Technology Acceptance and Organizational Change:
An Integration of Theory

by

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Abstract

This dissertation uses a sequential mixed method research design to examine a new model of change readiness that focuses on change initiatives involving technology. The model is called the model of technological change. It integrates two models, one from organizational change literature and one from information systems (IS) literature. The model of readiness for change follows the theoretical framework provided by Fishbein and Ajzen in the Theory of Planned Behavior (TPB) to predict behaviors using attitudes formed by beliefs, which are in turn informed by antecedents. The model consists of four classes of antecedents: content, process, context, and individual differences, which predict the five change recipient beliefs. The beliefs are: discrepancy, appropriateness, change efficacy, principal support, and personal valence. These beliefs reflect the attitude called readiness for change and predict various change-related outcomes. The technology acceptance model (TAM) comes from IS literature. The model is commonly used to predict use of a new technology after being implemented in an organization. It too follows the framework of Fishbein and Ajzen's TPB and matches very closely to the model of readiness for change in terms of its content, except that it has two beliefs that are very different, perceived ease of use and perceived usefulness. These two models are combined and both literatures are examined. Additional theoretical development related to expectancy theory as a process to explain readiness and resistance to change is explored by examining the combination of belief constructs within the integrated model.

A smaller hypothesized model consisting of one variable from each of the four antecedent categories is tested. The antecedents include specific ERP subsystem for content, training for process, LMX for context, and core self-evaluation for individual differences. The model includes all

seven beliefs, and three outcomes, affective commitment, technology acceptance, and personal initiative, are examined.

Qualitative data and quantitative data were collected from employees participating in a university change initiative involving the replacement of legacy IT systems with a pervasive enterprise resource planning (ERP) system. Study 1 consists of qualitative data collection and analysis involving of a variety of data sources and the formation of themes and subthemes that guided survey creation for Study 2. Study 2 consists of the collection of empirical data via web-based survey followed by analysis and hypothesis testing using SPSS syntax for moderated-mediation. The results provide overall general support for the integrated model. Specific findings are discussed, as are implications and future research directions.

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The comparative mythologist, Joseph Campbell, once wrote "follow your bliss," and that is what I chose to do. I really did not know what I was getting myself into when I decided to go for a Ph.D., but I am really glad that I chose this path. This experience has been wonderful. I have learned a lot about myself, others, and the career that I have chosen for my life. I am a very blessed person and I am very thankful for all of those who made this possible.

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List of Abbreviations

ERP System   Enterprise resource planning system

IS   Information systems

IT   Information technology

MROC   Model of readiness for organizational change

MTC   Model of technological change

OCRBS   Organizational change recipients' beliefs scale

PEOU   Perceived ease of use

PERUSE   Perceived usefulness

TAM   Technology acceptance model

TAM2   Technology acceptance model 2

TAM3   Technology acceptance model 3

TPB   Theory of planned behavior

TRA   Theory of reasoned action

CHAPTER 1

INTRODUCTION

Organizations are operating in economic, political, social, and technological environments that are ever changing (Hoskisson, Eden, Lau & Wright, 2000). In this aggressive landscape, organizations must continuously reconfigure and adapt to maintain a competitive advantage (Fay & Lührmann, 2004; Tenkasi & Chesmore, 2003) and to meet the demands of market competitiveness, enhanced efficiency, the changing workforce, the emergence of a global business environment, and the proliferation of e-business (Burke & Trahant, 2000; Frese & Fay, 2001; Gordon, Stewart, Sweo, & Luker, 2000; Lerman & Schmidt, 2002). Organizations that fail to change in a timely and effective manner (e.g., Sears versus Wal-Mart; the traditional airlines versus the discounters) lose marketshare or go away as a result (Collins, 2001; Vollman, 1996).

Often organizational changes do not go according to plan (Czarniawska & Joerges 1996). In fact, successful change initiatives are startlingly uncommon (Beer & Nohria, 2000; Kotter, 1995; Sturdy & Grey, 2003; Taylor-Bianco & Schermerhorn, 2006), with some researchers reporting that more than 75% of organizational changes ending in failure (Choi & Behling, 1997). Researchers have examined many reasons for this high failure rate (Block, 2001; Burke, 2002; Burke & Litwin, 1992; Kotter & Cohen, 2002).

Figuring out the reasons for failure and determining how to prevent it is strategically important to business leaders because of the high costs and the necessity for survival (Jimmieson, Peach, & White, 2008). It is the duty of researchers to provide insights into the organizational change phenomenon that will advance the efforts of change agents. This research

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often focuses on improving change initiative implementation through the modification of strategies, structures, and processes. Central to the research is a focus on change recipients, those organizational members who experience the change, and who are called upon to help achieve the change initiative goals. Since employees experience unprecedented amounts of transformation in their work environments (Kernan & Hanges, 2002), monitoring and managing their attitudes toward change can make all the difference between success and failure (cf. Armenakis, Harris, & Feild, 1999; Cummings & Worley, 2005).

Technology and Change

A vast amount of organizational change involves technological change (Armenakis, Bernerth, Pitts, & Walker, 2007). As such, this dissertation directly addresses how information systems (IS) research can be integrated into organizational change research. For purposes of this dissertation, the following definition of information technology (IT) is used:

> Information technology as defined herein is any hardware or software used to build, operate, or maintain an organization's IS applications including decision support tools and technologies as well as the IT infrastructure of transaction processing systems, enterprise resource planning (ERP) systems, servers, networks, and business to customer (B2C) and business to business (B2B) websites that enable those applications to function. IT thus comprises not only the decision support tools themselves, but also the tools for developing the underlying functional aspects of a decision support system (Benamati & Lederer, 2008,   p. 833).

It has been estimated that *Fortune* 100 firms each spent an average of $1 billion between 1980 and 1995 on change implementations (Jacobs, 1998). Since the 1980s, roughly 50% of new capital investments within organizations now center on the development and implementation of information technology (Venkatesh, Morris, Davis, & Davis, 2003; Westland & Clark 2000). It appears that this trend will likely continue into the foreseeable future (Chau & Hu, 2002). From 2004 to 2008, the worldwide investment in IT increased at a rate of 7.7% per year, which was an

increase from the 5.1% for 2000 to 2004 (World Information Technology and Service Alliance, 2008).

Clearly, IT has an increasingly noticeable role in organizations (Benamati & Lederer, 2008). The introduction of IT-based solutions, often labeled IT implementation, is one of the four core activity domains characterizing IS practice and research (Zmud, 2000). It is believed that IT can increase capabilities while simultaneously decreasing costs (Benamati & Lederer, 2008), provide greater reliability and functionality (Markus, 2004), deliver strategic IT solutions quickly (Clark, Cavanaugh, Brown, & Sambamurthy, 1997; Norman & Zawacki, 2002), and generate new ways to compete (Ceglieski, Reithel, & Rebman, 2005). As such, organizations are focusing on applying new IT to their core functions (Keen, 2001), bringing organizational change to countless employees.

IT changes often require work-related changes in tasks and processes concurrent with, or in advance of, the introduction of new IT (Dixon, 1999). IT implementations often simply run parallel with other conventional change initiatives, such as restructuring, reengineering of processes, products, mergers, and downsizing (Dixon, 1999). In some cases, a new IT becomes the means by which traditional change initiative goals are achieved, allowing organizational members to do things that were not possible before the new technology (e.g., access to new information, information in real time). Technology-driven organizational change has even earned the title "technochange" (Markus, 2004).

IT is now an integral part of organizational change (Bergeron, Raymond, & Rivard, 2004). Technological innovation is advancing at a breakneck pace (Wanberg & Banas, 2000). New technologies are becoming more complex, while their lifecycles are reducing (Kurzweil,

2004; Lee, Kim, Rhee, & Trimi, 2006). As Gallivan (2004, p. 1) stated: "One of the greatest difficulties confronting IT managers is adapting to rapid change."

One lens through which technology and organizational change can be viewed is socio-technical philosophy (Adler & Docherty, 1998; Herbst, 1974; Molleman & Broekhuis, 2001; Whitworth & De Moor, 2009). This theory centers on the idea that paying attention to social issues alone, or technical issues alone, is not enough. Social structures impact technology and vice versa. This school of thought developed out of the Tavistock Institute in England, post-WWII, and served as a heuristic for examining how to improve workplace performance (Herbst, 1974).

For instance, in a study in England involving a new method of coal mining, called the long-wall method (Trist & Bamforth, 1951) was mined with automated blades that sliced off coal and took it to the surface. The traditional method involved teams of men with picks and shovels who worked a seam of coal, extracting it and placing it in trains. The long-wall method led to team dismantling and employees being stationed along the belt carrying the coal to ensure no problems. The change in the way the work was conducted resulted in worker distress and lower productivity despite the reduced physical strain. According to the socio-technical interpretation of the negative results, that the dismantling of the work teams and the poorly managed implementation of the new technology made the organizational change difficult despite its many advantages. While conducted almost 60 years ago, this study's findings remain relevant today. The implementation of new technologies constitutes serious organizational change, and the results go beyond handing out new technology to employees. Even with the implementation of modern IT, similar problems remain in the change process today (Schneider, Brief, & Guzzo, 1996).

IT implementations fail nearly 70% of the time (Standish Group International, 2001). The underutilization and low adoption of IT is often cited as the reason why many organizations fail (Devaraj & Kohli, 2003). Technology is only useful if the intended users embrace the technology and apply it within their work routines (Venkatesh & Bala, 2008; Venkatesh et al., 2003). Despite the trade press and academic researchers' focus on the adoption and use of IT by employees, successful IT implementations remain uncommon (Gross, 2005; Overby, 2002). Organizational failure to adapt to new technology leads to huge losses, as demonstrated by Hewlett-Packard's (HP) failure in 2004 to successful implement a new enterprise resource planning (ERP) system, which had a financial impact of $160 million (Koch, 2004a), as well as Nike's failure in 2000, which cost $100 million in sales and resulted in a 20% drop in stock price (Koch, 2004b). Venkatesh and Bala (2008) opine that the high change of failure is exacerbated by the increasingly complex and central role of IT within organizational operations and managerial decision making (e.g., enterprise resource planning, supply chain management, and customer relationship management systems). As such, the organizational change process through which new IT is introduced and managed determines its strategic impact on a firm (Schrage, 2003). The issue seems to be that traditional IT management is limited in its ability to cope with continuous change and the rapid introduction and utilization of IT within organizations (Boar, 1998).

Research on individual-level IT acceptance and adoption are well established and provide rich theories and explanations of the determinants of adoption and use (cf. Sarker, Valacich, & Sarker, 2005; Venkatesh et al., 2003). The most widely employed model for IT adoption is the technology acceptance model (TAM). This model has been shown to be highly predictive of IT adoption (Davis, Bagozzi, &Warshaw, 1989; Adams, Nelson, & Todd, 1992; Venkatesh &

Davis, 2000; Venkatesh & Morris, 2000). Nonetheless, research on change management processes specific to technology adoption is limited (Ruta, 2005; Venkatesh, 1999). Few strategies have been developed within IT research that work reliably in successfully implementing information technologies. IT enables, but does not guarantee organizational change (Markus, 2004), and even if technology is accepted, (granting greater efficiency and speed), it does not necessarily mean that the desired organizational outcomes (such as higher quality decisions and enhanced organizational performance) will be achieved (Dixon, 1999). IT management practices simply do not seem to be keeping pace with the speed of technological innovation within organizations (Wynekoop & Russo, 1997).

The lack of managing change recipients while managing technological change has led to many documented IT failures (Irani, Sharif, & Love, 2001; Keil, 1995; Lemon, Liebowitz, Burn, & Hackney, 2002; Lyytinen & Mathiassen, 1998; Lyytinen & Robey, 1999; Sauer, 1993; Sauer, Southon, & Dampney, 1997). It has also created the demand for new ideas and practices that can improve organizational change-related activities by IT executives (Luftman, Kempaiah, & Nash, 2005) and research by academics (Cohen, 2005; Jasperson, Carter, & Zmud, 2005; Montealegre, 1998; Rockart, Earl, & Ross, 1996). Recent studies have focused on improving change management processes related to rapid IT change (e.g., Benamati & Lederer, 2008; Wagner & Newell, 2006). Combining traditional change management practices and IT implementation practices has been suggested as one solution (Harrington & Conner, 2000).

This dissertation seeks to break new theoretical ground by examining research from two distinct streams of research in conjunction. This dissertation is an exercise in horizontal theory borrowing and building (Whetten, Felin, & King, 2009). It seeks to integrate some basic

concepts from IT research into organizational change research. By doing so, it provides some new insights into areas that remain, as of yet, unexplored.

ERP Systems and Organizational Change

Researchers have called for the application and further development of the TAM within complex IT environments (Legris, Ingham, & Collerette, 2003; Venkatesh & Bala, 2008). Until recently, IT implementation studies have focused on traditional and simple, yet important, IT applications, including personal computing, word processing, e-mail systems, and spreadsheet software (Hong, Thong, Wong, & Tam, 2001-2002). However, as IT systems become more complex, there is a need for more research on the interrelationship between IT systems and organizational change. Enterprise resource planning (ERP) systems present a rich area for future research, for ERP system implementation epitomizes "technochange," and this dissertation focuses on this area.

ERP systems are integrated software programs designed to handle a multitude of organizational functions, including materials management, supply chain management, sales, distribution, financing, human resources, and accounting (Davenport, 2000). ERP systems represent a potent and enveloping IS infrastructure that helps organizations synchronously manage key resources (e.g., staff, products, vendors, customers or clients, and finances) effectively. ERP systems streamline activities and integrate operations across the organization's value chain. Harley, Wright, Hall, and Dery (2006, p. 62) said:

> ERP software enables data to be shared across the entire organization and provides opportunities to produce and access information in a "real-time" environment. Data entered at one point automatically updates all other relevant databases across the organization. For example, when the sales and distribution department of a vendor running an ERP system logs an order in the sales and distribution module of the ERP, the databases in the production planning module are updated along with (potentially) the relevant databases in materials management, inventory management, and financials. Thus, the generation of invoices, requests for replacement stock and materials, and

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updates to inventory and customer accounts can all be significantly automated, cutting down the number of process steps within the order fulfillment process. Moreover, the increased interdependency of work processes imposed by the technology also requires a more disciplined approach from users to conform to pre-established process requirements.

ERP systems are considered a separate class of IS, more complex than more traditional and facile IT systems. Since ERP systems integrate information across functional boundaries, they have significant implications in terms of redesigning organizational structures, business processes, and employee hierarchies (Harley et al., 2006). ERP systems also provide the potential for other outside parties, such as suppliers and customers, to "join up" by interacting with the ERP themselves. In fact, ERP systems have been touted as the most popular business software of the 20th century (Robey, Ross, & Boudreau, 2002).

The implementation of an ERP system represents a major organizational change, since the software's integrated design produces conformity to a single dominant way of working, eliminating independent legacy subsystems that have had their own sets of employee practices and work processes (Davenport, 2000; Hall, 2002; Ross, Vitale, & Willcocks, 2003 Wagner & Newell, 2006). ERP system implementation is a risky and laborious process involving the allocation of significant organizational resources and a large financial investment. ERP system providers often hype their products with success stories about implementations that have succeeded, yet many ERP system implementations have been criticized because of the great amount of time and money wasted, as well as the disruptions caused (King & Burgess, 2006). They are actually difficult to implement (Markus, Axline, Petrie, & Tanis, 2000; Scott & Vessey, 2002) and nearly two-thirds of the implementations fail (Cliffe, 1999; Griffith, Zammuto, and Aiman-Smith, 1999). It is reported that 20% of ERP system implementations shut down even before "going live" within the organization (Cooke, Gelman, & Peterson, 2001). It has been

argued that ERP system implementation does not simply drive or enable organizational change (Robey & Boudreau, 1999). Instead, a reciprocal causal relationship exists in which the outcome of an ERP system implementation remains somewhat unpredictable and emergent (Orlikowski, 2000; Wagner & Newell, 2006).

