Managing the Implementation of New Computer Systems in Small Businesses: Building Attitudes and Perceptions

Paul E. Madlock
Southeast Missouri State University

This study developed a model to advance scholarship and assist practitioners implement, manage and build their employees' perceptions of new computer systems. In doing so, Technology Management Model (TMM) was developed. TMM is comprised of three latent variables: technological; personal; organizational thought to influence the attitudes employees hold toward new computer systems. These attitudes were then hypothesized to be related to job satisfaction and organizational commitment. The results indicated that the data fit the TMM. Implications for these findings were discussed with an emphasis on the value derived from the development of TMM to scholars, practitioners, and employees.

INTRODUCTION

Since computer technology has become the newest "member" to join the workplace coupled with the influence the introduction of new computer systems have on the organization and its members, technology has become an area of interest to scholars, practitioners, and employees. Despite the enormous amount of time and money involved with implementing new computer systems (i.e., enterprise resource planning: ERP), thousands of companies have put these systems into practice because it allows them a competitive advantage over their competition by streamlining operations, improving communication, and allowing seamless information sharing (Trunk, 1999). However, the applications of these new systems may not achieve the desired results without a supportive organizational culture, a work climate that encourages the use of the new computer systems, and a workforce that is willing and able to adapt their work-lives to embrace these new computer systems (Achterberg, 2001).

Similarly, Cheney and Dickson (1982) pointed out that the end user (the employee) is crucial to the success or failure of computerized communication systems. The introduction of computer technology into the workplace has also brought about a number of changes to both the organization and its members by altering core elements of the organization, such as its structure, culture, and performance (Jackson, Poole, & Kuhn, 2002). Such changes are highlighted by the way in which organizational members react to, interact with, and perceive new computer systems.

Research that addresses the attitudes and perceptions employees hold toward new computer systems tend to be varied. For instance, prior experience with new computer systems is associated with more favorable attitudes toward the introduction of such systems (Morrow, Prell, & McElroy, 1986), while others found that gender, age, and race influence users' attitudes (Campbell, 1990). Additional research findings point to either structural or external factors such as the type of new computer system or strategies employed by top-level management (e.g., workforce reduction) as important factors that influence users'

attitudes about new computer systems (Martin, 1985). For example, research found that employees' negative attitudes about new computer systems were associated with their fear of change, fear of failure, fear of isolation, and fear of job displacement (Appelbaum, 1990). Despite the value of the previous examples, researchers have yet to determine whether the attitudes employees hold toward new computer systems impact their work-related attitudes of job satisfaction and organizational commitment.

Researchers have also been slow to envision the way in which multiple external and internal factors contribute to the attitudes and perceptions users hold toward new computer systems. The focus here was on small businesses with no more than 100 employees. This sector was chosen because of the sheer number of small businesses across the U.S. and because of the fiscal impact associated with implementing such a system. As a result, the current study was developed with the goal of filling the gaps in the research and to assist practitioners realize the value of these new computer systems by developing a multifactor model designed to explain the impact new computer systems such as ERP have on the organization and its members. In order to develop this multifactor model, Actor Network Theory (Latour, 1987) was incorporated as the theoretical underpinning for the current study. The following section will provide the rational for the inclusion of ANT and how it served to inform the development of the current model.

REVIEW OF LITERATURE

Theoretical Background

Actor-network theory (Latour, 1987) emerged from the field of science and technology research, ANT conceptualizes social interactions in terms of networks. Accordingly, networks integrate the material environment (e.g., new computer systems) and the semiotic environment (e.g., concepts and symbolic meanings) (Latour, 1987). This implies that social interactions have both material and human causes. For example, culture, society, and nature are constructed together simultaneously and are in a perpetual state of realization (Latour, 1987). Therefore, it would be incorrect to think that only one factor could explain the perceptions people hold toward society (Latour, 1987). In a similar vein, it also would be incorrect to think that only one factor (such as a new computer system) itself could explain the attitudes and perceptions employees hold toward the introduction of new computer systems in the workplace. Actor-network theory is also conceptually related to symbolic interactionism, insofar as social interactions construct and reify what is perceived as reality (Callon, 1986). Thus, in reality, there are a multitude of factors that contribute to a person's view of reality and the way he or she acts in given situations. Because the act of carrying out any task is under the influence of a number of factors, it is reasoned here that multiple factors also contribute the attitudes employees hold toward the introduction of new computer systems in the workplace. Therefore, the current study utilized multiple factors to develop a model that include technological, personal, and organizational factors to explain and describe how these factors influence employees' attitudes about the introduction of new computer system and in turn how these attitudes influence the work-related attitudes of job satisfaction and organizational commitment. The subsequent sections will elucidate the reason for including the factors found in TMM.

Technological Factors

To date, Technology Acceptance Model (Davis, 1989) is one of the most widely used and influential models developed to explain a person's acceptance and use of new technology. Among the most salient findings associated with TAM was that users' perceived ease of use and perceived usefulness of the new technology were found to be the primary predictors of users' intentions to use and their actual use of technology (Venkatesh & Davis, 1996). Ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Whereas, perceived usefulness is the degree to which a person believes that using technology will enhance his or her job performance (Davis, 1989). A shift from technology itself (as is the focus or TAM) was warranted here because, first technology is a broad term and second, today technology of some degree has been infused into the majority of workplaces. However, the current study focused on the introduction of new computer

systems, such as enterprise resource planning (ERP), accounting information system (AIS), material requirements planning (MRP), human resources management system (HRMS, e.g., PeopleSoft®), etc. into small businesses. As mentioned earlier, the focus on small businesses is related to the number of small businesses in the U.S. and because of the cost associated with purchasing such systems and the additional cost of training personnel. TAM is applicable here because of its focus on perceived ease of use and usefulness, which apply to the introduction of new computer systems in the workplace. Thus, if a new computer system is easy to use and is perceived as useful it is likely its users will embrace the new system, whereas the converse could also be true.

