-at-Record-Paces-Through-2016/

Polanyi, M. (1967). *The tacit dimension*. New York: Anchor Books.

Poynton, T. A. (2005). Evaluating the effect and effectiveness of a professional development workshop to increase school counselors' use of data: The role of technology (Doctoral dissertation, Boston University, 2005). *Dissertation Abstracts International.* (UMI No. 3186528)

Quesenberry, J. L., & Trauth, E. M. (2007). What do women want?: An investigation of career anchors among women in the IT workforce. *Proceedings of the 2007 ACM SIGMIS CPR conference,* 122-127. Retrieved July 15, 2008, from http://portal.acm.org/citation.cfm?id=1235000.1235030&coll=GUIDE&dl=GUIDE&CFID=7043398&CFTOKEN=24233487

Quigley, N. R., & Tymon, Jr., W. G. (2006). Toward an integrated model of intrinsic motivation and career self-management. *Career Development International, 11*(6), 522.

Rabhi, F., Yu, H., Dabous, F., & Wu, S. (2007). A service-oriented architecture for financial business processes: A case study in trading strategy simulation. *Information Systems and e-Business Management*, *5*(2), 185-200.

Rajadhyaksha, U. (2005). Managerial competence: Do technical capabilities matter? *The Journal for Decision Makers, 30*(2), 47-56.

Rao, T., Poole, W., Raven, P. V., & Lockwood, D. L. (2006). Trends, implications, and responses to global IT sourcing: A field study. *Journal of Global Information Technology Management, 9*(3), 5-23.

Rapoza, J. (2006a). Challenge of IT management; Labs on-site: Seminar effectively tackles people issues. *eWeek, 23*(1), 36.

Rapoza, J. (2006b). Help wanted: Tech-savvy CIO; IT managers need a good balance of skills, knowledge. *eWeek, 23*(20), 42.

Ravesteijn, W., De Graaff, E., & Kroesen, O. (2006). Engineering the future: The social necessity of communicative engineers. *European Journal of Engineering Education, 31*(1), 63-71.

Reid, J., & Crisp, D. (2007). The talent challenge: Creating a culture to recruit, engage and retain the best. *Ivey Business Journal Online, 4*, 1.

Roberts, J. A., Hann, I., & Slaughter, S. A. (2006). Understanding the motivations, participation, and performance of open source developers: A longitudinal study of Apache projects. *Management Science, 52*(7), 984-999.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.

Salkind, N. J. (2006). *Exploring research* (6th ed.). Upper Saddle River, NJ: Pearson Education.

Sankey, D. (2007). IT, business gap needs closing; Professionals in both fields, and their firms, benefit from learning each other's lingo. *Edmonton Journal, Final Edition,* 4.

Schmidt, R. (2007). The benefits of an engaged employee; Focus on employee relationships to drive member relationships. *Credit Union Journal, 11*(44), 10.

Schwarzkopf, A. B., Mejias, R. J., Jasperson, J. S., Saunders, C. S., & Gruenwald, H. (2004). Effective practices for IT skills staffing. *Communications of the ACM, 47*(1), 83-88.

Shrout, E. H. (1971). Competencies and training requirements for information systems analysts. *Proceedings of the ninth annual SIGCPR conference,* 75-100. Retrieved February 12, 2009, from http://portal.acm.org/citation.cfm?id=805100

Singh, R. (2005). The missing "soft skills" for project controls. Morgantown: *AAACE International Transactions,* Suppl. DE11-DE12.

Smith, R. M. (2006). An examination of the relationship between emotional intelligence and leader effectiveness (Doctoral dissertation, Nova Southeastern University, 2006). *Dissertation Abstracts International.* (UMI No. 3205547)

Soma, J. T., Rynerson, S. D., & Beall-Eder, B. D. (2004). An analysis of the use of bilateral agreements between transnational trading groups: The U.S./EU E-Commerce privacy Safe Harbor. *Texas International Law Journal, 39*(2), 171-214.

Song, H., & Grabowski, B. L. (2006). Stimulating intrinsic motivation for problem solving using goal-oriented contexts and peer group composition. *Educational Technology, Research and Development, 54*(5), 445-467.

SPSS. (2009). *PASW statistics*. Retrieved August 12, 2009, from http://www.spss.com/statistics/

Statistics Canada. (2006). *University enrolment*. Retrieved January 5, 2008, from http://www.statcan.ca/Daily/English/061107/d061107a.htm

Stokes, S. (2004). IT leadership. The must-have competency. *Information Systems Management, 21*(2), 86-90.