Because of the critical value and high cost of ERP systems, a number of studies have examined them for the purposes of identifying critical success factors (Akkermans & van Helden, 2002; Amoako-Gyampah & Salam, 2004; King & Burgess, 2006; Harley et al., 2006; Holland & Light, 1999; Hong & Kim, 2002; Somers & Nelson, 2001; Wagner & Newell, 2006). A ranking of critical success factors by U.S. executives (Somers & Nelson, 2001) revealed the following: "top 10" in terms of mean scores from lowest priority (1) to most critical (5).

Table 1
ERP System Critical Success Factors[a]

Rank	Critical success factor	Mean
1	Top management support	4.29
2	Project team competence	4.20
3	Interdepartmental co-operation	4.19
4	Clear goals and objectives	4.15
5	Project management	4.13
6	Interdepartmental communication	4.09
7	Management of expectations	4.06
8	Project champion	4.03
9	Vendor support	4.03
10	Careful package selection	3.89

[a] Reproduced from Somers and Nelson (2001)

Based on this list and the dearth within the IT literature that managing change recipients during technological change implementation, it is a clear that more research is needed in order to provide guidance to practitioners implementing ERP systems. This dissertation addresses that need by examining, integrating, and expanding upon two theoretical models that share the same

theoretical basis. One model comes from organizational change literature, the other comes from IS literature. Together they may provide new insight that can assist change agents.

Level of Study

Much of the organizational change research is macro-focused (Armenakis & Bedeian, 1999; Clegg & Walsh, 2004; Van de Ven & Poole, 1995), focusing on the strategic adaptation of structures and systems to environmental challenges (Romanelli & Tushman, 1994). ISO 9000, business process reengineering, total quality management (TQM) programs, and management by objectives (MBO) were produced from this macro-level approach. Despite management efforts at pushing change programs of this sort, only 30% of such programs are successful (Beer & Nohria, 2000). The high failure rate of organizational change was confirmed by Clegg and Walsh (2004) in their examination of 898 manufacturing companies within four countries; the results led them to conclude that micro-level factors beyond macro-level system and structure issues impacted the successfulness of change initiatives. Similarly, as mentioned previously, IT implementation has a high failure rate, and it too is often viewed from a macro-focused perspective (Leonard-Barton & Deschamps 1988; Rogers, 2003). Person-focused change influences change at the organizational level since organizations are composed of individuals (Schein, 2004). Schneider, Brief and Guzzo (1996, p. 7) opined: "Organizations as we know them are the people in them; if the people do not change, there is no organizational change."

Many organizational change researchers have encouraged research concerning the psychology of change recipients (Judge, Thoresen, Pucik, & Welbourne, 1999; Ogbonna & Wilkinson, 2003; Vakola & Nikolaou, 2005; Vakola, Tsaousis, & Nikolaou, 2003; Wanberg & Banas, 2000). Many IT researchers have likewise come to the same conclusion (e.g., Ajzen, 1991; Compeau & Higgins, 1995; Davis et al., 1989; Mathieson, 1991; Sheppard et al., 1988;

Taylor & Todd, 1995; Venkatesh, 1999, 2000; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000; Venkatesh, Morris, Davis, & Davis, 2003).

Likewise, they argue that macro-level changes in such things as technology, communication, and strategic networks are only effective to the degree to which change recipients embrace them. Researchers also point out that change can have different repercussions at different levels within an organization (Jones, Watson, Hobman, Bordia, Prashant, Gallois, & Callan, 2008), within different work groups, and among different individuals (Mohrman, Mohrman, & Ledford, 1990). All too often top management views a change as a beneficial event that is required for the prosperity of the organization, while lower level managers and employees see the same change as a disruption of their day-to-day activities (Strebel, 1996).

Micro-Level Resistance to Change

Organizational change is linked to change recipients' beliefs, interpretive schemata, paradigms, and behaviors (Elias, 2009; Smollan, 2006; Walinga, 2008). Often change agents simply expect change recipients to comply with change initiatives, or even enthusiastically support them, no questions asked, and without any regard to those change recipients' attitudes and beliefs (Piderit, 2000). In truth, change agents must win hearts *and* minds for a change initiative to be successful (Duck, 1993). Since the failure of many major change initiatives can be attributed to employee change resistance (Clegg & Walsh, 2004; Maurer, 1996), it is very important to understand the role of affective, cognitive, and behavioral processes among change recipients. If an organization does not take into account psychological processes, the change initiative is likely to generate stress and cynicism that will reduce organizational commitment, job satisfaction, trust in the organization, and motivation (Reichers, Wanous, & Austin, 1997; Rush, Schoel, & Barnard, 1995; Schweiger & DeNisi, 1991).

While remaining fairly distinct from organizational change literature, the body of IS research focuses on understanding and managing employee reactions to changes in IT (Agarwal & Karahanna, 2000). Speaking about computer systems, Warshaw (1989, p. 587) proclaimed: "understanding why people accept or reject computers has proven to be one of the most challenging issues in IS research." Despite decades of continued research and increased familiarity with innovation diffusion and the speed of technological advancement, change recipients seemingly accept and reject IT systems unsystematically (Hasan, 2003). Just as organizational change cannot occur without change recipients accepting the content of the change event, so too IT cannot produce any positive outcomes unless the technology is adopted and utilized. The research has come to the conclusion that IT acceptance and usage are ultimately determined by change recipients' beliefs and attitudes (Agarwal & Karahanna, 2000; Aubert, Michel, & Roy, 2008; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000; Venkatesh, Morris, Davis, & Davis, 2003).

Within the literature, many conceptualizations of change recipients' affective, cognitive, and behavioral responses to change have been offered, including readiness to change (e.g., Armenakis et al., 2007; Armenakis et al., 1999; Armenakis, Harris & Mossholder, 1993; Herold, Fedor, Caldwell, & Liu, 2008; Holt, Armenakis, Feild, & Harris, 2007a; Holt, Armenakis, Harris, & Feild, 2007b; Jimmieson et al., 2008; Jones, Jimmieson, & Griffiths, 2005; Oreg, 2006), change reluctance and inertia (e.g., George & Jones, 2001; Piderit, 2000), openness and commitment to organizational change (e.g., Chawla & Kelloway, 2004; Herscovitch & Meyer, 2002; Lines, 2004; Miller, Johnson & Grau, 1994; Wanberg & Banas, 2000), positive coping with organizational change (e.g., Avey, Wernsing, & Luthans, 2008; Judge et al., 1999; Quick &

Quick, 2004; Wright & Cropanzano, 2004), and change-related cynicism and resistance (e.g., Bommer et al., 2005; Lines, 2004; Stanley, Meyer, & Topolnytsky, 2005).

The bottom line is that change recipients' acceptance of, and support for, organizational changes are considered to be crucial for the success of planned organizational changes (Armenakis et al., 1993; Herold, Fedor, & Caldwell, 2007). Change recipients with a strong, positive attitude toward a change are likely to behave in a variety of helpful and effortful ways that support and facilitate the change initiative. However, change recipients with a strong, negative attitude toward a change are more likely to manifest lower trust (Kiefer, 2004), disloyalty and intention to quit (Turnley & Feldman, 1999), actively speaking out against the change (Mishra & Spreitzer, 1998), deception (Shapiro et al., 1995), sabotage (La Nuez & Jermier, 1994; Spector & Fox, 2002), aggression (Spector & Fox, 2002; Fox et al., 2001; Neuman & Baron, 1998), and refusal to work or complete certain tasks (Skarlicki et al., 1999).

Resistance to change can make things more difficult even within organizations that have well-established structures and processes (Oreg, 2006; Reay, Golden-Biddle, & Germann, 2006). Resistance is often the biggest obstacle change agents must face (Avey et al., 2008), and it can appear whenever any work activity or ingrained pattern of activity has become the taken-for-granted way of doing things (Zucker, 1987). Resistance can be expressed both actively and passively (Dervitsiotis, 1998), hindering change efforts, lowering morale and productivity, increasing turnover, and, as a result, increasing the likelihood of organizational failures (Abrahamson, 2000; Dervitsiotis, 1998; Eby, Adams, Russell, & Gaby, 2000; Osterman, 2000; Reichers et al., 1997; Stanley et al., 2005).

Heath, Knez, and Camerer (1993) posited that the psychological process of experiencing change leads to negative reactions because: (a) humans prefer a known situation over an

unknown future; (b) while change involves both gain and loss, people tend to experience the pain

of loss with greater intensity than they experience the pleasure of gain; and (c) people tend to see

existing entitlements as greater than they actually are. Change recipients find organizational

change disconcerting because of the ambiguity involved (Heath, Knez, & Camerer, 1993), and

this ambiguity leads to uneasiness, stress, and general mistrust of the decision-makers (Kanter,

1983; Cobb, Wooten, & Folger, 1995; Strebel, 1996). Similarly, Prospect theory, described by

Kahneman and Tversky (1979), suggests that how people interpret their choices, as either gains

or as losses, influences how much risk they are willing to take. When a potential outcome is

framed as a loss, more attention is given to avoiding that loss as an outcome. In general, people

prefer avoiding loss over acquiring gain.

Change initiatives trigger the sense-making (Weick, 1995) processes of change recipients

causing them to first evaluate the personal significance of a change initiative and then extend

their appraisal to cover the impact of the change initiative on other change recipients and the

organization itself (e.g., Lazarus, 1999). Their secondary appraisal includes examination of the

causes of the change, the change agents, and potential coping strategies (George & Jones, 2001;

Jordan et al., 2002; Lazarus, 1999; Scherer, 1999; Paterson & Hartel, 2002; Rousseau &

Tijoriwala, 1999).

Dent and Goldberg (1999) suggested that change recipients resist negative consequences

(e.g., losing one's job) rather than change for its own sake. Change often involves increased

workload, pressure, and stress, which require sustained cognitive efforts, thereby soliciting

resistance to change (Hambrick et al., 2005; Janssen, 2001; Kiefer, 2004; Ng, Ang, & Chan,

2008). Feelings related to loss of support, power, status, and job-related efficacy, as well as a

feeling of disconnection from the organizational culture have been suggested as factors related to

change resistance (Callan, 1993; Mirvis, 1985). Nord and Jermier (1994) argue that the term "resistance to change" is often used to cover over and dismiss a whole multitude of legitimate reasons for objecting to a change rather than trying to understand and resolve real organizational problems.

Management Strategies for Change Readiness

Getting change recipients motivated and psychologically ready to make a change is important for success (Madsen, Miller, & Cameron, 2005). It becomes the responsibility of change agents to bolster positive attitudes and diminish negative attitudes toward change (Antoni, 2004). For changes to be successful, organizations must generate positive momentum through communication, the primary mechanism of creating readiness (Armenakis et al., 1999). Much of the literature has focused on strategies for managing and leading a change process (Armenakis & Bedeian, 1999; Whelan-Berry, Gordon, & Hinings, 2003).

Starting with Lewin (1947, 1951), researchers have characterized the individual change process in terms of unfreezing, moving, and freezing. While it is a simple approach, it remains timeless. Past research has focused on identifying "stages of change" (Prochaska et al., 1997) and understanding the psychological, sociological, and emotional factors that contribute to moving from one stage of change to the next. Many variables have been offered, such as self-efficacy, optimism, core self-evaluation, perceived behavioral control, and social support (Avey et al., 2008; Bandura, 1977; Courneya, Plotnikoff, Hotz, & Birkett, 2001; Judge et al., 1999; Lazarus & Folkman, 1987; Vakola & Nikolaou, 2005).

In order to develop strategies for managing and evoking positive attitudes toward change, the concept of change readiness must be explored, understood, and identified in terms of its relationships with other aspects of organizational change. Lewin (1951) suggested that the

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potential sources of readiness to change lie both within the change recipient and within their environment. Interactional psychology (Ekehammar, 1974; Endler & Magnusson, 1976; Magnusson & Endler, 1977) has served as the basis for many attempts to understand the behavior of human beings in general. Interactional psychology is an approach to the study of human behavior that emphasizes a continuous and multidirectional interaction between the characteristics of the person and their situation, which would include the context, the content, and process of the situation. It focuses on the complex activity by which a person selects, interprets, and changes situations (Terborg, 1981). Both individual characteristics and situational characteristics are joint determinants of change recipients' behaviors.

As it relates to the interactional psychology approach, in their review of organizational change literature, Armenakis and Bedeian (1999) found six issues that were common among change efforts. These included criterion issues focusing on outcomes commonly assessed and issues regarding change recipients' readiness to change based on the change message conveyed to them. Their review also included a typology of factors that determined readiness to change. The typology included: (a) content issues focusing on the substance of the change; (b) context issues focusing on forces internal and external to the organization; and (c) process issues focusing on how the change was implemented. Since that time, the typology has been expanded to include a fourth factor, individual differences (Herold et al., 2007; Holt et al., 2007a, 2007b). The four change-related factors of content, process, context, and individual differences have been acknowledged and examined independently (Armenakis & Harris, 2002; Bommer et al., 2005; Trade-Leigh, 2002; Judge et al., 1999), but few studies have attempted to assess multiple factors simultaneously, if only because such a study would be too large to publish (Herold et al., 2007; Holt et al., 2007a, 2007b; Self, Armenakis, & Schaninger, 2001; Wanberg & Banas, 2000).

Parallel within IS literature, efforts have been made to understand technology acceptance and utilization from an interactionalistic perspective as well. Despite numerous models that have examined antecedents, much remains to be learned about what factors determine beliefs and attitudes related to technology-related change. Researchers continue to examine potential antecedents of beliefs and attitudes (Agarwal, 2000; Aubert et al., 2008; Hong, Thong, & Tam, 2006; Venkatesh, Morris, Davis, & Davis, 2003). Most recently, the TAM3 model, an extension of the TAM, has included elements of context, content, process, and individual differences (Venkatesh & Bala, 2008). Within their study of the TAM, Venkatesh and Bala (2008) called for an effort to connect technology acceptance research to other bodies of literature through theory integration. Certainly a logical extension is organizational change literature. Given that technology acceptance and organizational change are interrelated, a logical next step in the research would be to examine how the two processes are interrelated by first examining areas in which the two areas have produced similar findings.

Theoretical Basis and Importance of the Study

The primary purposes in this dissertation include: (a) presenting a theoretical framework and a conceptual model for integrating concepts from organizational change and IS research literatures; (b) presenting a closer examination of beliefs within the model as a motivational process; and (c) placing those beliefs within a larger context of antecedents and consequences. While much of this dissertation involves testing an empirical application of the theoretical framework, the value within this dissertation is both the theoretical and practitioner-related implications.

The theoretical framework for this dissertation draws upon the theory of planned behavior, the change model (particularly the typology of content, process, context, and individual

differences, and the change recipients' beliefs scale), and the TAM, (particularly the perceived usefulness, perceived ease of use, and subjective norm constructs from the TAM).

This study is important to both organizational change research and technology acceptance research in that it begins the process of closing the gap between two disparate bodies of literature that are often both directed toward a similar outcome. From a theoretical perspective, since both the change model and the TAM rely on Ajzen's (1991) theory of planned behavior, the integration of variables makes intuitive sense and allows not only for the testing of relationships established within both models, but also new relationships between change-related variables not in the TAM and TAM variables not in the change model. Examination of those relationships, as well as examination of the overall construct domains of variables unique to each model may provide greater insight into concepts that need further exploration.

Given the high degree of failure involving change initiatives and ERP system-related technology acceptance, it is important to examine the two streams of research in combination within such a setting. Even when not in an ERP system implementation, organizations are often simultaneously conducting smaller IT implementations within change initiatives, and even small scale IT implementations represent organizational change initiatives in which change resistance may occur. By examining the role of beliefs and their determinants, as they relate to both change outcomes and technology acceptance, better implementation strategies may be developed. In addition, the relationships between change-related outcomes (i.e., affective and normative commitment to change) and technology acceptance (i.e., personal initiative related to using the technology) can also help change agents develop their priorities and expectations in terms of outcome goals.