Despite the number of studies utilizing TAM, the majority have offered little insight into additional factors affecting the acceptance and use of new computer systems other than those pertaining to the technology itself. Additionally, several researchers acknowledge that TAM is incomplete in that it does not account for social influences that contribute to the users' attitudes of technology and its usage (Goodhue & Thompson, 1995). In an effort to extend TAM, Lin and Lu (2000) applied TAM to predict the acceptance of websites, which included external variables such as computer quality, information quality, response time, and system accessibility. The results indicated that the previously mentioned external variables significantly affected the perceived usefulness and perceived ease of use of websites (Lin & Lu, 2000). In addition to external determinants, a limited amount of prior research indicated that a number of personal factors contributed to the attitudes people develop toward technology such as: computer anxiety and frustration (Maurer, 1994), computer self-efficacy (Compeau & Higgins, 1995), and individual innovativeness (Rogers, 2003). Given that each of these personal factors alone or combined could affect the users' attitudes and perceptions of the introduction of new computer systems in the workplace, the following section will consider the influence of personal factors beginning with computer self-efficacy.

Personal Factors

Computer Self-Efficacy, defined as one's capability to use computer technology (Compeau, & Higgins, 1995), originated from self-efficacy in social cognitive theory and is conceptualized as person's belief in his or her ability to meet certain situational demands (Bandura, 1997). A high level of self-efficacy is indicative of a person's strong beliefs that he or she has the skills and ability to achieve desired goals. People with high self-efficacy are more likely to put forth additional effort in the process of pursuing their goals than those with low self-efficacy (Bandura, 1997). In following, Bandura, (1997) described the role of self-efficacy in human functioning as "a person's level of motivation, affective state, and actions that are based more on what they believe than on what is objectively true" (p. 2). Thistly, the anxiety that results from low self-efficacy may influence the employee's perceptions of technology in such a way that he or she would likely develop an aversion to computer technology and the implementation of new computer systems (Brosnan, 1998). Conversely, if the employee had a great deal of prior experience with the implementation of a new computer system coupled with a moderate to high level of computer self-efficacy, the employee would be motivated to learn the new computer system and develop an affinity towards the new system (Chua, Chen, & Wong, 1999). Additionally, computer self-efficacy and computer anxiety are both part of the self-efficacy framework (Bandura, 1997). In the current context, computer anxiety is also of interest because prior research has indicated that low computer anxiety was positively related to high computer self-efficacy beliefs and performance (Chen, Gully, Whiteman, & Kilcullen, 2000). Therefore, the relevance of computer anxiety to the current study will be considered in greater detail below.

Computer Anxiety is the fear of computers when using one, or the fear associated with the impending use of a computer or new computer system (Chua, Chen, & Wong, 1999), and is accompanied by a negative emotional state and a negative cogitative experience (Bozionelos, 2001). However, computer anxiety is not considered to be a personality trait, but rather a "state anxiety" which occurs at the time of computer use or at the time of imagined future computer use (Cambre & Cook, 1985).
Computer anxiety is likely to contribute to the development of negative attitudes, perceptions, and beliefs users hold towards using computers and using new computer systems (Heinssen, Glass, & Knight, 1987).

Additionally, the performance of employees with high computer anxiety tends to be poorer than those with little or no computer anxiety (Cambre & Cook, 1985). Computer anxious individuals exhibit phobia-like symptoms which lead them to use computers less, and when using computers to complete tasks, they do so more slowly (Mahar, Henderson, & Deane, 1997). In some cases, computer anxiety can even lead to physiological responses such as increased blood pressure and muscle tension (Scheirer, Fernandez, Klein, & Picard, 2002). Computer generated anxiety has also been recognized as a major reason why people develop low levels of computer self-efficacy, do not use computers or new computer systems to reach their goals, hesitate to use computers, and avoid computers altogether (Storms & Spector, 1987). Similarly, it has been indicated that in order for employees to cope with the changes technology brought to the workplace they must be adaptive and innovative (Rogers, 2003). Given that innovativeness speaks directly to a person's ability to adapt their current course of thought or action for more productive alternatives (introduction to new computer systems), it is reasonable to consider individual innovativeness as a personal factor of interest here.

Individual Innovativeness is defined as a predisposed tendency toward adopting an innovation (Rogers, 2003). According to the diffusion of innovation theory people react differently to a new idea, practice, or object due to their differences in individual innovativeness (Rogers, 2003). The innovativeness of an individual is a persistent predisposition that is reflective of an individual's underlying nature when exposed to an innovation or in the case of this study, a new computer system (Rogers, 2003). Because it is new or perceived as such, adopting an innovation inherently involves a risk, with some people being more likely to take risks of adopting an innovation as opposed to others as a result of their differences in individual innovativeness (Rogers, 2003). Given the rapid introduction of new technologies and the associated costs, identifying characteristic such as innovativeness is of substantial value for the successful implementation of new computer systems in the workplace (Rogers, 2003). Research findings indicate a positive relationship between individual innovativeness and the attitudes users hold toward implementing new computer systems (Karahanna, Ahuja, Srite, & Galvin, 2002). Therefore, it could be extrapolated that employees who are high in individual innovativeness would be more likely to develop positive attitudes towards the introduction of new computer systems in the workplace compared to employees low in individual innovativeness. In addition to the personal factors discussed here, the physical environment (both natural and man-made), the organizational structure and climate, the rules and procedures of the organization, and individuals both in and out of the organization may shape an employee's assessment of new computer systems. As a result, it is reasoned that organizational factors should be included here and will be consider in greater detail below.