Stone, A. (2006, November 19). Putty in their hands. *Sunday Times*, p. 11.

Talja, S. (2005). The social and discursive construction of computing skills. *Journal of the American Society for Information Science and Technology, 5*6(1), 13-22.

Tallon, P. P. (2008). Inside the adaptive enterprise: An information technology capabilities perspective on business process agility. *Information Technology and Management, 9*(1), 21-37.

Thamhain, H. J. (2004). Team leadership effectiveness in technology-based project environments. *Project Management Journal, 35*(4), 35-12.

Thatcher, J. B., Liu, Y., Stepina, L. P., Goodman, J. M., & Treadway, D. C. (2006). IT worker turnover: An empirical examination of intrinsic motivation. *ACM SIGMIS database, 37*(2-3), 133-146.

Thomas, K. W. (2002). *Intrinsic motivation at work* (1st ed.). San Francisco: Berrett-Koehler.

Tidd, J., Bessant, J., & Pavitt, K. (2005). *Managing innovation. Integrating technological, market and organizational change* (3rd ed.). West Sussex, England: John Wiley & Sons.

Tsigilis, N., & Theodosiou, A. (2003). Temporal stability of the Intrinsic Motivation Inventory. *Perceptual and Motor Skills, 97*, 271-280.

Tsigillis, N. (2005). The influence of intrinsic motivation on an endurance field test. *Journal of Sports Medicine and Physical Fitness, 45*(2), 213-216.

Useem, J. (2006). Five levels of excellence. *Fortune, 154*(9), 176.

van der Merwe, A. (2007). Using blended learning to boost motivation and performance in introductory economics modules. *South African Journal of Economics, 75*(1), 125-135.

Varon, E. (2006). Business skills crunch looming. *CIO Canada, 14*(6), 1.

Vathanophas, V., & Thai-ngam, J. (2007). Competency requirements for effective job performance in the Thai public sector. *Contemporary Management Research, 3*(1), 45-70.

Venator, J. A. (2006). IT certification: In the information technology field, professional certification can make an individual even more marketable. *Techniques: Connecting Education & Careers, 81*(1), 28-31.

Verma, M. (2004). Does software project management success depend on a manager's depth of technical IT knowledge? (Doctoral dissertation, Roosevelt University, 2004). *Dissertation Abstracts International.* (UMI No. 1419711)

Viitala, R. (2005). Perceived development needs of managers compared to an integrated management competency model. *Journal of Workplace Learning, 17*(7/8), 436-452.

Vinaja, R. (2006). The IT curriculum: A global perspective. *Journal of Global Information Technology Management, 9*(4), 1-4.

Vizard, M. (2007). An IT friend in need. *eWeek, 24*(38), 6.

Vroom, V. (1964). *Work and motivation*. New York: Jon Wiley & Sons.

Watts, C. E., & Caldwell, L. L. (2008). Self-determination and initiative. *Journal of Leisure Research, 40*(1), 156-182.

Wellington, J. K. (2005, August 1). The "soft skills" of success. *Vital Speeches of the Day, 71*(20), 628-635. Willcocks, L., Hindle, J., Feeny, D., & Lacity, M. (2004). IT and business process outsourcing: The knowledge potential. *Information systems management, 21*(3), 7-15.

Willcocks, L., Hindle, J., Feeny, D., & Lacity, M. (2004). IT and business process outsourcing: The knowledge potential. *Information systems management, 21*(3), 7-15.

Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70*, 767-779.

Williams, G. C., Freedman, Z. R., & Deci, E. L. (1998). Supporting autonomy to motivate glucose control in patients with diabetes. *Diabetes Care, 21*, 1644-1651.

Wu, J. (2005). Characteristics of an outstanding business intelligence project manager. *DM Review, 15*(5), 30.

Zoomerang. (2007). *Terms of Use.* Retrieved February 12, 2009, from http://www.zoomerang.com/Terms-of-Use/

APPENDIX A: INTRINSIC MOTIVATIONAL INVENTORY

Intrinsic Motivation Inventory (IMI)

The participants were instructed to think of an IT related, technical task they completed that helped deliver value to the business community.