Model of Readiness for Organizational Change (MROC)

The model of readiness for organizational change (MROC) was developed from the content, process, context, and individual differences typology developed by Armenakis et al., (1999) and Armenakis and Bedeian (1999). Given that it is the more well-known of the two models that are integrated, no description is offered and the model will be detailed in a later section.

Technology Acceptance Model

The technology acceptance model (TAM; Davis, 1989; Davis et al., 1989) continues to be the most widely applied theoretical model in the IS field (Lee, Kozar, & Larsen, 2003) for explaining user acceptance of IT (e.g., Hartwick & Barki, 1994; Igbaria et al., 1995; Mathieson, 1991; Taylor & Todd, 1995). Many empirical investigations have established strong empirical support for the TAM (Karahanna, Straub, & Chervany, 1999; Venkatesh & Brown, 2001; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003).

The TAM was derived from the theory of reasoned action (TRA; Fishbein & Ajzen, 1975) and its later modified form, the theory of planned behavior (TPB; Ajzen, 1991). It also includes elements of innovation diffusion theory (Rogers, 2003) and social cognitive theory (Compeau & Higgins, 1995). The TAM posits that user acceptance can be explained by two beliefs: perceived usefulness and perceived ease of use. Within the last two decades, the TAM has been tested, refined, and extended to better understand the intention to use technology. Nevertheless, the TAM has produced relatively low explanatory power in many cases (Zhang, 2005), which has been attributed to not taking into account many influential factors, especially potential moderating variables (Adams et al., 1992; Lucas & Spitler, 1999; Venkatesh et al., 2003; Zhang, 2005). Even though the TAM has many limitations, only a few studies have sought

to expand the TAM beyond simply testing slight differences in terms of relationships among well-accepted constructs (Lee et al., 2003).

The TAM2 was the first expansion of the TAM, adding some additional determinants of perceived usefulness and perceived ease of use (Venkatesh & Davis, 2000). The second expansion was the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003), which included variables from IT-related models outside the TAM, including the model of personal computer utilization (MPCU; Thompson, Higgins, & Howell, 1991) and the motivational model (Davis, Bagozzi, & Warshaw, 1992). The latest expansion of the TAM, the TAM3 (Venkatesh & Bala, 2008) focuses on pre-implementation and post-implementation differences among the relationships of previously tested variables. However, it does examine several context, process, content, and individual difference variables that have been tested one at a time within various TAM studies. The results of experiments and field studies have revealed numerous inconsistent relationships among the variables tested, which has led many researchers to question whether all the important constructs are being examined within the research, despite the expansion of the TAM (Lee et al., 2003; Legris et al., 2003; Zhang, 2005).

Integrating Organizational Change, IS Theory, and Motivation Theory

Whetten et al. (2009) noted that, within organizational studies, scholars have often adopted theory from other disciplines. In addition, scholars have also applied organizational theory within the discipline to phenomena for which they were not originally intended. The rationale is that theory borrowing can provide new perspectives, and that systematic application of a theory to the new phenomena can increase the explanatory power.

This dissertation's theory is based in organizational change and borrows from IS literature and motivation theory. The organizational change and IS literatures have provided similar models and have reached comparable conclusions that are examined herein. IS literature provides propositional theory, in other words, concepts from the IS literature provide insights into the change phenomenon.

Ruta (2005) was the first (to this author's knowledge) to recognize the need to integrate organizational change constructs, as defined by the Armenakis and Bedeian (1999) typology, into IT user acceptance models. He did this in order to drastically expand upon our knowledge of technology acceptance and use, as well as our knowledge of organizational change which specifically involves the application of new technologies. Ruta's (2005) qualitative study examined the implementation of an HR portal, one form of an ERP system, for Hewlett-Packard within its Italian subsidiary. A replication of Ruta's (2005) theoretical model is presented in Figure 1. He noted that

> Change management theory and the IT user acceptance model focus on overlapping dimensions of this model for implementing an HR portal. The IT user acceptance model focuses on "what" predicts intentions to use the HR portal, while change management theory focuses on "how" intentions to use the HR portal can be influenced and "how" cognitive phenomena are formed. Both theoretical streams view individual acceptance and use of the HR portal as the final outcome" (p. 37).

Figure 1

Replication of Ruta's (2005) Conceptual Structure
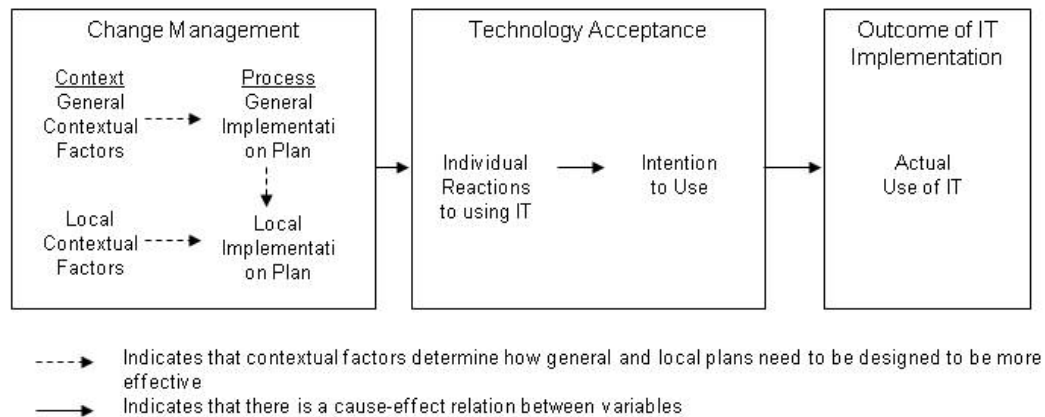
Study Context

This research was conducted in a large southeastern university that partnered with an ERP system manufacturer in implementing a complete suite of ERP solutions. The ERP system was specifically designed for higher education institutions and included portal, content management, performance reporting, and analytics within an administrative suite consisting of human resources, financial, financial aid, student advancement, and enrollment functions (Sungard, 2009). By the time implementation of the new ERP system began, more than 900 other institutions worldwide were using (or had used) the system to some extent.

Prior to implementing the new ERP system, a variety of functional legacy information systems (IS) existed throughout the university, with limited standardization of the data, which required some work in aggregating and consolidating university-wide reporting. A legacy system is an old IT system that is used simply because it still functions in meeting an organization's needs even though newer technology is available. This organizational context provided challenges in terms of adopting a single, integrated ERP system (Swartz & Orgill, 2001; Wagner & Newell, 2004). The new ERP system directly affected over 2,400 change recipients to some

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extent in terms of their job content, the method of performing various tasks, their access to information, and their role responsibilities. The change was substantial in its impact on change recipients, prompting many early retirements.

Overview of the Method

This dissertation follows a sequential mixed methods approach consisting of two studies, each one representing a different phase of the research. Study one consists of the preliminary qualitative investigation, and Study two consists of the quantitative research that followed once important areas on which to focus were determined. Brief descriptions are given here and detailed information is presented in the Method chapter.

This research follows a sequential mixed-method (or multimethods or triangulation) research design (Creswell, 2008; Creswell & Plano Clark, 2007; Creswell & Tashakkori, 2007; Sandelowski, 2003) for the purpose of gathering and analyzing data on change recipient perceptions and attitudes related to an organizational change involving the technology adoption of an ERP system. Several researchers advocate the use of multiple methods for the purpose of triangulating and validating the information discovered, noting that the combination of qualitative and quantitative data provides a better understanding of research problems than either approach alone can provide, especially when studying complex phenomena (Creswell, 2008; Onwuegbuzie, Johnson, Tashakkori & Teddlie, 2003). The use of multiple data collection approaches dates back to Campbell and Fiske's (1959) multitrait-multimethod matrix for use in psychological research, and many organizational studies since that time have employed mixed-methods approaches (e.g., Campbell & Martinko, 1998; Di Pofi, 2002; Edmondson, 1999; Jehn, 1995; Vitale, Armenakis, & Feild, 2008).

Study One

The qualitative study was conducted prior to the quantitative study. It consisted of responses to 16 semi-structured, open-ended questions by 68 individuals in combination with 37 in-person one-on-one interviews and 31 Web-based open-ended questionnaires. The questionnaire is included in Appendix A. Additionally, archival documents, observational data, conversational data, and data gathered from feedback sessions, were included in the analysis. Qualitative data were gathered and unitized. Qualitative themes were developed through content analysis, based on an understanding of the literature. Constructs of interest were chosen and relationships were hypothesized based on the literature. The specific research questions for the study are provided in Table 2:

Table 2
Research Questions for Study 1

R1	During the implementation of an ERP system, what are the primary concerns of change agents and change recipients?
R2	During the implementation of an ERP system, do the activities of change agents and change recipients involve both technology acceptance and organizational change processes?
R3	What linkages possibly exist between technology acceptance and organizational change processes?
R4	What types of influence and how much influence do the technological aspects have on the social aspects of an ERP system implementation?
R5	What particular constructs and relationships seem most critical and worthy of including in a quantitative study?

Study Two

The quantitative study followed the qualitative study and involved the collection of data from over 700 respondents answering over 200 items. The study served to test a model that combined elements from the organizational change and the technology acceptance literatures. The foundation of the model was the theory of planned behavior.

Data were collected anonymously via a Web-based survey. Scales developed for three

variables in the study were examined using exploratory factor analysis (EFA) in SPSS and

confirmatory factor analysis (CFA) in AMOS, among other procedures. Hypothesis testing

involved hierarchical regression and both mediation and moderated-mediation performed in

SPSS via macros (Preacher & Hayes, 2008). A summary of the hypotheses examined within this

dissertation are included in Table 3.

Table 3
Summary of Hypotheses

H1a-g	(*1a*) Discrepancy, (*1b*) appropriateness, (*1c*) change efficacy, (*1d*) principal support, (*1e*) personal valence, (*1f*) perceived ease of use, and (*1g*) perceived usefulness will be positively related to affective commitment to change.
H2a-g	(*2a*) Discrepancy, (*2b*) appropriateness, (*2c*) change efficacy, (*2d*) principal support, (*2e*) personal valence, (*2f*) perceived ease of use, and (*2g*) perceived usefulness will be positively related to technology acceptance.
H3a-g	(*3a*) Discrepancy, (*3b*) appropriateness, (*3c*) change efficacy, (*3d*) principal support, (*3e*) personal valence, (*3f*) perceived ease of use, and (*3g*) perceived usefulness will be positively related to personal initiative.
H4	The combination of organizational change recipient beliefs and TAM beliefs as one set of predictors will explain more variance in affective commitment to the change than organizational change recipient beliefs alone or TAM beliefs alone can explain.
H5	The combination of organizational change recipient beliefs and TAM beliefs as one set of predictors will explain more variance in technology acceptance than organizational change recipient beliefs alone or TAM beliefs alone can explain.
H6	The combination of organizational change recipient beliefs and TAM beliefs as one set of predictors will explain more variance in personal initiative than organizational change recipient beliefs alone or TAM beliefs alone can explain.
H7	The quality of the Finance subsystem will be indirectly associated with affective commitment to change through (7a) appropriateness, (7b) change efficacy, (7c) principal support, (7d) perceived ease of use, and (7e) perceived usefulness.

Table 3

Summary of Hypotheses, continued

H9	The quality of the Student subsystem will be indirectly associated with affective commitment to change through (9a) appropriateness, (9b) change efficacy, (9c) principal support, (9d) perceived ease of use, and (9e) perceived usefulness.
H10	The quality of the Finance subsystem will be indirectly associated with technology acceptance through (10a) appropriateness, (10b) change efficacy, (10c) principal support, (10d) perceived ease of use, and (10e) perceived usefulness.
H11	The quality of the HR subsystem will be indirectly associated with technology acceptance through (11a) appropriateness, (11b) change efficacy, (11c) principal support, (11d) perceived ease of use, and (11e) perceived usefulness.
H12	The quality of the Student subsystem will be indirectly associated with technology acceptance through (12a) appropriateness, (12b) change efficacy, (12c) principal support, (12d) perceived ease of use, and (12e) perceived usefulness.
H13	The quality of the Finance subsystem will be indirectly associated with personal initiative through (13a) appropriateness, (13b) change efficacy, (13c) principal support, (13d) perceived ease of use, and (13e) perceived usefulness.
H14	The quality of the HR subsystem will be indirectly associated with personal initiative through (14a) appropriateness, (14b) change efficacy, (14c) principal support, (14d) perceived ease of use, and (14e) perceived usefulness.
H15	The quality of the Student subsystem will be indirectly associated with personal initiative through (15a) appropriateness, (15b) change efficacy, (15c) principal support, (15d) perceived ease of use, and (15e) perceived usefulness.
H16	Training will be indirectly positively associated with affective commitment to change through (16a) appropriateness, (16b) change efficacy, (16c) principal support, (16d) perceived ease of use, and (16e) perceived usefulness.
H17	Training will be indirectly positively associated with technology acceptance through (17a) appropriateness, (17b) change efficacy, (17c) principal support, (17d) perceived ease of use, and (17e) perceived usefulness.
H18	Training will be indirectly positively associated with personal initiative through (18a) appropriateness, (18b) change efficacy, (18c) principal support, (18d) perceived ease of use, and (18e) perceived usefulness.

Table 3

Summary of Hypotheses, continued

H19	Leader-member exchange will moderate the indirect effects of Finance subsystem on affective commitment through (19a) appropriateness, (19b) change efficacy, (19c) principal support, (19d) perceived ease of use, and (19e) perceived usefulness.
H20	Leader-member exchange will moderate the indirect effects of HR subsystem on affective commitment through (20a) appropriateness, (20b) change efficacy, (20c) principal support, (20d) perceived ease of use, and (20e) perceived usefulness.
H22	Leader-member exchange will moderate the indirect effects of Finance subsystem on technology acceptance through (22a) appropriateness, (22b) change efficacy, (22c) principal support, (22d) perceived ease of use, and (22e) perceived usefulness.
H21	Leader-member exchange will moderate the indirect effects of Student subsystem on affective commitment through (21a) appropriateness, (21b) change efficacy, (21c) principal support, (21d) perceived ease of use, and (21e) perceived usefulness.
H23	Leader-member exchange will moderate the indirect effects of Finance subsystem on technology acceptance through (23a) appropriateness, (23b) change efficacy, (23c) principal support, (23d) perceived ease of use, and (23e) perceived usefulness.
H24	Leader-member exchange will moderate the indirect effects of Finance subsystem on technology acceptance through (24a) appropriateness, (24b) change efficacy, (24c) principal support, (24d) perceived ease of use, and (24e) perceived usefulness.
H25	Leader-member exchange will moderate the indirect effects of ERP subsystem on personal initiative through (25a) appropriateness, (25b) change efficacy, (25c) principal support, (25d) perceived ease of use, and (25e) perceived usefulness.
H26	Leader-member exchange will moderate the indirect effects of ERP subsystem on personal initiative through (26a) appropriateness, (26b) change efficacy, (26c) principal support, (26d) perceived ease of use, and (6e) perceived usefulness.
H27	Leader-member exchange will moderate the indirect effects of ERP subsystem on personal initiative through (27a) appropriateness, (27b) change efficacy, (27c) principal support, (27d) perceived ease of use, and (27e) perceived usefulness.
H28	Leader-member exchange will moderate the indirect effects of training on affective commitment through (28a) appropriateness, (28b) change efficacy, (28c) principal support, (28d) perceived ease of use, and (28e) perceived usefulness.