Organizational Factors

Socialization has been defined as the process by which newcomers acquire the requisite attitudes, behaviors, and knowledge in order to participate as an organizational member (Van Maanen & Schein, 1979). When individuals join organizations, they must learn to understand and make sense of their new surroundings (Louis, 1980). Organizational Socialization also involves a shared understanding between the organization and its members regarding acceptable job behaviors (e.g., the use of new computer systems). Specifically, organizational socialization is considered to be a component of the assimilation process defined as the way of teaching those ongoing behaviors and cognitive processes by which individuals join, become integrated into, and exit an organization (Jablin, 2001). The success of an organization in terms of its productivity, employee job satisfaction, and minimal turnover rate (organizational commitment) depends primarily on the effective socialization practices of the organization (Downs & Hazen, 1977). With regard to organizational socialization and the implementation of new computer systems, organizational newcomers learn the appropriate use and misuse of new computer systems through formal and informal communication interactions. Specifically, group and organizational norms regarding the use of new computer systems influences employees' frequency of use and their attitudes toward the new computer systems. Additionally, task socialization regarding the appropriate use of new computer systems is also considered here as an important factor that contributes to the attitudes and perceptions employees hold toward new computer systems. Based on social pressures to

conform to the expectations of others that result from the social influence of a referent group or authority figure, it is reasoned here that social influence may also influence the attitudes and perceptions employees hold toward the use of new computer systems. Therefore, social influence was included in the current study.

Social influence has its roots in the classic experiments involving influence and compliance (see Asch, 1966). Social influence is comprised of normative influence which involves the conformity of one person's behavior to conform with the positive expectations of others, and subjective influence, which is defined as the influence to establish a favorable image within a referent group (Deutsch & Gerard, 1955). Therefore, according to normative and subjective influence it is reasoned here that employees will likely develop attitudes about new computer systems that are congruent with both the attitudes expressed by organizational members and the desire to establish and or maintain a favorable image within a reference group. For instance, the use and acceptance of new computer systems by one's work group has been found to be positively related to an individuals' use and acceptance of new computer systems, especially when group attraction is high (Markus, 1994). Also, the use and acceptance of new computer systems by management has been found to be a significant predictor of employees use and acceptance of new computer systems (Markus, 1994). To ensure that employees behave in ways espoused by the organization, such as rules and structures (both formal and informal) are developed to make certain that such behaviors occur. Thus, task structure relevant to the introduction of new computer systems in the workplace was considered in greater detail below.

Task structure has its roots in Structuration Theory (Giddens, 1979) to the extent that Structuration Theory highlights how the process of reality construction becomes a part of the social fabric of an organization through the development of structures. Further, it is argued that structures consist of rules and resources upon which individuals rely on to guide actions (Giddens, 1979). As research points out, new computer systems have not only revolutionized the ways in which organizations operate, its value is based on the influences of those in power through the development of structures designed to embrace this new form of reality (Foster & Flynn, 1984). Thus, the integration of structures with socialization and social influence could effectively explain how the application of rules and resources produce and reproduce a shared reality through the application of recursive communication structures. As a result, each time an employee engages in or uses new computer systems to complete work related tasks their actions reinforce organizational structures that support the reality that the new computer system is a valued asset. Since attitudes and perceptions ultimately shape a person's view of reality and their subsequent behaviors; the following section will examine the way in which technological, personal, and organizational factors influence the attitudes and perceptions employees hold toward new computer systems in the workplace.

Employee Attitudes/Perceptions of Computer Technology

Some of the seminal research carried out in the field of attitudes was conducted by (Ajzen & Fishbein, 1980) who described a person's attitude as a predisposition to respond either favorably or unfavorably to objects in the world. Implicit in this viewpoint is the notion of evaluation, where individuals rate their feelings toward an object or procedure. In effect, this evaluation process is the foundations for the current study, which is based on individuals rating their feelings toward various aspects of using new computer systems in the workplace. In the study of human-computer interaction, computer anxiety and negative attitudes toward computers were found to be positively correlated (Sewell & Barker, 2006). Current scholarship has also described computer surveillance as either good or bad or coercive or caring (Sewell & Barker, 2006). Surveillance can also protect employees against unfair work distribution or accusations of incompetence by creating a record of how an employee's performance meets or exceeds management's expectations (Sewell & Barker, 2006). Accordingly, it is reasoned here that a number of factors contribute to the attitudes employees develop towards new computer systems. Since a scant amount of prior research has examined the relationship between the attitudes employees hold toward new computer systems and their work-related attitudes, job satisfaction and organizational commitment were included here.

Work-Related Attitudes

Job satisfaction is identified as "a pleasurable or positive emotional state from the appraisal of one's job or experiences" (Locke, 1976, p. 1297). Prior studies of computer technology and its association with user satisfaction have been divided into two distinct research streams (Mowday, Steers, & Porter, 1979). The first utilizes behavioral measures, such as technology acceptance and use, while the second is based on the attitudes and beliefs of the user (Wixom & Todd, 2005). Specifically, the first stream is found in the technology acceptance literature, most notably TAM (Davis, 1989). The research objective of TAM is to explain and predict user behavior, such as system adoption and use (Davis, 1989). More important to the current study is the second stream of research because it is concerned with users' attitudes and perceptions of new computer systems as they relate to users' job satisfaction. Some argue that new computer systems may have a positive or negative affect on employee job satisfaction depending on the perceptions employees hold toward the new computer system (Wixom & Todd, 2005). Following this reasoning it can be hypothesized that the relationship between the implementation of new computer systems and satisfaction is not direct but indirect; meaning that it is mediated by the users' attitudes and perceptions of the new computer system. In that job satisfaction is different from, yet related to organizational commitment; it could be extrapolated that employees' attitudes and perceptions of technology are likely to influence both job satisfaction and organizational commitment. Therefore, organizational commitment was considered here.