For each of the following statements, please indicate how true it is for you, using the following scale:

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

1. While I was working on the task, I was thinking about how much I enjoyed it.

2. I did not feel at all nervous about doing the task.

3. I felt that it was my choice to do the task.

4. I think I am pretty good at this task.

5. I found the task very interesting.

6. I felt tense while doing the task.

7. I think I did pretty well at this activity, compared to other peers.

8. Doing the task was fun.

9. I felt relaxed while doing the task.

10. I enjoyed doing the task very much.

11. I did not really have a choice about doing the task.

12. I am satisfied with my performance at this task.

13. I was anxious while doing the task.

14. I thought the task was very boring.

15. I felt like I was doing what I wanted to do while I was working on the task.

16. I felt skilled at this task.

17. I thought the task was very interesting.

18. I felt pressured while doing the task.

19. I felt like I had to do the task.

20. I would describe the task as very enjoyable.

21. I did the task because I had no choice.

22. After working at this task for a while, I felt competent.

Subscale scores are calculated by averaging the items scores as follows:

The (R) represents items scores that are reversed.

Interest/enjoyment: 1, 5, 8, 10, 14(R), 17, 20

Perceived competence: 4, 7, 12, 16, 22

Perceived choice: 3, 11(R), 15, 19(R), 21(R)

Pressure/tension: 2(R), 6, 9(R), 13, 18

APPENDIX B: PERCEIVED COMPETENCE SCALE

Perceived technical competence

Please respond to each of the following items in terms of how true it is for you with respect to your perceived ability to handle technical tasks that drove business value in your current role. Use the scale:

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

1. I feel confident in my ability to manage technical projects.

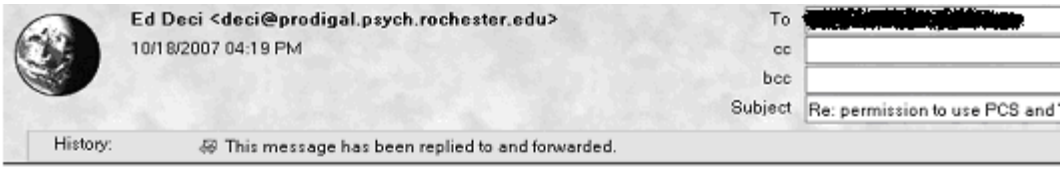
2. I am capable of handling technical issues.

3. I am able to introduce technical solutions to business problems.

4. I feel able to meet the technical challenges in performing well in my job.

The PCS score is calculated by average the item scores.

APPENDIX C: SIGNED PERMISSION TO USE AN EXISTING SURVEY



Ed Deci <deci@prodigal.psych.rochester.edu>
10/18/2007 04:19 PM

To [redacted]
cc
bcc
Subject Re: permission to use PCS and

History: This message has been replied to and forwarded.

You are welcome to use the measures mentioned below for your research project. Yes, it is fine to make small changes in wording to reflect specifically the situations you want to study.

****
Edward L. Deci
Professor of Psychology and
Gowen Professor in the Social Sciences
University of Rochester
P. O. Box 270266 (for US mail)
355 Meliora Hall (for couriers)
Rochester, NY 14627
Phone (585) 275-2461
Fax (585) 273-1100
e-mail: deci@psych.rochester.edu
web site: http://selfdeterminationtheory.org

On Thu, 18 Oct 2007 [redacted] wrote:

> Dr. Deci,
> I am interested in using the Perceived Competence Scales (PCS) and
> Intrinsic Motivation Inventory (IMI) questionnaires for a research study
> in partial fulfillment of the requirements for a Doctoral Degree from the
> University of Phoenix.
> I am hoping to study perceived technical competence and intrinsic
> motivation of Information technology (IT) managers.
>
> Can I confirm that I have permission to use these instruments ?
> Is it reasonable to adjust the PCS questionnaire to meet my needs ? (see
> below in read)
> I would greatly appreciate any other input you are willing to offer.
>
> thank you for taking the time to read this.
>
> [redacted]

>
> Potential changes to the PCS :
>
> 1. I feel confident in my ability to manage technical projects.
>
> 2. I am capable of handling technical issues.
>
> 3. I am able to introduce technical solutions to business problems.
>
> 4. I feel able to meet the technical challenges to perform well in my
> job.
>
>
> Leading statement to IMI :
>
> The participants will be instructed to think of a technical task they
> completed that helped deliver value to the business community.
>
> 1. While I was working on the task I was thinking about how much I
> enjoyed it.
>
> 2. I did not feel at all nervous about doing the task.
>
> 3. I felt that it was my choice to do the task.
> .....

APPENDIX D: DEMOGRAPHIC QUESTIONS

Demographic measures were collected by the current study using the following questions.

a) What is your gender?