Table 3

Summary of Hypotheses, continued

H29	Leader-member exchange will moderate the indirect effects of training on technology acceptance through (29a) appropriateness, (29b) change efficacy, (29c) principal support, (29d) perceived ease of use, and (29e) perceived usefulness.
H30	Leader-member exchange will moderate the indirect effects of training on personal initiative through (30a) appropriateness, (30b) change efficacy, (30c) principal support, (30d) perceived ease of use, and (30e) perceived usefulness.
H31	Core self-evaluation will moderate the indirect effects of Finance subsystem on affective commitment to the change through (31a) change efficacy and (31b) perceived ease of use.
H32	Core self-evaluation will moderate the indirect effects of Finance subsystem on affective commitment to the change through (32a) change efficacy and (32b) perceived ease of use.
H33	Core self-evaluation will moderate the indirect effects of Finance subsystem on affective commitment to the change through (33a) change efficacy and (33b) perceived ease of use.
H34	Core self-evaluation will moderate the indirect effects of HR subsystem on technology acceptance through (34a) change efficacy and (34b) perceived ease of use.
H35	Core self-evaluation will moderate the indirect effects of HR subsystem on technology acceptance through (35a) change efficacy and (35b) perceived ease of use.
H36	Core self-evaluation will moderate the indirect effects of HR subsystem on technology acceptance through (36a) change efficacy and (36b) perceived ease of use.
H37	Core self-evaluation will moderate the indirect effects of Student subsystem on personal initiative through (37a) change efficacy and (37b) perceived ease of use.
H38	Core self-evaluation will moderate the indirect effects of Student subsystem on personal initiative through (38a) change efficacy and (38b) perceived ease of use.
H39	Core self-evaluation will moderate the indirect effects of Student subsystem on personal initiative through (39a) change efficacy and (39b) perceived ease of use.
H40	Core self-evaluation will moderate the indirect effects of training on affective commitment to the change through (40a) change efficacy and (40b) perceived ease of use.
H41	Core self-evaluation will moderate the indirect effects of training on technology acceptance through (41a) change efficacy and (41b) perceived ease of use.
H42	Core self-evaluation will moderate the indirect effects of training on personal initiative through (42a) change efficacy and (42b) perceived ease of use.

CHAPTER 2

LITERATURE REVIEW AND HYPOTHESES

This chapter reviews the literatures relevant to the development of a proposed model of technological change and provides details to support hypotheses that are offered.

Theoretical Overview

The Theory of Planned Behavior

The theory of planned behavior (TPB; Ajzen, 1991), which developed out of the theory of reasoned action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), provides the foundation of the model of readiness for organizational change (MROC) and the technology acceptance model (TAM) which are integrated in this dissertation.

The theory of planned behavior (TPB; Ajzen, 1991) added the concept of perceived behavioral control as a new antecedent to intentions and behavior to help explain behaviors that are not entirely volitional. Perceived behavioral control is defined as "the person's belief as to how easy or difficult performance of the behavior is likely to be" (Ajzen & Madden, 1986, p. 457). In many ways, it is very similar to Bandura's (1977, 1982) concept of self-efficacy, which individuals' confidence in their ability to perform a particular behavior. In fact, Ajzen's (1991) conceptualization is based on research concerning self-efficacy (Bandura, Adams, & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980). In addition, the definition of action includes actions that are subject to interference by internal and external forces.

Figure 2

The Theory of Planned Behavior (Ajzen, 1991, p. 182)
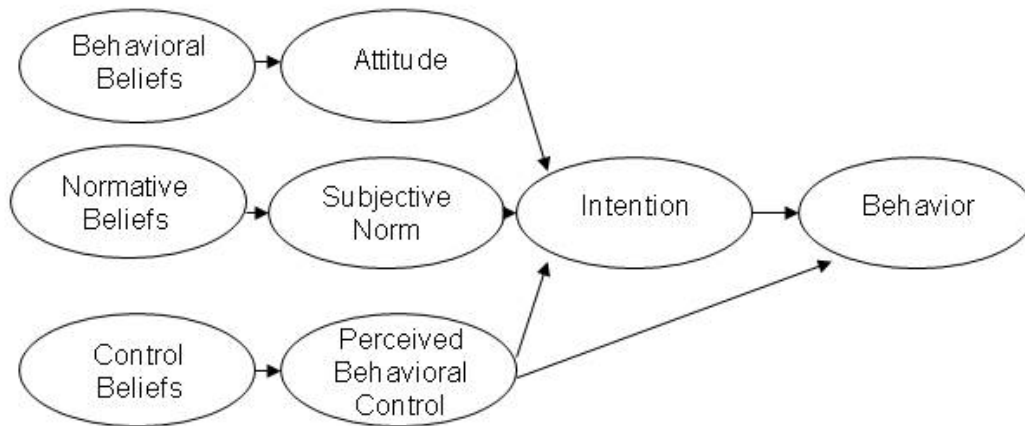
The performance of a behavior is the joint function of intentions and perceived

behavioral control. Whenever the opportunity to perform a behavior exists with total volition,

intentions alone should be sufficient to predict the behavior, as specified in the theory of

reasoned action. However, perceived behavioral control is believed to become increasingly

important as a predictor as volitional control over the behavior declines. Intentions and perceived

behavioral control can contribute significantly to the prediction of behavior when full volition is

not possible. In such cases, both are not necessarily equal, and either intentions or perceived

behavioral control may be more important than the other (Ajzen, 1991).

In addition, three different kinds of salient beliefs are distinguished in the literature as

having an influence on attitudes, subjective norm, and perceived behavioral control (Ajzen,

1991). These beliefs are: (a) behavioral beliefs that influence attitudes toward the behavior, (b)

normative beliefs that constitute the underlying determinants of subjective norms, and (c) control

beliefs that provide the basis for perceived behavioral control.

The TPB has been used successfully for prediction purposes in a broad range of research

areas (cf. Armitage & Conner, 2001), including the use of structured interview techniques for

selection purposes (e.g., van der Zee, Bakker, & Bakker, 2002), the prediction of managers'

personal motivation to improve their own skills after receiving feedback (e.g., Maurer & Palmer,

1999), readiness for organizational change (e.g., Jimmieson et al., 2008), technology adoption

(e.g., Rei, Lang, & Welker, 2002), intent toward participating in an employee involvement

program (e.g., Dawkins & Frass, 2005), and the extent of efforts managers are willing to go to in

benchmarking (e.g., Hill, Mann, & Wearing, 1996).

The Model of Readiness for Organizational Change (MROC)

Piderit (2000) suggested that research on reactions to organizational change could benefit

by distinguishing between affect, cognitions, and behaviors. In addition, it has been noted that

resistance to change has both attitudinal and behavioral components, and that attitudes

supporting the psychological rejection of a proposed change precede unsupportive behaviors

(Chawla & Kelloway, 2004). The TPB also serves as the theoretical framework for better

understanding the antecedents of employees' intentions to behaviorally support an organizational

change event. This model was developed to better understand change recipients' responses to

change.

The MROC was developed by Holt et al. (2007a) from the findings regarding change

recipients' readiness for change and typology of change antecedents reported in the Armenakis

and Bedeian (1999) literature review. The MROC was produced after the content analysis of 32

change readiness instruments (Holt et al., 2007b) revealed that items contained within the

instruments fit within the domains of each of the four types of antecedents. The four types of

antecedents include: (1) content, representing *what* is being changed; (2) process, representing

how it is being changed; (3) context, representing the *circumstances* within which the change is

taking place, and (4) individual differences, representing *whom* it is that is being changed.

The MROC suggests that (intended and unintended) behavioral outcomes are due to intentions (and reactions) concerning those behaviors. Researchers have previously argued that a positive and favorable view toward organizational change, based on the extent to which employees believe that a change is likely to contain positive and beneficial implications for themselves and the wider organization will lead to better reactions to change (Armenakis et al., 1993; Miller et al., 1994). In turn, these intentions and reactions are linked with the attitude called readiness for change, which has been defined in numerous ways (cf. Holt et al., 2007b). This attitude is, in turn, believed to be due to various change-related beliefs.

Several attempts have been made to define change recipients' beliefs (Armenakis et al., 2007; Holt et al., 2007a, 2007b). In addition, these change recipients' beliefs are related to various antecedents that fit within the aforementioned typology. Subjective norms play a crucial role. The proposition that subjective norms help predict intentions relating to supporting organizational change comes from the idea that social influence will create pressure among employees that directs them to act in support of the change. Researchers have suggested that practitioners should capitalize on the social networks in organizations as a tool for creating power bases and alliances that can influence and inform one another about a change in order to generate support and create shared meaning during times of change (Greiner & Schein, 1988; Tenkasi & Chesmore, 2003).

Because of the importance placed on content, process, context, and individual difference constructs within this dissertation, each of the four types of antecedents will be discussed in greater detail in separate sections to follow. It is worth noting, however, that perceived behavioral control is included within the MROC as change recipients' appraisals of those antecedents. The extent to which employees believe that various resources and demands can

either facilitate or hinder their ability to act in support of a change represents perceived behavioral control. In many respects, this relates to sensemaking (Balogun & Johnson, 2004; Bartunek, Rousseau, Rudolph, & Depalma, 2006; Hornung & Rousseau, 2007; Lüscher & Lewis, 2008; Weick & Quinn, 1999). The results of several studies suggest that perceptions (or appraisals) of behavioral control (particularly the assessment of resources), are influential in helping employees to cope and make adjustments during times of organizational change (e.g., Terry & Jimmieson, 2003; Sutton & Kahn, 1986).

As with the TAM, readiness for change as an attitude, is not included within the MROC, and the beliefs that are considered to be the most salient to the attitude are directly linked in the model to intentions and reactions. These intentions and reactions take the form of various cognitive assessments of one's own willingness to act or not act in carrying out a particular behavior. Commitment to the change, engagement, and stress represent different types of intentions that are, in turn, postulated to be determinants of behaviors.

This theoretical framework, or a similar framework based on the TPB, has been used to various extents within several recent studies (Brown, Armenakis, Harris, & Gresch, 2008a; Brown, Armenakis, Gresch, & Harris, 2008b; Herold et al., 2007; Herold et al., 2008; Holt et al., 2007a, 2007b; Jimmieson et al., 2008; Oreg, 2006; Self, Armenakis, & Schraeder, 2007). Within these studies, general support was found for the validity of the application of the TPB to the study of change constructs. In sum, the TPB offers a comprehensive yet comparatively parsimonious framework for the MROC. The MROC is presented in Figure 3 below.

Figure 3

The Model of Readiness for Change (MROC; Holt et al., 2007a)
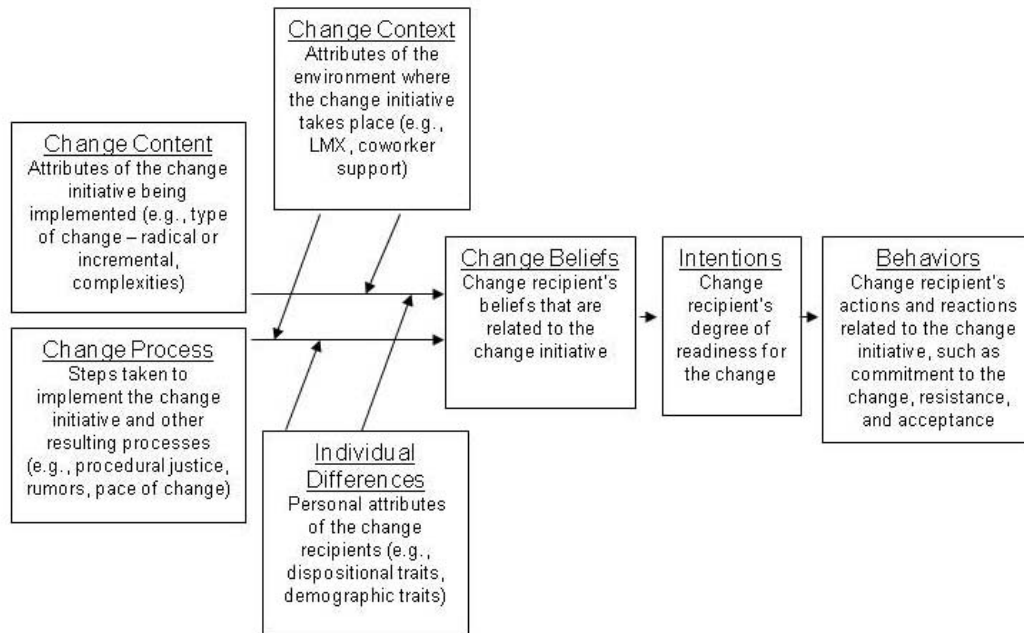
A more complex variation on the integrated MROC presented by Holt and colleagues (2007b), and included in Figure 4, points out that not only do relationships exist between antecedents and change recipients' beliefs, but also among the various antecedents. One example might be how participation as a change-related strategy and organizational networks as an attribute of the internal context could influence change-related training. Training might be easier if participation by change recipients was used as a strategy in choosing and developing the specifics of the change initiative. In addition, if the organization contains many strong network connections, information may spread more quickly, thus making training more effective through informal support. The sheer magnitude and variety of relationships among antecedents presents an important direction for future research, but, because of the complexity involved, testing this model is beyond the scope of this dissertation.

Figure 4

Variation on the Model of Readiness for Change (MROC; Holt et al., 2007b)
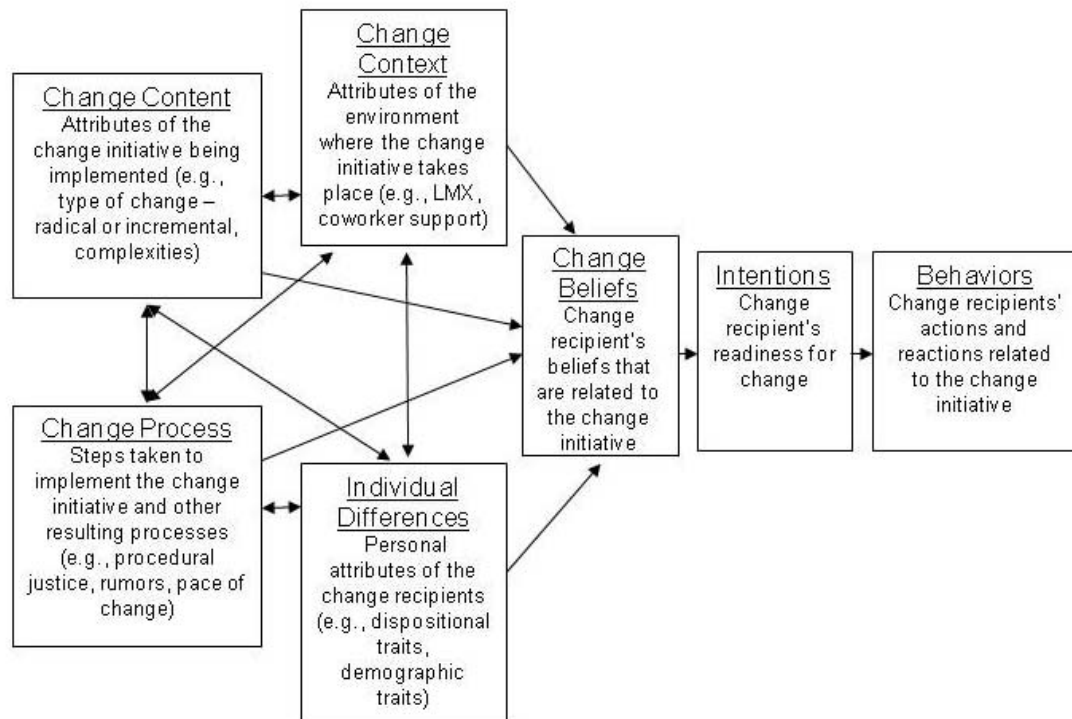
Technology Acceptance Model (TAM)

The study of people's reactions to computing technology has been an important topic in IS research since the 1980s. The theoretical foundation for the study of whether a person is willing to use a technology comes from research on adoption and diffusion (Moore & Benbasat, 1991; Rogers, 2003). Research in this area has continued to develop over the decades producing other theories, including the technology acceptance model (e.g., Davis et al.1989; Venkatesh & Davis, 1996), the theory of planned behavior (e.g., Mathieson 1991; Taylor & Todd, 1995), and social cognitive theory (e.g., Compeau & Higgins, 1995; Hill et al. 1986, 1987). In an effort to better understand how individuals make decisions regarding new technology, studies based on these theories have examined variables related to individuals' beliefs and intentions regarding the acceptance and continued use of new IT (Bhattacherjee, 2001). Researchers have studied

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different aspects of the phenomenon and have produced insights into the cognitive, affective, and behavioral reactions of individuals to technology and into the factors which influence these reactions. No theoretical framework has been more successful at this than the TAM (Davis et al., 1989).