Organizational commitment is the strength of emotional attachment to the organization and the acceptance of the organization's goals and values (Mowday et al., 1979) Affective commitment as described above has received the majority of the attention in the literature and is described as an emotional attachment to the organization in which employees remain with their organization because they want to (Allen & Meyer, 1990). Affective commitment is of particular interest here because it is reasoned that employees' attitudes and perceptions of new computer systems will influence their affective commitment to the organization. Hence, the reduction of employee-organization friction as a result of shared attitudes and perceptions of new computer systems affect how employees view the organization (Davis, 1989). For example, employees who sense their organization cares about them and is willing and able to provide them with the tools (e.g., computer training and service support) necessary to perform their jobs are expected, in turn, to offer increased levels of commitment to the organization.

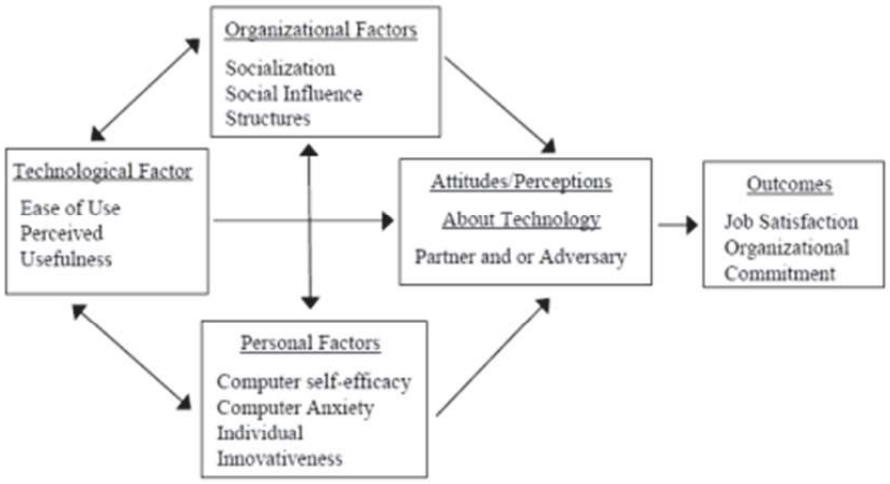
Because new computer systems have become such a vital part of organizational life today, it is important to examine the role of these new systems; the attitudes and perceptions employees hold toward the new computer systems, the factors associated with the development of these attitudes and perceptions, and the work-related attitudes that result. The examination of attitudes and perceptions are relevant here because they contribute to the construction of a person's view of reality. Additionally, despite the contributions TAM (Davis, 1989) has made to our understanding of why individuals use and accept new technology, it may not be the best model for explaining the influence new computer systems have in the workplace. Subsequently, TMM was developed here with the intention of providing a means to explain the previously mentioned associations. In doing so, the following hypotheses were advanced.

H1: There will be a positive relationship between employee job satisfaction and the attitudes and perceptions they hold toward their new computer system.

H2: There will be a positive relationship between employee organizational commitment and the attitudes and perceptions they hold toward their new computer system.

H3: The data will provide a good fit for TMM in which the attitudes and perceptions employees hold toward their new computer system (observed variable) will mediate the relationship between technological, personal, and organizational factors (latent variables) and the employees job satisfaction and organizational commitment (observed variables) (see Fig. 1).

FIGURE 1
HYPOTHESIZED TECHNOLOGY MANAGEMENT MODEL (TMM)



METHOD

Participants

Of the original 2000 questionnaires distributed to full-time working adults, 647 were returned (32.4% return rate), 62 of which could not be used as a result of missing data or unverifiable participants (see procedures section for requirements). This resulted in 586 useable questionnaires for the current study. Participants were working adults in the Mid-Atlantic and Mid-Western regions of the United States (48.6% male, n = 285) and (51.4% female, n = 301), whose overall tenure at their current job ranged from 1 to 39 years (M = 9.95, SD = 7.67). Participants ranged in age from 23 to 61 (M = 40.43, SD = 10.44) and the percentage of their day spent using computers as a part of their job functions ranged from 20% to 100% (M = 71.60, SD = 20.29). Participants also reported their computer experience ranging from 2 to 26 years (M = 14.48, SD = 6.14).

Procedures

A network sample was utilized for the current study consisting of employees recruited by the primary author and graduate and under graduate students enrolled in communication and business courses at a large Mid-Atlantic university and at a large Mid-Western university. The participants were full-time working adults who worked for small businesses (100 employees or less) who within the last year implemented new computer systems such as an enterprise resource planning (ERP), accounting information system (AIS), material requirements planning (MRP), human resources management system (HRMS, e.g., PeopleSoft®), etc. To ensure that the participants are working adults the following procedure was utilized. The participants (working adults) were given an email address located on the cover letter in which they were asked to report the name of their organization in the subject line of the email followed by their name and telephone number in the body of the email. Participants were then instructed to return the completed questionnaire in the self addressed stamped envelope provided by the researcher in which the return name and address were to match the company name indicated in the subject line of their email. Also in the lower right-hand corner of the envelope they were asked to write their name as it appeared in the body of the email. Only envelopes containing a completed questionnaire with verifiable information were used in the study. Periodically (i.e., approximately every 30 surveys), the primary author called and verified that the participants who completed a questionnaire were the persons they claimed to be.