   Male

   Female

b) How many years have you spent within an IT organization?

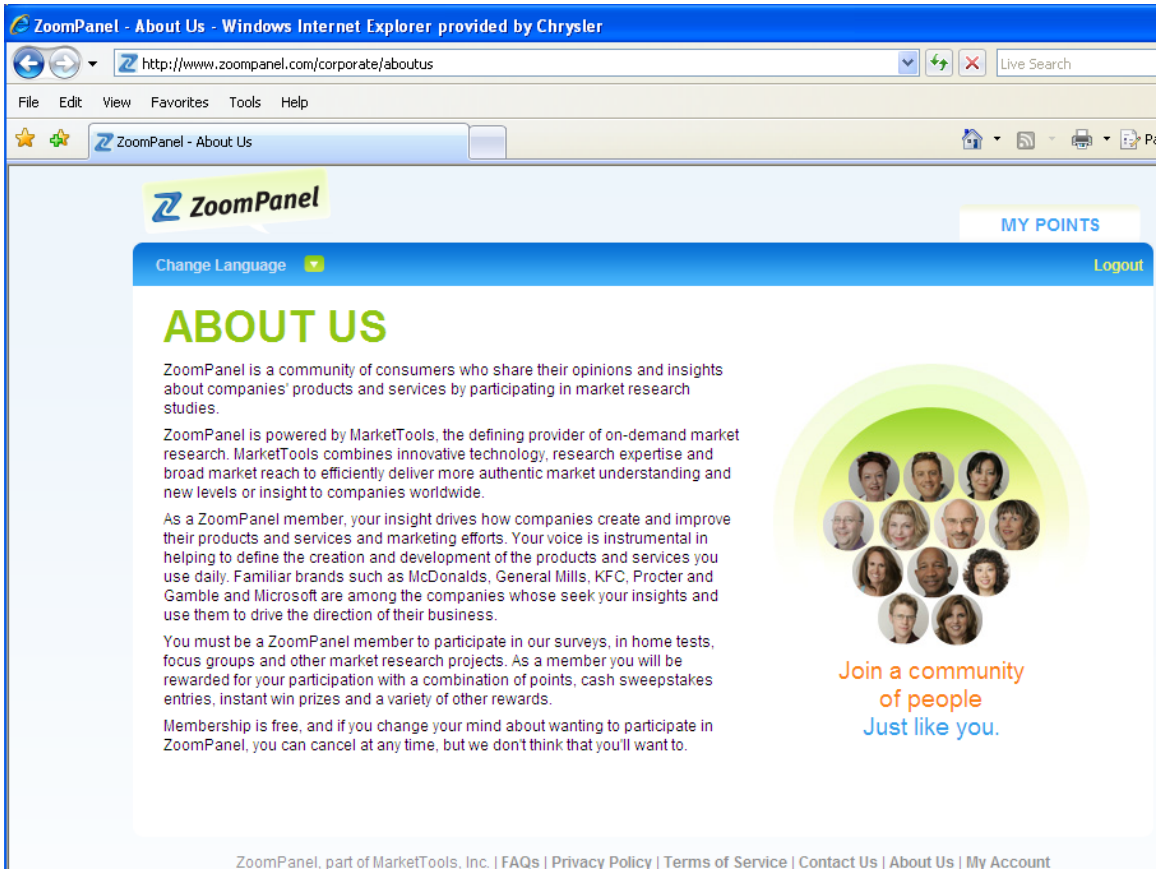
c) Which description best describes your current organization?

   a) IT company offering IT products or services

   b) Non-IT company with an IT department

APPENDIX E: ZOOMPANEL MEMBERS

ZoomPanel Community



APPENDIX F: INFORMED CONSENT FORM

Introductory Page to the Participants

Date:

To the survey participant,

I am a student at the University of Phoenix working on a doctoral degree in the Information Systems and Technology specialization of the Doctor of Management in Organizational Leadership degree (DM/IST). I am conducting a research study entitled EXAMINING THE RELATIONSHIP BETWEEN PERCEIVED TECHNICAL COMPETENCY AND INTRINSIC MOTIVATION FOR INFORMATION TECHNOLOGY MANAGERS.

The purpose of the research study is to examine the correlation between the motivational behaviors of IT managers, and the perceptions of their technical competencies. The current study will offer insight into management behavioral factors specific to information technology managers.

Your participation will involve completing 26 questions on your perception of your technical skills. Your participation in the current study is voluntary. If you choose not to participate or to withdraw from the study at any time, you can do so without penalty or loss of benefit to yourself. The results of the research study may be published, but your name will not be used and your results will be maintained in confidence.