The stated purpose of the TAM is to "provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis et al., 1989, p. 985). It assumes rationality within the decision-making process. Many studies have provided empirical support for the TAM (Agarwal & Karahanna, 2000; Chau, 1996; Davis et al., 1989; Davis, 1989; Gefen, 2003; Gefen & Straub, 1997; Gefen, Karahanna,& Straub, 2003; Hendrickson, Glorfeld, & Cronan, 1994; Hubona & Cheney, 1994; Karahanna et al., 1999; Karahanna, Agarwal, & Angst, 2006; Lederer, Maupin, Sena, & Zhuang, 2000; Lu, Yu, Liu, & Yao, 2003; Pavlou, 2003;Segars & Grover, 1994; Venkatesh & Brown, 2001; Venkatesh & Davis, 1996, 2000; Venkatesh, Morris, Davis, & Davis, 2003, 2007; Wang, Wang, Lin, & Tang, 2003). The TAM also compares favorably with other technology acceptance theories (Mathieson, 1991; Taylor & Todd, 1995) and consistently explains about 40% of the variance in individuals' intentions to use an IT and actual usage. As such, the TAM is said to be the most influential technology acceptance theory and model (Saga & Zmud, 1994). As of June 2009, Google Scholars listed the number of citations for the two journal articles that introduced TAM (Davis, 1989; Davis et al., 1989) at 8,217.

The TAM proposes that the use of technology is motivated by an individual's attitude toward using the technology, which is a function of their beliefs about using the technology and an evaluation of the value of actually using it. This is based on ''the cost-benefit paradigm from

behavioral decision theory'' (Davis, 1989, p. 321), which posits that human behavior is based on a person's cognitive tradeoff between the effort required to perform an action and the consequences of the action (Jarvenpaa, 1989). Therefore, the TAM asserts that a person will use a technology if the benefits of doing so outweigh the effort required to use it (Davis, 1989).

Among the behaviors commonly measured are: system usage (Igbaria, Zinatelli, Cragg, & Cavaye, 1997; Venkatesh, 1999), and user satisfaction (Bhattacherjee, 2001; Igbaria, 1990). Some researchers have studied both of these dimensions as a composite (Gelderman, 1998; Kim, Suh, & Lee, 1998). User satisfaction actually represents a cognitive and affective outcome that is less tangible in terms of classification as a behavior. Al-Gahtani and King (1999) pointed out that system usage is a more precise measure of IT acceptance.

The behavior of actually using a technology is determined directly by the intention to use it, because people, in general, behave as they intend to, so long as they have control over their actions. The behavioral intentions to use technology, in turn, are determined by attitudes toward using the system. Following the logic of the TRA framework, users' attitudes are determined by beliefs about the system and about the consequences of using it.

The TAM adopts the TRA's concept of beliefs in the form of two variables: perceived ease of use and perceived usefulness (Igbaria et al., 1995a). These two beliefs are considered major determinants of IT usage. Davis (1989, p. 320) defined perceived ease of use as "the degree of which a person believes that using a particular system would be free of effort," and perceived usefulness as "the degree of which a person believes that using a particular system would enhance his/her job performance." The TAM suggests that PEOU and PERUSE predict the behavior of actual system usage through the mediating variables of attitude and intention, (which are sometimes not directly measured when operationalizing the TAM).

A common operationalization of the TAM is presented in Figure 5 (Igbaria et al., 1995a).

Figure 5
Basic Technology Acceptance Model (Davis et al., 1989)
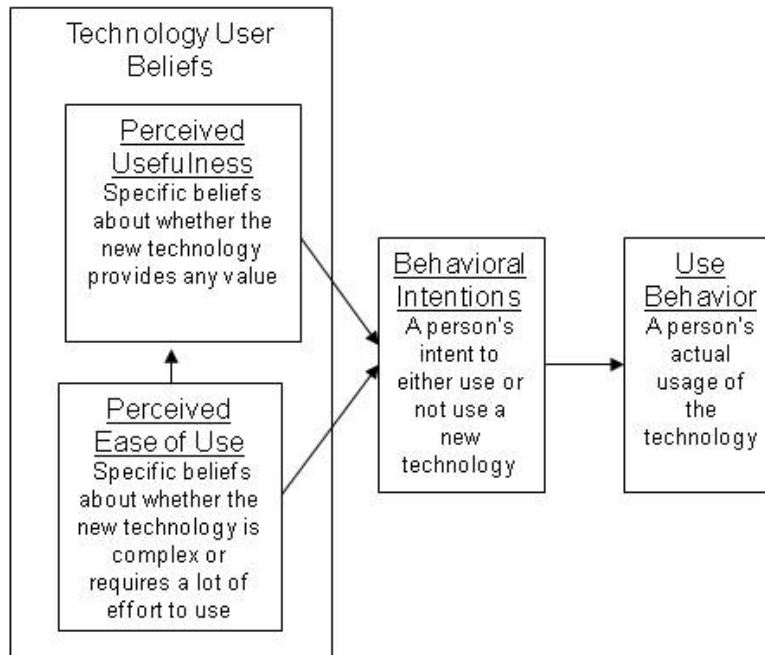
The TAM was directly compared with the TPB by Mathieson (1991). He found that both

models were strong in explaining technology user intentions, though the TAM explained slightly

more variance in user intentions within a laboratory setting. Mathieson (1991) argued that the

TPB could be more useful in developing a better understanding of why users were more or less

inclined to use a technology. Despite the many advantages of the TAM, it has been noted that,

when compared to the TPB, the TAM "only supplies general information on users' opinions

about a system" (Mathieson, 1991, p. 173). Various studies on IT implementation found that

certain controllable factors that were part of the implementation process or the environment

influenced technology acceptance yet they are completely ignored as determinants of either

technology user beliefs or as direct influences on intentions (DeLone, 1988; Igbaria, Zinatelli,

Cragg, & Cavaye, 1997; Montazemi, 1988; Szajna, 1996).

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In furtherance of this deficit within the TAM, a detailed version of the TPB, called the decomposed theory of planned behavior, was tested (Taylor & Todd, 1995). This new application of the TPB detailed specific predictors of attitude, subjective norms, and perceived behavioral control. It suggested that attitude and subjective norms mediated behavioral intentions' relationships with perceived usefulness and ease of use (Taylor & Todd, 1995). This model increased the variance explained and also provided a greater explanation of how managers might play a role in influencing organizational members through subjective norms relating to the adoption of the new technology.

Few systematic efforts traced the development of the TAM or evaluated the whole body of findings, limitations, and future research opportunities, though there were calls for it in the research (cf. Gefen & Straub, 2000; Legris et al., 2003). As such, an evaluation was needed in order to integrate the TAM's past research findings, identify possible research topics, and conduct future studies. This led to the development of the present incarnation of the TAM, the TAM3 (Venkatesh & Bala, 2008).

Venkatesh and Bala (2008) provided an integrated model that represented a comprehensive nomological network of the determinants of individual level IT adoption and use. They empirically tested their model and produced a number of significant findings. They advocated that researchers in the future should focus on implementation, particularly examining potential constructs and relationships in both pre-implementation and post-implementation phases in order for management to make better decisions concerning its implementation strategies. It was noted that few research studies have investigated the role that managerial interventions (or change process) play in influencing IT adoption and use. The purpose was to understand users' beliefs better in order to design more effective organizational interventions that

could increase user acceptance and use of new IT systems. They also noted that, for the TAM to continue to evolve, more research effort should be focused on examining similar research in other fields (Venkatesh & Bala, 2008).

Interestingly, Venkatesh and Bala (2008) developed four categories of antecedents of technology user beliefs. They labeled these categories as individual differences, system characteristics, social influence, and facilitating conditions. Notably, these four categories largely correspond to the typology of the antecedents of change recipient beliefs within the MROC (cf. Holt et al., 2007a). Individual differences, as a category, are identical within both models. System characteristics represent a category very similar to the MROC category of content, though content might also include other factors (i.e., the type of change – radical or incremental, the degree of volition in choosing to participate). Social influence and facilitating conditions are categories that tie in with the change model categories of process and context. Change process can include elements of social influence (managerial pressure directed toward the change, encouragement, feedback sessions, etc.) as well as facilitating conditions (technical support, help desks, training, etc.). Likewise, change context can have social influence (LMX, coworker support) as well as facilitating conditions (a learning organizational culture, transparency, helpful management practices).

Figure 6

Theoretical Framework for the Technology Acceptance Model III (TAM3; Venkatesh & Bala, 2008)
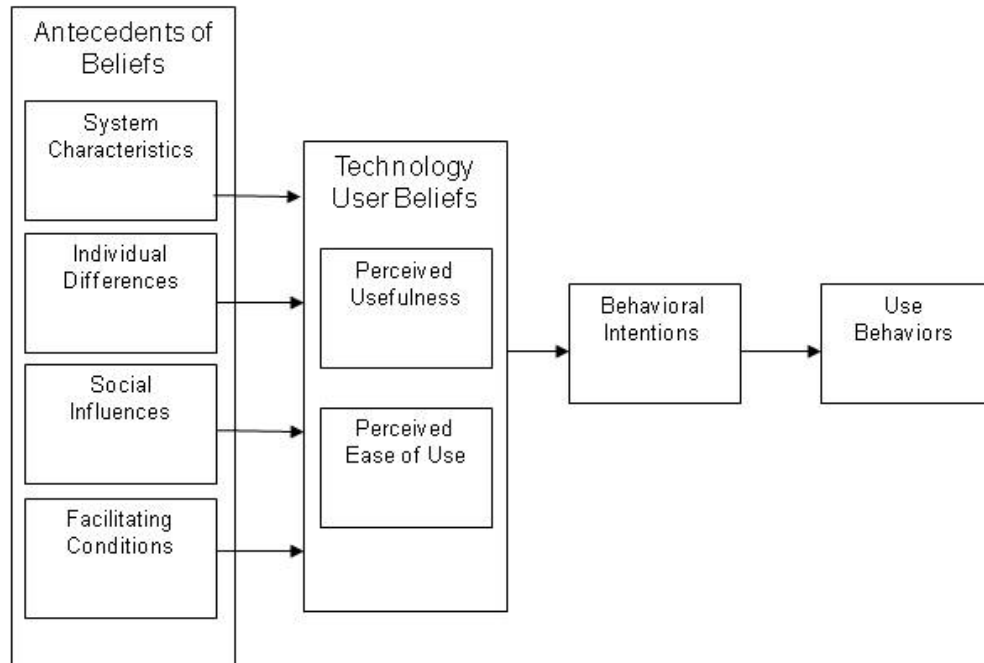
Complaints Concerning Further Development of the TAM

Lee et al. (2003) conducted a meta-analysis of the TAM and found that one of the major problems with TAM research was that scholars were performing replication studies that provide very little incremental advancement to the literature. Researchers were not really expanding the TAM. Lee et al. noted that many scholars felt that the concept of a "cumulative tradition" was carried too far in all the repetitious studies of the TAM, because the model had become an inhibitor of more advanced theories of IS use.

Despite the limitations of the TAM, however, Lee et al. (2003) asked "Are there areas of TAM that need more exploration?" (p. 766). The responses focused on several areas of expansion, (including some that remain unexplored within the change literature). Suggestions for future research included developing a greater understanding of factors contributing to perceived

ease of use and perceived usefulness was needed. Further examination was also suggested in the area of developing an understanding of content and context variables as determinants of beliefs, particularly, an examination of different IS and work environments. Multi-user systems and team-level IS research was called for as well. More research on emotion, habit, dispositional difference, and societal acceptance technology change was noted as being underdeveloped, along with a lack of examination regarding the differences between mandatory and voluntary change settings. More detailed examination of social factors was especially crucial, particularly since many social factors that might impact IT acceptance were positioned outside the TAM's boundaries (Agarwal, 2000). Aside from suggestions by Lee et al. (2003), Aubert, Michel, and Roy (2008) noted more research was also needed on managerial interventions (change process activities), such as user training (Bostrom, Olfman, & Sein, 1990), participation, and end-user involvement (Barki et al., 2001).

The Model of Technological Change (MTC)

For this dissertation, the MROC presented by Holt and colleagues (Holt et al., 2007a) was combined with components of the TAM 3 (Venkatesh & Bala, 2008), the third iteration of the TAM (Davis et al., 1989). The model produced is called the *model of technological change* (MTC). It specifies potential relationships among variables from both the TAM and the model of organizational change. For the theoretical model, the MROC serves as the template and technology acceptance variables are included into the model. The proposed MTC theoretical model is provided in Figure 7.

Figure 7
The Proposed Theoretical Framework for the Model of Technological Change (MTC)
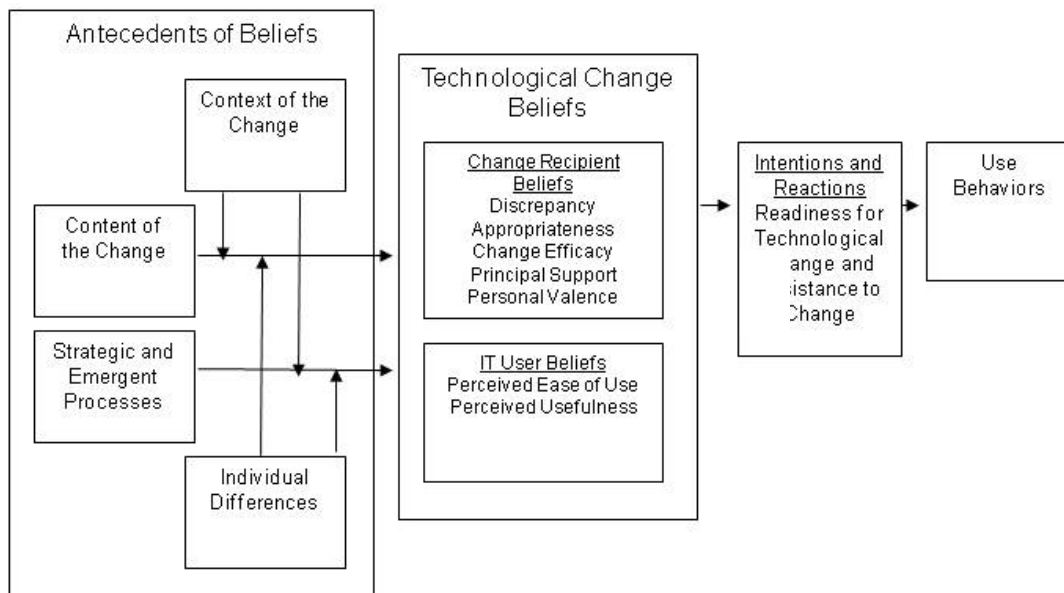
The change-related beliefs chosen for this dissertation consist of the five interrelated beliefs referred to as the *organizational change recipients' beliefs* (OCRBs). The five beliefs include: *discrepancy*, "is a change needed"; *appropriateness*, "is this the right change"; *efficacy*, collectively and individually, "is it possible for this change to succeed"; *principal support*, "has everyone bought into making the change happen"; and *valence*, "what is in it for me" (Armenakis et al., 1999). These five beliefs are not detailed in this section since each one is focused on in greater detail in the sections that follow within this literature review. In addition to the five change-related beliefs, the two primary beliefs that form the linchpin of the TAM, perceived ease of use and perceived usefulness, are also included. It is proposed that these seven beliefs are the result of sensemaking as it concerns any number of antecedents that could be related to the organizational change involving technology.