Measures

Technological factors were measured by a variation of the 6-item ease of use and the 6-item usefulness scales developed by Davis (1989). The revised measure referenced new computer systems instead of the technology itself. A 5-point Likert-type response format (1 = Strongly Disagree to 5 = Strongly Agree) was used here. The scales for perceived usefulness and perceived ease of use have amassed evidence of reliability; Taylor and Todd (1995) reported reliabilities of .92 for perceived usefulness and .91 for perceived ease of use. Cronbach's alpha for the current study was .86 for perceived usefulness (M = 4.24, SD = 0.76) and .90 for perceived ease of use (M = 3.91, SD = 0.83).

Personal Factors

Computer Self Efficacy and Computer Anxiety were measured by 8 of the 16-items from the New Computer Anxiety and Self-Efficacy Scale developed by Barbeite and Weiss (2004). Four items measuring computer self-efficacy for advanced activities (introduction of new computer systems) and four items measuring anxiety as a result of the introduction of new computer systems were used here. Based on the advanced focus of new computer systems the current study excluded items measuring computer self-efficacy for the general use of technology and anxiety associated with the general use of technology. A 5-point Likert-type response format (1 = Strongly Disagree to 5 = Strongly Agree) was used here. Prior research indicated evidence of reliability (see Barbeite & Weiss, 2004). Cronbach's coefficient alpha for the current study was .87 for computer self-efficacy (advanced activities) (M = 4.03, SD = 0.85) and .93 for computer anxiety (for advanced activities) (M = 4.57, SD = 0.68).

Individual Innovativeness was measured by the Individual Innovativeness Scale developed by Hurt, Joseph, and Cook (1977) to measure a person's predisposition to be innovative. A 5-point Likert-type response format (1 = Strongly Disagree to 5 = Strongly Agree) was used here. Prior research indicated evidence of reliability (see Clark & Goldsmith, 2006). Cronbach's alpha for the current study was .96 (M = 4.20, SD = 0.67).

Organizational Factors

Socialization was measured using a modified version of the 35-item Newcomer Socialization Questionnaire (Haueter, Hoff-Macan, & Winter, 2003). The scale measured organizational, workgroup, and task socialization. A 5-point Likert-type response format (1 = Strongly Disagree to 5 = Strongly Agree) was used here. Prior research indicated evidence of reliability (see Madlock & Horan, 2009). For the current study, the items were modified to reflect a focus on the introduction of new computer systems. Cronbach's alpha for the current study was .88 for organizational socialization (M = 4.30, SD = 0.72), .86 for workgroup socialization (M = 4.57, SD = 0.59), and .89 (M = 4.60, SD = 4.61) for task socialization.

Social influence was assessed using the 10-item Social Influence Scale developed by Kelman (1961). A 5-point Likert-type response format (1 = Strongly Disagree to 5 = Strongly Agree) was used here. Prior research indicated evidence of reliability (see Malhotra & Galletta, 1999). Items were modified to reflect a focus on the introduction of new computer systems. Cronbach's alpha for the current study was .80 (M = 3.57, SD = 0.91) for internalization.

Task Structure was measured using a modified version of the original version of the 4-item Task Characteristics Scale developed by Withey, Daft, and Cooper (1983). The scale wasdesigned to assess the degree of structure in a person's job. A 5-point Likert-type response format (1 = Very Little Extent to 5 = Very Large Extent) was used here. Prior research indicated evidence of reliability (see Anandarajan, Simmers, & Igbaria, 2000). The modified version of the scale used here reflected the degree of structure associated with the introduction of new computer systems at work. Cronbach's alpha for the present study was .90 (M = 4.23, SD = 0.82).

The Attitudes and Perceptions of Computer technology were measured here by a modified version of the Computer Attitudes Scale (CAS; Nickell & Pinto, 1986) with a focus on the introduction of new computer systems. A 5-point Likert-type response format (1 = Strongly Disagree to 5 = Strongly Agree) was used here. Prior research indicated evidence of reliability (see Anandarajan et al., 2000). Cronbach's alpha for the current study was .96 (M = 3.89, SD = 0.85).

Job satisfaction was measured by the eight-item Abridged Job In General Scale (Russell, Spitzműller, Lin, Stanton, Smith, & Ironson, 2004). A 7-point semantic differential response format was used in the

current study instead of the original scale formatting (0 for "no," 1 for "?" and 3 for "yes) for clarity. Prior research indicated evidence of reliability (see Madlock, 2008a, 2008b). Cronbach's coefficient alpha for the current study was .81 (M = 5.55, SD = 1.16).

Organizational commitment was measured by the 15-item Organizational Commitment Questionnaire (Mowday et al., 1979). A 5-point Likert scale response format ranging from (1 = Strongly Disagree to 5 = Strongly Agree) was used here. Prior research indicated evidence of reliability (see Madlock & Horan, 2009). Cronbach's coefficient alpha for the current study was .81 (M = 4.10, SD = 0.67).