In this research, there are no foreseeable risks to you.

Although there may be no direct benefit to you, the possible benefit of your participation is to extend the body of knowledge in IT management and improve the understanding of perceived competency and motivation.

If you have any questions concerning the research study, please call me at ---- --- -----

Sincerely,

Doctoral student in the DM/IST program

----------@email.phoenix.edu

phone number

Informed Consent Agreement

I understand:

1. I may withdraw or decline at any time without consequences.
2. The research records and interview information will remain confidential.
3. My personal anonymity will be upheld and guaranteed.
4. The research data results will be used for publication.
5. ----------, the researcher, has thoroughly explained the parameters of the research study and all of my questions and concerns have been addressed. If I have future questions or research-related concerns, I may contact the researcher by phone:---------- or (email): ----------@email.phoenix.edu.
6. Data will be stored in a confidential and locked environment, will be held for a period of three years, and then destroyed in the most appropriate manner available to the researcher at the time.

(☐) I understand the above statements and give consent for my information to be used in the study

(☐) I understand the above statements and do NOT give consent for my information to be used in the study

If the participant gives consent by choosing the first option, then the following statement will be presented and the survey can be used in the current study. If the second option is chosen the survey must be discarded.

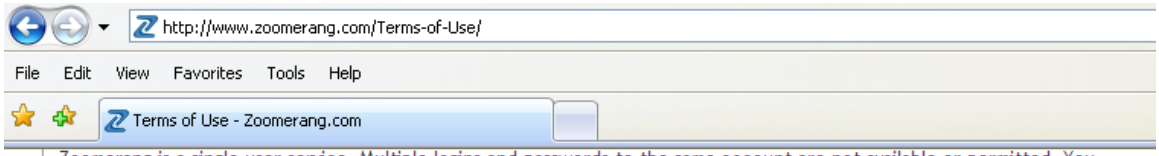
By accepting to participate, I acknowledge that I understand the nature of the study, the potential risks to me as a participant, and the means by which my identity will be kept confidential. I acknowledge that I am 18 years old or older and that I give my permission to voluntarily participant in the study described.

(☐) I accept

(☐) I do not accept to participate

APPENDIX G: ZOOMERANG CONFIDENTIALITY AGREEMENT

Zoomerang Privacy and Confidentiality Agreement



Zoomerang is a single user service. Multiple logins and passwords to the same account are not available or permitted. You may not share logins and passwords with others. Sharing login information is in violation of this Agreement and may result in immediate account termination.

6a. PRIVACY.

We are committed to protecting the privacy and confidential information of Users. For more information on our Privacy Policy, please click here. You agree to maintain and comply with a privacy policy that is consistent with the Zoomerang Privacy Policy. You are responsible for all decisions with respect to the personally identifiable information of persons (other than ZoomPanelists) that respond to your surveys or to whom you send surveys. With respect to the personally identifiable information of ZoomPanel members, you agree to comply with the terms and conditions of the zoompanel.com privacy policy. You represent and warrant that your surveys will not target children under 13 and that you will not knowingly collect personally identifiable information from children under 13.

6b. CONFIDENTIALITY.

We agree not to use any of your Confidential Information (defined below) for any purpose except to operate the Site and Services in accordance with this Agreement. We agree not to disclose any of your Confidential Information to any third party other than to our employees and consultants who are bound by confidentiality obligations and are required to have access to the Confidential Information in order to operate the Site and Services. Nothing in this Agreement limits our right to independently develop, acquire or market products, ideas, or businesses, without use of your Confidential Information. "Confidential Information" may include, solely to the extent entered into the Services or Site by you, (a) technical information, know-how and other intellectual property, to the fullest extent that such information is maintained as a trade secret by you; (b) confidential marketing strategies; (c) confidential future product plans; (d) confidential financial information (including pricing); and (e) other confidential business information. Confidential Information will not include any information that (i) was publicly known and generally available in the public domain prior to the time of disclosure by you; (ii) becomes publicly known and generally available after disclosure by you through no action or inaction of ours; (iii) is already in our possession at the time of disclosure by you; (iv) is obtained by us from a third party without a breach of such third party's obligations of confidentiality; (v) is independently developed by us without use of or reference to your Confidential Information; or (vi) is required by law to be disclosed by us, provided that we give you prompt written notice of such requirement prior to such disclosure and assistance in obtaining an order protecting the information from public disclosure.