More specific details regarding constructs within this theoretical model are offered in the sections to follow within the remaining literature review. However, the more parsimonious

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research model that is tested in this dissertation is offered in Figure 8. It includes specific

variables and hypothesized relationships.

Figure 8
Tested MTC for this Dissertation
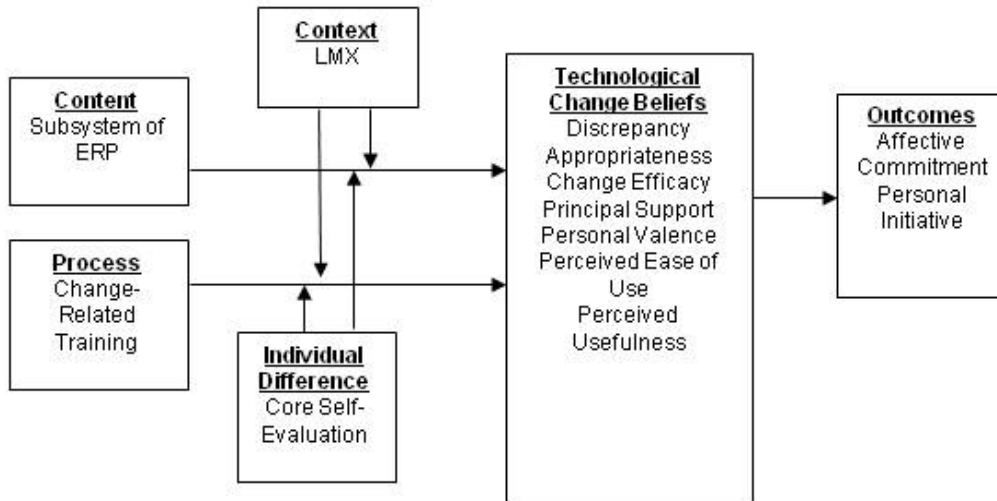
Temporal Dimensions of the Model of Technological Change

The MTC presented within this dissertation addresses the change readiness and adoption

stages of a change initiative, as it is defined by Armenakis and colleagues (1999). These two

stages align with Lewin's (1951) theory, being change readiness (unfreezing) and adoption

(moving). Maintaining change readiness throughout these two phases, as well as the third phase,

institutionalization (freezing), is crucial (Armenakis et al., 1999).

Similarly, the MTC also addresses the pre-implementation phase and early post-

implementation phase as they are conceptualized within the TAM3 model. The implementation

of new IT is categorized as pre-implementation and post-implementation interventions

(Venkatesh & Bala, 2008), based on the stage models presented by Cooper and Zmud (1990) and

Saga and Zmud (1994). The pre-implementation phase is characterized by everything leading to

making the system a day-to-day routine. This phase includes initiation (getting change recipients

accustomed to the idea), organizational adoption (making the change), and adaptation (working out any issues in getting the IT system to function). The post-implementation phase entails everything that follows the actual deployment of the system, including user acceptance (getting change recipients to use the IT system), routinization (getting change recipients to turn use into a habit), and infusion (the evaluation of the IT system as no longer new; Cooper & Zmud, 1990). The MTC addresses the change readiness and adoption phases, as well as the pre-implementation phase and user acceptance stage of the post-implementation phase.

<div align="center">Technological Change-Related Outcomes</div>

Organizational change often results in modified work roles and altered performance goals that go beyond existing duties and responsibilities (Hornung & Rousseau, 2007). Within such situations, change agents depend on employees to rise and meet such challenges. When people are faced with organizational change, they respond not just on a behavioral level, but also on cognitive and affective levels (Ashkanasy, Hartel, & Daus, 2002; Mossholder et al., 2000; Smollan, 2006). Behavioral responses are often the results of cognitive and emotional actions and reactions. These cognitive and emotional actions and reactions are framed as intentions within the TPB, TAM, MROC, and MTC.

Numerous behavioral outcomes related to change readiness have been examined within the change literature, including absenteeism and turnover (Mack et al., 1998; McManus et al., 1995). Studies have also examined affective outcomes related to change readiness, such as organizational commitment, job satisfaction and psychological well-being (Eby et al., 2000; Terry et al., 1996). The focus within the technology acceptance literature has been primarily on actual use of the technology (Davis et al., 1989; Teo, Lim, & Lai, 1999) and job satisfaction related to the technological change (Bhattacherjee, 2001). Other performance-related outcomes

have also been examined within IS studies that have focused on efficiency and effectiveness of IT usage (Compeau, Higgins, & Huff, 1999). Despite the examination of specific outcomes, the relationships between, and processes that link, initial sensemaking of a change event to many of these change-related outcomes remain underdeveloped in the organizational change literature (Martin, Jones, & Callan, 2005; Pettigrew et al., 2001).

This dissertation specifically examines technology continuance, affective commitment to organizational change, and personal initiative as outcome variables. A vast array of other potential outcomes could have been chosen. Continuance was chosen because it represents the core attitudinal outcome of the TAM. Affective commitment to the change was chosen because it is an emotion-related attitude. Personal initiative was chosen because it represents a behavioral outcome that represents one type of action that change recipients can demonstrate in support of a technological change.

Technology Acceptance, Adoption, and Continuance

Technology acceptance (trial usage), adoption (used to accomplish tasks, testing the qualities of the technology over time), and continuance (adoption until better technology is available) have been the major focus of IS research for more than two decades (Premkumar & Bhattacherjee, 2008) because they have been demonstrated to be key drivers in organizational performance (Devaraj & Kohli, 2003).

The distinction between acceptance and continuance is made because it is important to understand that the two concepts represent different outcomes and constructs even though often discussed as a single outcome (Karahanna et al., 1999). Technology acceptance is a critical, immediate outcome. Technology acceptance is necessary but not sufficient for an organizational change involving technology to succeed. However, technology acceptance represents only the

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first phase of the actual change process. Technology adoption and continuance are truly the outcomes sought by the change process.

Research concerning technology acceptance and adoption has been informed primarily by the TAM (Davis, Bagozzi, & Warshaw, 1989). However, the TAM, while proposed as a model of technology acceptance and adoption, has been used to examine continued usage (Karahanna et al., 1999; Venkatesh & Brown, 2001; Venkatesh & Davis, 2000). Technology continuance has been informed by the expectation-disconfirmation theory (EDT), which proposes that users of technology constantly make judgments as to whether to continue to use it based on their own experiences and the opinions of others (Oliver, 1980). Continuance has been explained with concepts such as *implementation* (Zmud 1982), *incorporation* (Kwon & Zmud, 1987), and *routinization* (Cooper & Zmud, 1990). These studies focus on technology usage reaching a point that transcends conscious behavior, becoming part of a person's routine activities (Bhattacherjee, 2001). Innovation diffusion theory, in its five-stage adoption decision process (consisting of *knowledge, persuasion, decision, implementation*, and *confirmation* phases), proposes that individuals re-evaluate their acceptance decisions during the *confirmation* phase and decide whether to continue to use the technology (Rogers, 2003). All of these theoretical perspectives, however, view continuance as an extension of acceptance behaviors, which would mean the same influencing factors apply to both acceptance and continuance (Bhattacherjee, 2001; Davis et al. 1989; Karahanna et al., 1999). However, this position makes it difficult to explain why some users discontinue the use of technology even though they initially accepted it; this has been called the "acceptance-discontinuance anomaly" (Bhattacherjee, 2001).

The concepts of acceptance, adoption, and continuance can add great value to organizational change research. Very little research has been done within the change literature to

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address this technology acceptance as an aspect of change process. For example, the application of new work practices and procedures that are part of change content might also be viewed as a process spanning initial experimentation, adaptation of one's regular work routine, and continued performance. IS-based theories might be able to provide fresh insight into understanding how the content of change initiatives is received and acted upon by change recipients over the course of time.

Commitment to Organizational Change

Commitment to organizational change originated from the organizational commitment literature (Meyer & Allen, 1997; Meyer & Herscovitch, 2001). Herscovitch and Meyer (2002) defined *commitment to organizational change* as a "force (mind-set) that binds an individual to a course of action deemed necessary for the successful implementation of a change initiative" (p. 475). In alignment with their previous model of workplace commitment, they conceptualized commitment to organizational change as multidimensional. It consists of: (a) *affective commitment to organizational change*, reflecting support for a change initiative based on feelings and beliefs concerning the value of the change; (b) *continuance commitment to organizational change*, reflecting perceptions of the costs associated with failure to support the change, such as loss of position, authority, pay, or job; and (b) *normative commitment to change*, reflecting a sense of duty to support the change (Herscovitch & Meyer, 2002).

Examination of commitment to a change as a construct has revealed it to be conceptually and empirically distinct from organizational commitment (Fedor et al, 2006; Ford et al., 2003; Herscovitch & Meyer, 2002) and to be a better predictor of support for change (Ford et al., 2003; Herscovitch & Meyer, 2002). Similarly, Ford et al. (2003) found commitment to a significant

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change (labeled "strategy change" in their research) to be conceptually and empirically distinct from organizational commitment.

Organizational change and development literatures note that employee commitment to a change plays a vital role in the success of a change initiative (Fedor, Caldwell, & Herold, 2006; Fedor et al, 2006; Ford et al., 2003; Herscovitch & Meyer, 2002). Highly committed change recipients are more likely to comply with a change initiative and usually put forth the necessary effort to achieve success (Porras & Robertson, 1992). Thus, change agents must focus on building and sustaining commitment to the change through implementation strategies (Conner & Patterson, 1982).

The examination of reactions to organizational change initiatives has revealed that commitment to change reflects not only positive attitudes toward the change but also alignment with the change, willingness to support it, and intention to work toward making it a success. Conner (1992) aptly described commitment to change as "the glue that provides the vital bond between people and change goals" (p. 147). It implies an internalization of the organizational change goal as a personal goal, with change recipients recognizing the need to put forth effort in order for the organization to succeed in achieving the potential benefits from the change. It captures some aspects of the absence of negative attitudes, such as resistance to the change (Kotter & Schlesinger, 1979; Piderit, 2000), the presence of positive dispositions toward a change, such as readiness for change (Armenakis et al., 1993) and an openness to change (Wanberg & Banas, 2000).

Any of the three types of commitment to change will likely lead to a change recipient enacting "focal" or required behavior mandatory for minimal success. However, discretionary behavior that goes beyond focal behavior should differ based on the type of commitment

(Herscovitch & Meyer, 2002). Change recipients with continuance commitment to organizational change are aware of the costs associated with not complying with the change and support it simply because they must. Change recipients with a sense of normative commitment may not wish to participate in the change, but they still believe that they should support the change initiative because of a sense of duty, not because they believe in the value of the change. Change recipients who are normatively committed to organizational change engage in a manner similar to the way they would if they were continuance committed to the change. This means they would likely demonstrate any mandatory support for the change, but they might also engage to some extent in extrarole behaviors in their support. Change recipients who are affectively committed typically possess strong beliefs concerning the value of the change, are intrinsically motivated to achieve the change initiative's goals, and verbally support the change. Change recipients who are affectively committed not only comply with the change, but also tend to demonstrate extrarole behavioral support. Affective commitment to change was found to be linked with "championing" behavior involving the positive promotion of the value of the change (Herscovitch & Meyer, 2002). Affectively committed change recipients may even make some level of personal sacrifice in order to achieve the goals of the change initiative (Herscovitch & Meyer, 2002). Notably, fostering affective commitment in the context of change is a difficult task (Meyer, Allen, & Smith, 1993).

Researchers have proposed a wide variety of antecedents that are believed to influence the development of commitment to change. Meyer and Allen (2001) noted that the same processes by which each form of organizational commitment is fostered most likely apply to other commitment domains, including organizational change. Possible antecedents include a number of process antecedents, including participation (Miller et al., 1994), justice (Daly &

Geyer, 1994), and communication (Conner & Patterson, 1982; Zorn et al., 2000). Individual

differences, specifically personal attributes, have also been linked to commitment to

organizational change (Herscovitch & Meyer, 2002).

Within this dissertation, due to space and time considerations, only affective commitment

to organizational change is included as an outcome variable. Related hypotheses are offered later

in the literature review.

Personal Initiative

Kahn (1992) stressed the necessity of employee-driven change for the success of the

organization, while Ilgen and Pulakos (1999) noted the importance of employees responding to

problems and changing events within organizations. For a change initiative to be successful,

change recipients need to take an active role in handling problems, searching for new

opportunities, and adapting to modifications in duties, tasks, and processes that result from the

change. *Personal initiative* has been defined as "an active performance concept stressing that

people self-start to bring about positive individual and organizational outcomes" (Bledow &

Frese, 2009, p.230). Frese and his colleagues (Frese & Fay, 2001; Frese, Kring, Soose, &

Zempel, 1996) noted that personal initiative reflects behavior that is self-starting (meaning doing

something without being told or without an explicit role requirement), proactive (meaning

having a long-term focus and anticipating future problems or opportunities), and persistent

(meaning overcoming barriers to bring about change). They argue that these dimensions of

personal initiative relate to going beyond expectations in terms of the amount of action taken.

Research on the relationships between personal initiative and organizational performance

have been neglected in past examinations of work performance (Griffin, Neal, & Parker, 2007),

and ambiguity remains concerning the theoretical concept of personal initiative and how it can be

measured in organizational research (Frese, Fay, Hilburger, & Leng, 1997). Even though some researchers have suggested that situational interviews (Latham & Saari, 1984) are the best way to examine personal initiative, most researchers have relied on the prevalent, Likert response format, self-report scales (e.g., Bateman & Crant, 1993; Frese, Teng, & Wrjnen, 1999; Morrison & Phelps, 1999; Van Dyne & LePine, 1998). Typically, instruments for assessing personal initiative are custom designed to measure specific behaviors that are unique to the phenomenon examined (Frese et al., 1996; Frese et al., 1999).

Many studies have examined behaviors that reflect initiative on the part of the employee (e.g., Ashford & Cummings, 1985; Dutton, Ashford, O'Neill, & Lawrence, 2001; Frese et al., 1996; LePine & Van Dyne, 1998; Morrison, 1993; Morrison & Phelps, 1999; Parker, Wall, & Jackson, 1997; Staw & Boettger, 1990; Wanberg & Kammeyer-Mueller, 2000; Wrzesniewski & Dutton, 2001). As a result of this research, a wide-ranging assortment of constructs that describe personal initiative and proactive employees has emerged (Crant, 2000; Thompson, 2005), and there has been no integrative theory proposed.

Personal initiative shares much in common with the broader construct called proactive behavior, which focuses on employees taking an active role in improving their current circumstances, challenging the status quo rather than accepting situations, and learning in order to improve their effectiveness on an existing job (Bateman & Crant, 1993; Crant, 2000; Unsworth & Parker, 2003). Griffin, Parker, and Neal (2008) note proactive behavior, which they call *adaptivity*, represents an employee's personal initiative in achieving performance success when there is ambiguity and a lack of guidance. This echoes Dvir and colleagues' (2002) definition of *initiative*, *activity*, and *responsibility*. Similar concepts appear elsewhere in the literature: *adaptive performance* (Pulakos, Arad, Donovan, & Plamondon, 2000), *proactivity*

(Crant, 2000; Bateman & Crant, 1993), *taking charge behavior* (Morrison & Phelps, 1999), *task revision* (Staw & Boettger, 1990), *innovative behavior* (Scott & Bruce, 1994), *role breadth self-efficacy* (Parker, 1998), *flexible role orientations* (Parker et al., 1997), *role innovation* (Schein, 1971), *voice* (Van Dyne & LePine, 1998), and *transcendent behavior* (Bateman & Porath, 2003).