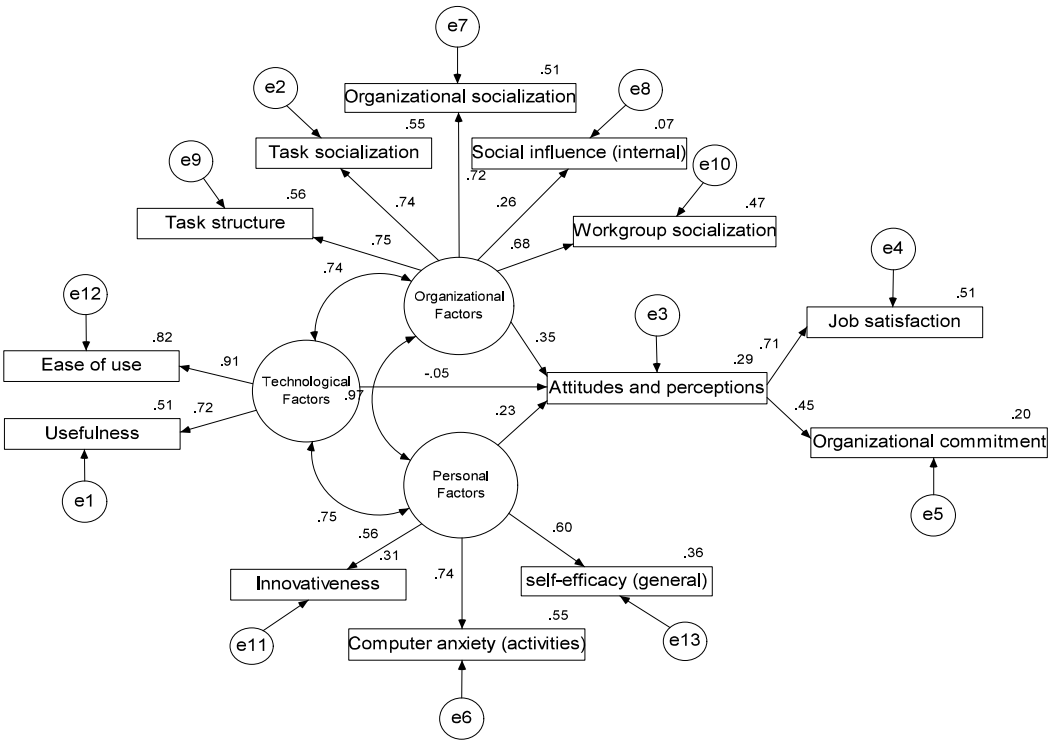
RESULTS

Hypothesis 1 predicted that employee job satisfaction would be positively related to the attitudes and perceptions employees hold toward their new computer system. Results of Pearson's correlational analysis showed that the data were consistent with the hypothesis by indicating a strong significant positive relationship ($r = .72$, $p < .001$) between the variables.

Hypothesis 2 predicted that employee organizational commitment would be positively related to the attitudes and perceptions employees hold toward their new computer system. Results of Pearson's correlational analysis showed that the data were consistent with the hypothesis by indicating a significant moderate positive relationship ($r = .45$, $p < .001$) between the variables.

Hypothesis 3 predicted a meaningful path model for TMM in which the attitudes and perceptions employees hold toward their new computer system (observed variable) would serve to mediate the relationship between technological, personal, and organizational factors (latent variables) and employees' job satisfaction and organizational commitment (observed variable). The path model of TMM showed that the data were consistent with the hypothesis. Results of the Structural Equation Model indicated that the data fit the model: $x2\ (60) = 185$, $p = .042$; CFI = .929, NFI = .926, GFI = .920, AGFI = .897, RMSEA = .059 (see Figure 2).

FIGURE 2
ACTUAL TECHNOLOGY MANAGEMENT MODEL (TMM)



DISCUSSION

Since computer technology has become the newest "member" to join the workplace coupled with the influence new computer systems (of interest here ERP) have on the organization and its members, the implementation of new computer systems have become an area of interest to scholars, practitioners, and employees. Despite this high level of interest, there has yet to be a widely accepted model that explains the influence new computer systems have on the work environment. As a result, the goal of this study was to develop a model TMM, comprised of multiple factors (technological, personal, and organizational) hypothesized to explain how the attitudes employees hold toward new computer systems are developed and how these attitudes influence employees' work-related attitudes of job satisfaction and organizational commitment.

Hypotheses 1 and 2 examined the relationships between job satisfaction and organizational commitment and the attitudes employees hold toward their new computer system. These findings indicated that the attitudes employees hold toward new systems were positively related to job satisfaction and organizational commitment. In other words, as employees' attitudes toward the new computer system increased so did their job satisfaction and organizational commitment. These findings are of value because they provide support for the position that the value-added component of a new computer system can be realized at the employee level. In this instance, the value of a new computer system, can be explained through the association between the attitudes employees hold toward that new computer system and their subsequent work-related attitudes of job satisfaction and organizational commitment.

Additionally, since a value-added component of new computer systems resides in the employee's job satisfaction and organizational commitment, TMM provides a means to explain how to maximize the value-added component by way of technological, personal, and organizational factors found to contribute to the attitudes employees hold toward the new system. As a result of the costs associated with the purchase and implementation (e.g., training) of new computer systems, coupled with the value associated

with the new system and the impact of the work-related attitudes of employees, scholars and practitioners alike should take note of the findings contained in this study.

Hypothesis 3 predicted that a Structural Equation Model would provide a meaningful fit for TMM. Following the criteria previously set forth in this research study, the data indicated a meaningful fit for TMM. Another important point highlighted by the development of the TMM is found in its simplicity and practicality. For example, TMM is simple and practical in its ability to explain the influence of new computer systems on employees and the organization. Another example of the simplicity and practicality of TMM is found in its ability to serve as a guide for employees, managers, and the organization to manage the influence of new computer systems in the workplace. Since TMM indicates that employees' attitudes toward new computer systems are primarily influenced by organizational factors, managers may want to focus their attention on these factors in order to maximize the buy-in of employees to the new computer system. Specifically, TMM explains two ways in which technology in the workplace contributes to an organization's bottom line. The first is associated with the money saved in recruiting, training, and socializing employees as a result of increased levels of organizational commitment. The second contribution resides in the positive association between job satisfaction and increased production of employees (Gruneberg, 1979).

Additionally, TMM offers an explanation of how the personal factors of computer self-efficacy, computer anxiety, and individual innovativeness influence the attitudes employees hold toward new computer systems. With this realization, employees may begin to work on improving their personal factors beginning with being proactive in building their computer self-efficacy (e.g., taking classes to build computer skills), which will reduce their computer anxiety. As far as the personal factor of innovativeness, it is realized here that any increase in innovativeness may take the employee some time to achieve as traits are difficult to change but can be managed. At the same time, employees also need to enhance their organizational factors by engaging in information seeking tactics during the socialization process to fully understand the policies regarding the use of their new computer system. As a result of utilizing TMM as a guide to manage the introduction and implementation of new computer systems organizations can maximize the value-added component of their investment.

Another unique finding associated with TMM was the order in which the latent variables were found to influence the attitudes employees held toward their new computer system. Although technological factors were thought to influence the attitudes employees hold toward the new computer system, when combined with the influence of personal and organizational factors there was no association. It appears that the ability of technological factors to predict the attitudes employees' hold toward their new computer system was attenuated by personal and organizational factors. To explain, employees high in computer self-efficacy, high in individual innovativeness, and low in computer anxiety (personal factors) may as a result; find computer their new computer system easy to use and useful. Thus, attenuating the affect technological factors alone have on employees' attitudes toward their new computer system. Similarly, employees who experience high levels of organizational socialization (task, organizational, and workgroup), high levels of task structure, and high levels of social influence (organizational factors) may also find their new computer system easy to use and useful.

One additional point of interest associated with TMM is that the latent variable of organizational factors was the greatest predictor of the attitudes employees hold toward technology. The value of this finding is based on the associations between organizational, personal, and technological factors to the extent that organizational factors appear to attenuate the influence of both personal and technological factors. For example, organizational factors such as socialization, structure, and social influence provides employees with training about the appropriate use of the new technology and the associated benefits, that would likely contribute to employees' self-efficacy, decrease their anxiety, and increase their innovativeness. In sum, it appears that the communication interactions that take place within the organization are important factors to consider when implementing new computer systems in the workplace.

Limitations

Although the current study is of value it is not without limitations. The first limitation involves the lack of a qualitative component which could have allowed for a greater understanding of TMM. For example, a qualitative approach could identify the formal and informal messages exchanged during socialization that adequately address the appropriate use of new computer systems. Another limitation involves the list of procedures requested of the participants by the primary author in order to verify that they met the requirements for participation in the study. As a result, some potential participants may have felt uncomfortable with identifying themselves or may have just been irritated with the list of requests and chose not to participate in the study. This may have inadvertently resulted in the exclusion of individuals who were limited on time or irritated by the list of requests.

REFERENCES

Achterberg, M. (2001). How culture affects information sharing in an organization. Retrieved July 30, 2008 from http://www.kwork.org/White Papers/cultural.html.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of Occupational Psychology, 63*, 1-18.

Anandarajan, M., Simmers, C., & Igbaria, M. (2000). An exploratory investigation of the antecedents and impact of internet usage: An individual perspective. *Behavior and Information Technology, 19*, 69-85

Appelbaum, S. H. (1990). Computerphobia: Training managers to reduce the fears and love the machines. *Industrial and Commercial Training, 22*, 9-16.

Asch, S. E. (1966). Opinions and social pressure. In A. P. Hare, E. F. Borgatta, & R. F. Bales (Eds.), *Small groups: Studies in social interaction,* (pp. 318-324). New York: Alfred A. Knopf.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Barbeite, F. G., & Weiss, E. M. (2004). Computer self-efficacy and anxiety scales for an Internet sample: Testing measurement equivalence of existing measures and development of new scales. *Computers in Human Behavior, 20*, 1-15.

Bozionelos, N. (2001). Computer anxiety: Relationship with computer experience and prevalence. *Computers in Human Behavior, 17*, 213-224.

Brosnan, M. J. (1998). The impact of psychological gender, gender-related perceptions, significant others, and the introducer of technology upon computer anxiety in students. *Journal of Educational Computing Research, 18*, 63-78.

Callon, M. (1986). The sociology of an actor-network: The case of the electric vehicle. In M. Callon, J. Law, & A. Rip (Eds). *Mapping the dynamics of science and technology: Sociology of science in the real world.* London: Macmillan.

Cambre, M. A., & Cook, D. L. (1985). Computer anxiety: Definition, measurement, and correlates. *Journal of Educational Computing Research, 1*, 37-54.

Campbell, N. J. (1990). High school students' computer attitudes and attributions: Gender and ethnic group differences. *Journal of Adolescent Research,* 5, 485-499.

Chen, G., Gully, S. M., Whiteman, J., & Kilcullen, R. N. (2000). Examination of relationships among trait-like individual differences, state-like individual differences, and learning performance. *Journal of Applied Psychology, 85*, 835-847.

Cheney, P. H., & Dickson, G. W. (1982). Organizational characteristics and information systems: An exploratory investigation. *Academy of Management Journal, 25*, 170-184.