Another confusing element in the related literature is that some researchers have defined personal initiative as a form of contextual performance or extra-role behavior (e.g., Borman et al., 2001; Moon, Kamdar, Mayer, & Takeuchi, 2008; Morrison & Phelps, 1999; Speier & Frese, 1997). Other researchers have challenged this notion, suggesting that employees can take different degrees of initiative in both task and contextual elements (Crant, 2000; Frese & Fay, 2001; Griffin et al., 2007).

According to action theory, "the human is seen as an active rather that a passive being who changes the world through work actions…" (Frese & Zapf, 1994, p. 86). Therefore, when they are being subjected to change, they are often not simply passive recipients, but rather take intentional action to change their current circumstances (e.g., Diener, Larsen, & Emmons, 1984). Scholars agree that an organization's long-term viability is critically dependent on the personal initiative of its members (Kanter, 1983; Katz & Kahn, 1978). While discussing the inability of any organization to foresee all potential contingencies and environmental changes, Katz (1964) stated "the resources of people in innovation, in spontaneous cooperation, in protective and creative behavior are thus vital to organizational survival and effectiveness" (p. 133). This directly relates to organizational change, since there is a lack of predictability in terms of inputs, processes, and outputs of work systems, making it difficult for change agents to specify all new and revised tasks that must be performed and the procedures that must be followed in order to perform effectively (Griffin et al., 2008). Crant (2000) stated that, because of its importance and

drastic impact on organizations, proactive behavior represents a "high-leverage concept rather than just another management fad" (p. 435).

Various conceptualizations of personal initiative have been linked to positive individual and organizational outcomes, including job performance (e.g., Ashford & Northcraft, 1992; Crant, 1995), feedback (e.g., Ashford & Cummings, 1985; VandeWalle & Cummings, 1997), entrepreneurial behaviors (Becherer & Maurer, 1999), self-improvement (Seibert, Crant, & Kraimer, 1999), individual innovation (Seibert, Kraimer, & Crant, 2001), small-firm innovation (Kickul & Gundry, 2002), newcomer adaptation (e.g., Chan & Schmitt, 2002), and sales performance (Crant, 1995). Proactive behavior has been found to be significantly correlated with certain types of personal achievements (Bateman & Crant, 1993) and also to predict job performance, even after controlling for employee experience, social desirability, general mental ability, conscientiousness, and extraversion (Crant, 1995). It has also been examined within an organizational change context (Prabhu, 2007).

Despite the importance of personal initiative, its antecedents are not well understood (Parker, Williams, & Turner, 2006). Initiative is not always simply generated by an employee; Crant (2000), as well as Frese and Fay (2001), noted the importance of considering how personal characteristics and situational characteristics relate to this type of behavior. Crant proposed that motivational states (e.g., role breadth self-efficacy) and contextual factors (e.g., management support, organizational culture) influence proactive behaviors directly. Morrison and Phelps (1999) discovered empirical support for motivational determinants (self-efficacy and felt responsibility) and contextual variables (top-management openness) as antecedents of taking charge behavior. Supportive supervision has also been found to be an antecedent of proactivity (Parker et al., 2006).

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Readiness for Change

Readiness for change as a concept dates back to the earliest investigations on organizational change (Coch & French, 1948; Lewin, 1947; Schein & Bennis, 1965), first being introduced by Jacobson (1957) and remaining a central element of the research ever since. The study of people's willingness to change has become the countervailing perspective against the assumption that people automatically resist change. Many scholars have challenged the axiom of resistance (Jansen, 2000), and even argue that resistance is rare (Kotter, 1995). Viewing attitude as readiness rather than resistance falls in line with the emerging body of literature classified as "positive organizational behavior" (Luthans, 2002a, 2002b; Luthans & Youssef, 2007; Nelson & Cooper, 2007; Seligman & Csikzentmihaly, 2000; Wright, 2003). Positive psychology focuses on human strengths and optimal functioning rather than on weaknesses and fallibilities. Luthans (2002b) states that positive organizational behavior is "the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement" (p. 59).

Readiness for change has been defined in a wide variety of ways. Miller and colleagues (1994) and Wanberg and Banas (2000) conceptualized it as openness to organizational change, consisting of a willingness to support the change and positive affect about the potential consequences of it. Armenakis and colleagues (1993) defined readiness as the beliefs, attitudes, and intentions that people hold in regards to whether or not there should be a change and whether or not the organization can change. Very similarly, Killing and Fry (1990) defined readiness for change in terms of the extent to which organizational members are aware of the need for change and whether or not they possess the necessary skills or education to carry out the change.

Hanpachern (1997) defined readiness for change as "The extent to which individuals are mentally, psychologically, or physically ready, prepared, or primed to participate in organizational development activities" (p. 11). Kouzes and Posner (2002) posited that successful change requires change recipients to be intrinsically motivated, to see the change as a learning opportunity, and to feel as if in control over the change process. Beckhard and Harris (1987) stated that readiness was all about "willingness, motives, and aims . . ." (p. 61) of change recipients. Other definitions focus on change recipients' awareness of the need to change, their acceptance of the change, and perceptions of the positive implications for themselves and the wider organization (e.g., Argyris, 1990; Carr & Johansson, 1995; Huy, 1999; Jones et al., 2005; Miller et al., 1994; Schein, 1980).

One aspect of readiness for change is cognitive in the sense of developing schemata and attitudes toward change (Bandura, 1982; Fishbein & Ajzen, 1975), which are described as precursors of actual resistance or support (Armenakis et al., 1993; Armenakis & Burdg, 1988; Armenakis & Harris, 2002; Fiske & Taylor, 1984; George & Jones, 2001; Isabella, 1990; Lau & Woodman, 1995; Thompson & Hunt, 1996). Another aspect of readiness for change consists of the emotional reactions to the change process (Damasio, 1994; Huy, 1999; Jones et al., 2005). Related to this are the interpretive and interactive aspects of coping with change (Judge et al., 1999), as expressed in Lazarus and Folkman's (1987) transactional model of stress and coping. In related research, scholars have examined psychological capacity (PsyCap) as a person's cognitive and emotional resources, as they relate to dealing with organizational change (Avey et al., 2008). They suggest that if change recipients are optimistic and efficacious, they usually possess positive expectations for goal achievement, cope well with the change, and experience

positive feelings of confidence. Setbacks and challenges are also better overcome through this hopeful confidence, reducing cynicism and producing engagement (Avey et al., 2008).

Research on organizational climate suggests that the sum of a change recipient's experiences shape his/her overall perceptions of the organization (James & James, 1992; Schneider, 1975, 1990), and this includes the extent to which the change recipient thinks that the organization is ready to make a change initiative successful (Jones et al., 2005). As such, readiness at the organizational level means that there is an alignment of collective cognitions throughout the organization, possessing collective efficacy, positively directed toward the change, which serves as the precursor to successful action taken by the organization (Armenakis et al., 1993).

Managing Readiness for Change

There are often many reasons why organizational change initiatives fail, but few are as critical as change recipients' attitudes toward the change event. The earliest illustration of the importance of readiness for change comes from Lewin's (1947) concept of unfreezing, which represents efforts taken to break up the complacency of employees. Lewin stated that it is necessary to provide evidence that certain old habits, attitudes and behaviors are no longer acceptable or appropriate in the organization. Schein (2004) argued that failure is often traceable to an organization's inability to effectively unfreeze and foster readiness for change before attempting to implement (i.e., the moving phase) the change. All too often organizations begin implementation before unfreezing, leaving change recipients psychologically unready for the change. As research provides a greater understanding of the extent to which readiness for change leads to successful implementation, more and more attention is given to preparing employees for making the change (Jones et al., 2005).

Building positive employee beliefs, perceptions and attitudes is critical for successful change interventions (Armenakis et al., 1993; Eby et al., 2000; Elias, 2009; Jones et al., 2008). Fostering readiness for change is an organizational development (OD) process through which global and local change agents prepare change recipients for future changes so that they can more proactively act and effectively react to the change. The foundations for creating readiness can be found in several theoretical models, which Van de Ven and Poole (1995) integrated from several disciplines in order for researchers, management, and OD professionals to assess a theoretical means in understanding the change phenomenon. Organizational leaders, acting as change agents, introduce purposeful, system-wide change initiatives to achieve some specified goals. This is called teleological change (Van de Ven & Poole, 1995). When these purposeful changes are introduced, differences and conflicts arise from constituencies of change recipients with competing goals and interests. For the conflict to be resolved, the beliefs and cognitions of all of the change recipients must fall into alignment with those of the change agents. Change when there is alignment of this sort is called dialectical change (Van de Ven & Poole, 1995). In essence, change recipient support and enthusiasm for the change initiative must be first created in order to prevent conflict and failure (Piderit, 2000), and failure to create this readiness produces resistance to change (Armenakis et al., 1999).

The models found in the organizational change literature follow Lewin's (1947) work and propose that building momentum, excitement, and buy-in to the change initiative are all critical components of success (Armenakis et al., 1993; Beer & Walton, 1990; Eby et al., 2000; Galpin, 1996; Judson, 1991). This often involves increasing the decisional latitude, participation, and empowerment of change recipients, thus mandating a participative managerial approach rather than an authoritative one (Antonacopoulou, 1998).

Armenakis and his colleagues (1993, 1999) developed the three-step conceptualization of conducting a change initiative based on the work of Lewin (1947). It described the change process as readiness (unfreezing), preparing for the change; adoption (moving), shifting from the old, no longer appropriate behaviors to the desired new behaviors, often through changes in organizational structures and processes, and institutionalization (freezing), reaching a new state of equilibrium, with lasting changes in norms, policies, structures, and possibly even organizational culture. Rather than viewing the process as moving cleanly through each of the three steps one at a time, the model recognized that the change process can be somewhat more convoluted (Isabella, 1990), with overlaps in the three steps making it more of a series of phases. Because of this, the initial creation of readiness does not stop when adoption begins, and the change agent must continue to manage readiness throughout the entire change initiative (Armenakis et al., 1993, 1999). This is done through a change message (Armenakis et al., 1993, 1999; Carr & Johansson, 1995; Huy, 1999).

Research on readiness for change has linked it to several other constructs. Perceived need for change, self-efficacy, commitment to organizational change, perceived behavioral control, active participation in the change process, as well as productivity, and turnover intentions are all correlates of readiness for change (Ajzen, 1991; Armenakis et al., 1993; Cunningham et al., 2002; Iacovini, 1993; McDonald & Siegal, 1993; McManus, Russell, Freeman, & Rohricht, 1995; Prochaska et al., 1997; Terry & Jimmieson, 2003).

Readiness for change is most often used within both conceptual and empirical research as a dependent variable (e.g. Armenakis et al., 1993; Eby et al., 2000; Miller et al., 1994). Readiness for change is seldom used as a mediating variable between change management strategies and change implementation success (Jones et al., 2005). Two studies, one conducted

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by Wanberg and Banas (2000) and another by Oreg (2006), are exceptions; both of these studies involved testing a mediating model of readiness for change, proposing that several variables (e.g. self-efficacy, positive attitudes about the change, information provision, active participation) would encourage readiness for change. In turn, readiness for change would be predictive of employee adjustment (e.g. job satisfaction, organizational commitment, work irritation, intention to quit, and actual turnover). The results revealed that several of the pre-implementation measures predicted readiness for change perceptions, and readiness for change predicted organizational commitment, work irritation, job satisfaction, and turnover intentions.

Within the present study, readiness for change is not directly addressed as a variable. Intention as a variable is often left out of the TPB framework when tested. Instead, beliefs that contribute to readiness are tested in relation to the outcome variables. In order to do so, variables must be chosen that represent the beliefs that foster readiness for change.

Technology Readiness as an Attitude

It is difficult to directly tie the concept of readiness for change to the IT adoption literature. At more of a macro level, the definition of readiness for change offered by Beer (1987), that readiness for change represents the social, technological, and systematic capability of an organization to change, fits with the IS research conducted by Clark et al. (1997), who stated that technological change readiness is the ability of IS-based organizations to deliver strategic IT applications within short development cycle times by utilizing a highly skilled internal IS workforce. It is implied that employees are already ready for the implementation, with the *human element* remaining largely unaddressed. As discussed within the previous section, however, change recipients play a major role in the success of change events.

Some research within the IT adoption literature recognizes Lewin's (1947) concept of unfreezing. This research has focused more on the individual level psychological process involved in readiness for IT-related change. One such conceptualization is called *technology readiness*, which represents a person's trait-like propensity to embrace and use new technologies for accomplishing goals in home life and at work (Parasuraman, 2000). It was conceptualized by Parasuraman as more of a *trait* than a *state*.

Technology readiness can also be viewed in a manner similar to readiness for change in that it represents a person's willingness to use technology at least on a trial basis (Lin, Shih, & Sher, 2007). Lin and colleagues described technology readiness as consisting of four sub-dimensions, namely, optimism, innovativeness, discomfort, and insecurity. *Optimism* reflects a positive view of technology in general and the belief that it offers people increased control, flexibility, and efficiency. *Innovativeness* represents a tendency to be a technology pioneer and opinion leader (Rogers, 2003). *Discomfort* represents a sentiment of lack of control over technology and a feeling of being overwhelmed by the new technology. *Insecurity* reflects mistrust of new technology and skepticism about its ability to work properly. Technology readiness is believed to influence attitude toward use of a specific technology, much like perceived ease of use and perceived usefulness, except that technology readiness is a trait and the other two are states. Past research findings (Lin et al., 2007), however, suggest that perceived usefulness and perceived ease of use together mediate the relationship between technology readiness and someone's intention to use a technology, making it an even more distal variable, putting it in line with the individual differences classification of variables.

The TAM had a general "attitude towards technology acceptance" construct to reflect change readiness, but it was removed in later research because it did not appear to fully mediate

the effects of perceived ease of use and perceived usefulness on behavioral intentions (Venkatesh & Davis, 1996). Research has consistently found, however, that perceived ease of use and perceived usefulness directly predicted behavioral intentions to use a variety of technologies (Karahanna et al., 1999; Marler, Fisher, & Ke, 2009; Mathieson, 1991; Thompson et al., 2006; Venkatesh, Speier, & Morris, 2002). Later examinations of the TAM also excluded a general attitude construct (Venkatesh, 1999, 2000; Venkatesh and Davis, 2000; Venkatesh & Morris, 2000), though some studies have included it (Chau & Hu, 2001). The inclination to leave out general attitude may simply indicate that attitude toward technology acceptance is complex and composed of multiple beliefs, two of which are perceived ease of use and perceived usefulness, which are discussed in a later section of this literature review.

<div align="center">Technological Change-Related Beliefs</div>

Organizational Change Recipients' Beliefs

Antoni (2004) stated that "one has to change the beliefs of the organizational members, which shape their behaviour, in order to support sustainable organizational change" (p. 198). In order to successfully execute a change initiative, change agents must prepare change recipients for the challenges involved. In order to assess whether or not change recipients are ready, specific beliefs that they have about the change can be assessed as a reflection of their overall attitude of readiness for change (cf. Ajzen, 1991; Fishbein & Ajzen, 1975; Piderit, 2000). A *belief* is an opinion or a conviction about the truth of something. A belief may not be readily obvious or subject to any form of systematic verification. As it applies to organizational studies, any description of an organizational outcome, event, or action that occurs is subject to being interpreted by organizational members who will likely form one or more beliefs around what they perceived as a result of sensemaking.

Several means of assessing readiness have been created which measure specific beliefs (Cunningham et al., 2002; Jones et al., 2005; Weeks, Roberts, Chonko, & Jones, 2004). In a review of these instruments, Holt and colleagues (2007b) confirmed through an examination of 32 different quantitative instruments that more work was needed to improve the measurement of readiness for change.