Chua, S. L., Chen, D., & Wong, A. (1999). Computer anxiety and its correlates: A meta-analysis. *Computers in Human Behavior, 15*, 609-623.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *Management Information Systems Quarterly, 19*, 189-211.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly, 13*, 319-340.
Deutsch, M., & Gerard, H. (1955). A study of normative and informational social influence upon individual judgment. *Journal of Abnormal and Social Psychology, 51*, 629-636.
Downs, C. W., & Hazen, D. (1977). A factor analytic study of communication satisfaction. *Journal of Business Communication, 14*, 63-73.
Foster, L. W., & Flynn, D. M. (1984). Management information technology: Its effects on organizational form and function. *Management Information Systems Quarterly, 8*, 229-236.
Giddens, A. (1979). *Central problems in social theory.* Berkeley, CA: University of California.
Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance, *Management Information Systems Quarterly, 19*, 213-236.
Greenwald, C. (2006). Tech companies see U.S. talent shortage as a barrier to innovation. *Information Technology Association of America.* Retrieved November 20, 2008 from http://www.itaa.org/newsroom/release.cfm?ID=2386.
Gruneberg, M. M. (1979). *Understanding job satisfaction.* New York: Wiley.
Heinssen, R. K., Glass, C. R., & Knight, L. A. (1987). Assessing computer anxiety: Development and validation of the computer anxiety rating scale. *Computers in Human Behavior, 3*, 49-59.
Herrmann, A. F. (2006). Stockholders in cyberspace: Weick's sensemaking online. *Journal of Business Communication*, *44*, 13-35.
Hurt, H. T., Joseph, K., & Cook, C. D. (1977). Scales for the measurement of innovativeness. *Human Communication Research*, *4*, 58-65.
Jablin, F. M. (2001). Organizational entry, assimilation, and disengagement/entry. In F. M. Jablin & L. L. Putnam (Eds.), *The new handbook of organizational communication: Advances in theory, research, and methods* (pp. 732-818). Thousand Oaks, CA: Sage.
Jackson, M. H., Poole, M. S., & Kuhn, T. (2002). The social construction of technology and studies of the workplace. In L. Lievrouw & S. Livingstone (Eds.), *The handbook of new media* (pp. 236-253). London: Sage.
Kelman, H. C. (1961). Processes of opinion change. *Public Opinion Quarterly, 2*, 51-60.
Latour, B. (1987). Science in action: How to follow scientists and engineers through *society*. Milton, Keynes: Open University Press.
Lin, J. C. C., & Lu, H. P. (2000). Towards an understanding of the behavioral intention to use a Web site. *International Journal of Information Management, 20*, 197-208.
Locke, E. A. (1976). The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1297-1349). Chicago: Rand McNally.
Madlock, P. E. (2008a). The link between leadership style, communicator competence, and employee satisfaction. *Journal of Business Communication*, *45*, 61-75.
Madlock, P. E. (2008b). Employee satisfaction: An examination of supervisors' communication competence. *Human Communication, 11*, 81-100.
Madlock, P. E., & Horan, S. M. (2009). Predicted outcome value of organizational, work group, and task socialization. *Communication Research Reports, 26*, 40-49.
Mahar, D., Henderson, R., & Deane, F. (1997). The effects of computer anxiety, state anxiety, and computer experience on users' performance of computer based tasks. *Personality and Individual Differences, 22*, 683-692.
Malhotra, Y., & Galletta, D. (2005). A multidimensional commitment model of volitional systems adoption and usage behavior. *Journal of Management Information Systems, 22*, 117-151.
Markus, M. L. (1994). Electronic mail as the medium of managerial choice. *Organization Science, 5*, 502-527.
Martin, R. (1985). Attitudes towards advanced manufacturing technology (AMT): The role of AMT experience, skill level and job involvement. *Social Behavior, 3*, 297- 305.

Maurer, M. M. (1994). Computer anxiety correlates and what they tell us. *Computers in Human Behavior, 10*, 369-376.
Morrow, P. C., Prell, E. R., & McElroy, J. C. (1986). Attitudinal and behavioral correlates of computer anxiety. *Psychological Reports,* 59, 1199-1204.
Mowday, R. T., Steers, R. M., & Porter, L. W. (1979). The measurement of organizational commitment. *Journal of Vocational Behavior, 14*, 234-247.
Nickell, G. S., & Pinto, J. N. (1986). The computer attitude scale. *Computers in Human Behavior, 2*, 301-306.
Rogers, E. M. (2003). *Diffusion of innovations* (*5th ed.*). New York: Free Press.
Russell, S. S., Spitzműller, C., Lin, L. F., Stanton, J. M., Smith, P. C., & Ironson, G. H. (2004). Shorter can also be better: The abridged job in general scale. *Educational and Psychological Measurement, 64*, 878-893.
Scheirer, C., Fernandez, R., Klein, J., & Picard, R. (2002). Frustrating the user on purpose: A step toward building an affective computer. *Interacting with Computers, 14*, 93-118.
Sewell, G., & Barker, J. R. (2006). Coercion versus care: Using irony to make sense of organizational surveillance. *Academy of Management Review*, *31*, 1-24.
Spector, P. E. (1978). Organizational frustration: A model and review of the literature. *Personnel Psychology, 31*, 815-828.
Trunk, C. (1999). Building bridges between WMS & ERP. *Journal of Transportation and Distribution, 40*, 6-8.
Van Maanen, J., & Schein, E. H. (1979). Toward a theory of organizational socialization. In B. M. Staw (Ed.), *Research in Organizational Behavior* (vol. 1, pp. 209–264). Greenwich, CT: JAI Press.
Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease-of-use: Development and test. *Decision Sciences, 27*, 451-481.
Withey, M., Daft, R. L., & Cooper, W. H. (1983). Measures of Perrow's work unit technology: An empirical assessment and a new scale, *Academy of Management Journal, 26*, 45-63.
Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research, 16*, 85-102.