Through their research on readiness for change, Armenakis et al. (2007) developed a higher order construct that takes into account five interrelated beliefs, or components, that capture the thoughts of change recipients. The five beliefs are: efficacy, principal support, discrepancy, appropriateness, and valence. They examined the literature and found 41 publications dating between 1948 and 2006 that included one or more of those beliefs. A similar instrument was produced by Holt et al. (2007b), composed of four of the five beliefs, excluding discrepancy. Armenakis and colleagues stated that change recipients' beliefs could be measured at any time during a change initiative to gauge the level of readiness for change. The information obtained from the assessment of these beliefs is stated to serve as useful in revealing the degree of buy-in among change recipients and areas in which deficiencies in supportive beliefs exist that could negatively impact the change. By assessing these beliefs, change agents can better plan and execute the activities that follow during the change implementation process (Armenakis et al., 2007).

Discrepancy

Discrepancy represents the idea that, without the recognition that there is a need for change, a proposed change will be seen as valueless. If there is no visible difference between current and desired outcomes, the motives for change put forth by change agents may seem *arbitrary*. Bies (1987) noted that information must be provided by change agents to explain why

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the change is needed. Many organizational scientists have provided support for this argument (cf. Bandura, 1986; Bartunek et al., 2006; Coch & French, 1948; Kotter, 1995; Nadler & Tushman, 1989; Pettigrew, 1987; Rafferty & Griffin, 2006; Rousseau & Tijoriwala, 1999).

Research has found that when employees believe that their needs are not being met in terms of the current method of operations, and, when they believe that a proposed change initiative will improve the situation, they will be more willing to support the change (Hultman, 1998). A measurable difference between the current organizational outcomes and desired outcomes can help to legitimize the need for change. Change forces people to give up routines that have been successful in the past. For people to be willing to give up routines that have been previously successful, there must be sufficient reason to make a change, if not, they will be more likely to resist the change.

Nadler and Tushman (1995) stated that organizational awareness of the need to make a change is critical. Simply put, a change cannot occur unless the organization is aware of the need for a change. Because of the risk of not recognizing the need to make a change, Nadler and Tushman suggested that organizational leaders engage in frequent environmental scanning for potential issues that may arise, such as technological innovation, regulatory modification, and so forth.

Beer (1980) noted that a "fundamental reason that some crisis or pressure seems to be important in setting the stage for change is that it creates a state of readiness and motivation to change" (p.48). Fairhurst and Starr (1996) pointed out that organizational leaders have the responsibility of presenting change initiatives in such a way as to shape employee responses. It is necessary to make clear the difference between how things are now and how things could be. In order to do this, organizational leaders must demonstrate that there is a "clear and present

danger: a tangible and immediate problem that must be confronted if the organization is to remain economically viable" (Beer et al., 1990, p.55). For example, Galpin (1996) examined how organizational leaders in a petro-chemical company used industry benchmarks to justify to their employees the need for a change. Morris and Rabin (1995) argued that organizational leaders need to help organizational members see for themselves that there was a need to change, instead of simply trying to sell them on the need to change.

Spector (1989) suggested that organizational members should be made aware that the current state is not satisfactory and that it will be necessary to change through the sharing of information. In the example provided by Spector, a plant manager shared information about competitors throughout the plant to demonstrate that change was necessary for competitive reasons. However, because the plant was unionized, making the necessary changes was considered impossible due to the existing labor contract. After the sharing of the information, the union members and their leaders worked closely with management in making necessary changes.

An even more classic example illustrating the issue of discrepancy and the sharing of information is Coch and French's (1948) study in a pajama-manufacturing facility. Even though Coch and French framed their discussion in the language of resistance to change, later examination of the Coch and French study (Jacobson, 1957) observed that when the managers demonstrated to the garment workers that there were no apparent quality differences between two pairs of pajamas (even though one pair sold for much less than the other) the employees got a clear picture of the necessity of implementing changes that would enable their organization to survive by improving its efficiency. The study illustrated the power to make change a reality by involving the change recipients. Those garment workers who participated in the self discovering

of the discrepancy chose to support the change demonstrating that resistance in not a foregone, automatic conclusion.

In addition to information being shared, Kotter (1996) argued that change leaders needed to impress upon change recipients a sense of urgency. Kotter asserted that action in support of the change would not occur unless change recipients believed the situation was urgent. Therefore, change agents must express the need to change in dramatic and insistent terms. In the example that Kotter provided, the change agents provided notebooks filled with extensive details on the proposed change, but they did not provide a compelling reason to make the change, which left the change recipients uninspired and unmotivated to support the change. Instead, the change recipients were left confused about what needed to be changed, in what order it needed to be changed, and, especially, why it needed to be done so urgently. Because of this lack of clarity as to the need and the lack of urgency, the change recipients resisted the change.

The concept of discrepancy as a construct has not appeared explicitly within the IS literature, and (to this author's knowledge) nothing similar has been examined in relation to technology acceptance. However, within the innovation diffusion theory process (Rogers, 2003), the first of the five stages of the adoption decision process is represented by "knowledge." *Knowledge* within the process denotes recognition of any potential advantages that the innovation could provide. This knowledge implies that the predecessor of the innovation, serving in similar role or function (unless the innovation does something totally new), is not able to meet the demands of the person, related tasks, and/or environment as well as the innovation can do so. As such, this connotes discrepancy in terms of the attributes of the predecessor.

Discrepancy hypotheses. Based on the previous research concerning discrepancy, affective commitment to the change, technology acceptance, and personal initiative, the following hypotheses are offered:

Hypothesis 1a: Discrepancy will be positively related to affective commitment to the change.

Hypothesis 2a: Discrepancy will be positively related to technology acceptance.

Hypothesis 3a: Discrepancy will be positively related to personal initiative.

Appropriateness

Whenever employees are confronted with organizational change, they are likely to ask themselves why the proposed change is the right one (Linden, 1997). Recognition of the problem (i.e., discrepancy) does not mean that whatever solution is offered will be accepted, the solution must be perceived as appropriate (Armenakis et at., 1999). The concept of change agents presenting a vision, a sense of what will be accomplished through the change, has been considered to be the communication of the appropriateness of the proposed change (Kotter, 1995; Levesque, 1998). Brown, Massey, Montoya-Weiss and Burkman (2002), in a study concerning the introduction of new technology within a financial institution, found communication to be especially important in situations in which change is mandatory. They found that several communication tools, including testimonials, formation of user groups, and other such means were necessary to gain employee acceptance of the usefulness of the new technology.

Appropriateness is linked directly to discrepancy. Research conducted to improve upon the diagnostic skills of managers noted the importance of identifying the unique attributes of an

organizational problem. Identification of the discrepancy is important in order for the most

appropriate action to be taken to resolve the problem cause (Kepner & Tregoe, 1965).

Kissler (1991) posited that even if change recipients perceive a need for change, they

could disagree with the proposed change initiative. Kissler described an organization in which

supervisors, as change recipients, were told to use persuasion rather than positional power to

create a more participative environment that would increase organizational effectiveness. Many

supervisors did not agree with the participative approach and did not support the change. This

study illustrates that, if change recipients hold a different perception of the appropriateness of the

change, they may oppose it (Rousseau & Tijoriwala, 1999).

Even if a change entails uncertainty and hardships, if there is legitimacy to the change

proposed and procedural justice in the decision-making, change recipients are more likely to

support the change, regardless of the favorableness of decision outcomes (Korsgaard &

Roberson, 1995). Also, if change recipients trust the change agents, they are typically more

supportive (Hultman, 1998). If the process by which a change initiative is implemented is

inconsistent with the reasons given for the change, the change recipients are likely to view the

change agents as untrustworthy (Kernan & Hanges, 2002). This will negatively impact the

outcome of the change and will likely also affect future attempts to change as well.

The myth of the quick fix is another issue (Kilmann, 1984). All too often organizational

leaders develop the specifics for a change initiative based on popular management fads from the

practitioner literature (cf. Abrahamson, 1996; Ghoshal & Bartlett, 1996). Management solutions

touted in the popular press are almost never the most appropriate approaches in solving

organizational problems, making such fads "solutions in search of problems" (Nadler &

Tushman, 1989, p. 198). These faddish approaches often fail to get change recipients to buy into

the change effort. Conversely, when a change initiative is perceived as being implemented only after careful deliberation and planning, change recipients are more likely to feel comfortable making the change (Bartunek et al., 2006; Rafferty & Griffin, 2006; Rousseau & Tijoriwala, 1999).

When change initiatives in the past have failed or have been mishandled, it is usually more difficult to implement change initiatives in the future. This becomes a major issue when new change initiatives are attempted on a regular basis without any strong commitment or follow-through (Beer et al., 1990). These types of change initiatives become viewed as gimmicky "program of the month" wastes of time, thus leading to cynicism and resistance (Armenakis et al., 1999; Beer et al., 1990).

As it relates more to the appropriateness of technology, the TAM2 version (Venkatesh & Davis, 2000) of the TAM (Davis et al., 1989) focused on perceived usefulness. Inherently, the more useful a new technology appears to be to a potential user, the more appropriate it is perceived as a likely solution. An examination of potential correlates with perceived usefulness found job relevance, result demonstrability, and output quality to be strongly related. Therefore, change recipients found technology to be more useful when it served job-related duties, performed efficiently as a piece of technology, and improved information quality (Venkatesh & Davis, 2000).

Appropriateness has implications for IT vendors as well. Given that many IT systems are predesigned, especially ERP systems, vendors must be very sensitive to the needs and perceptions of IT managers. As Benamati and Lederer (2008) noted, IT vendors must constantly reassess their strategies and efforts to solve the problems involving IT managers' perceptions of poor quality of the system, incompatibility with other technologies, management confusion about

what their products can deliver, and the training demands. Because of vendor competitiveness, many IT managers are wary of vendor marketing claims and pressures to adopt their products. Often the claims made by the vendors about their technology do not prove to be true. Some vendors push products, before they are fully functional and error-free. In addition, the level of support that vendors claim they will provide is not always met (Benamati & Lederer, 2008).

In addition, management may not fully grasp the actual level of expertise required for organizational members use the technology effectively. As such, they often underestimate the training required and the time that it will take in implementing the new IT (Venkatesh & Davis, 2000). Management must stay informed on the products of many vendors, but even doing so, it still remains difficult to choose from among them. Benamati and Lederer (2008) advised that management should focus on demanding fewer errors and more truthfulness in information concerning new IT.

Appropriateness hypotheses. Appropriateness has been show to be a useful predictor of change readiness in the research. Based on the previous research concerning appropriateness, affective commitment to the change, technology acceptance, and personal initiative, the following hypotheses are offered:

Hypothesis 1b: Appropriateness will be positively related to affective commitment to the change.

Hypothesis 2b: Appropriateness will be positively related to technology acceptance.

Hypothesis 3b: Appropriateness will be positively related to personal initiative.

Change Efficacy

The application of efficacy to an organizational change initiative makes it much more specific in domain content than the content of *global efficacy*. However, before directly addressing the domain content of change efficacy, efficacy in general should be addressed.

Global self-efficacy. Socio-cognitive theory (Bandura, 1997) has identified the motivational concept of self efficacy as the most powerful self-regulatory mechanism in affecting behaviors (Ng, Ang, & Chan, 2008). Locke (2003) commented that self-efficacy "has proven to be extraordinarily useful as a motivation concept in numerous domains of human functioning" (p. 441). Efficacy relates to the amount of effort and persistence a person is willing to put forth to reach a desired outcome. It influences thought patterns, emotions, and behaviors, and accounts for differences in actions undertaken, coping mechanisms, and stress reactions (Bandura, 1982).

Bandura (1997) applied the concept of self-efficacy to the workplace, and its value in organizational research has been mentioned in numerous studies (Compeau & Higgins, 1995; Gist & Mitchell, 1992; Hasan, 2003; Herold et al., 2007; Judge, Jackson, Shaw, Scott, & Rich, 2007). It has been as "the employee's conviction or confidence about his/her abilities to mobilize the motivation, cognitive resources, or courses of action needed to successfully execute a specific task within a given context" (Stajkovic & Luthans, 1998b, p. 66). Avey, Wernsing, and Luthans (2008, p. 53) stated that, "In relationship to hope, efficacy can be interpreted as the conviction and belief in one's ability to (a) generate multiple pathways, (b) take actions toward the goal, and (c) ultimately be successful in goal attainment."

In the last 25 years, more than 800 articles that feature studies involving self-efficacy have been published within organizational journals. It has been utilized in relation to training

(Kozlowski et al., 2001), leadership (Chen & Bliese, 2002), newcomer socialization and adjustment (Saks, 1995), performance evaluation (Bartol, Durham, & Poon, 2001), stress (Jex, Bliese, Buzzell, & Primeau, 2001; Schaubroeck, Jones, & Xie, 2001), political influence behaviors (Bozeman, Perrewé, Hochwarter, & Brymer, 2001), creativity (Redmond, Mumford, & Teach, 1993), negotiation (Stevens & Gist, 1997), and group–team processes (Feltz & Lirgg, 1998).

According to a meta-analysis by Stajkovic and Luthans (1998a), efficacy has a great deal of explanatory power in organizational research. It has strong relationships with performance, various job attitudes (Saks, 1995), and more distal, predictors of work performance (Judge et al., 2007). It is linked with an employee's overall ability to meet a variety of situational demands in the workplace (Wood & Bandura, 1989).

Generalized, or global, self-efficacy has far less explanatory power when it comes to examining its relationship to particular tasks than more setting or domain specific conceptualizations of self efficacy that relate specifically to the task (Bandura, 1997; Herold & Fedor, 1998; House, Shane, & Harold, 1996). Because of this, there has been an increase in more domain-specific usage of efficacy, such as team efficacy (Devine, Clayton, Philips, Dunford, & Melner, 1999; Guzzo & Shea, 1992; Hackman, 1992; Sundstrom, De Meuse, & Futrell, 1990), leader self efficacy (Ketterer & Chayes, 1995; McCall, 1993; Ng, Ang, & Chan, 2008), collective efficacy (Edmondson, 1999; Gibson, Randel, & Earley, 2000; Gully, Incalcaterra, Joshi, & Beaubien, 2002; Kline & MacLeod, 1997; Pond, Armenakis, & Green, 1984; Stajkovic, Lee, & Nyberg, 2009), and change efficacy (Amiot, Terry, Jimmieson, & Callan, 2006; Armenakis et al., 2007; Eby et al., 2000; Jansen, 2004; Jimmieson, Terry, & Callan, 2004; McGuire & Hutchins, 2006).

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There arises an issue concerning the differences between the concept of generalized self-efficacy and more setting or domain specific conceptualizations. *Generalized self efficacy* (as a trait) reflects the beliefs about one's competence across a broad range of situations (Judge, Erez, & Bono, 1998), while assessment of self-efficacy as a state reflects one's competence directly within a specific situation or as it pertains to a particular activity (Gist & Mitchell, 1992). Examination of generalized self efficacy would seem to be more of a trait assessment, while more focused examinations seem to refer more toward state assessments of efficacy (Chen, Gully, & Eden, 2001).

Personal efficacy specific to change. Support for the role of efficacy in organizational change situations has been found in previous research (Amiot et al., 2006; Armenakis et al., 2007; Eby et al., 2000; Jansen, 2004; Jimmieson et al., 2004; McGuire & Hutchins, 2006). According to social learning theory, a person's past behavior and experiences will influence their expectations regarding their own future abilities and experiences (Bandura, 1982). Previous success reduces fear of outcomes in the future, providing expectations of success. However, change events involve ambiguity and originality, meaning that change recipients do not have any relatable prior experiences. This uncertainty often leads to fear of the unknown (Bandura, 1982), making efficacy even more important as the first step in generating readiness for change (Bernerth, 2004).

Within organizational change situations, there is often uncertainty, stressful job conditions, fear of failure, loss of control, and demands for adaptation. Cooper, Dewe, and O'Driscoll (2001) asserted concerning self-efficacy during stressful situations "that beliefs about the self and one's abilities may function as effective buffers against the adverse effects of stressful job conditions" (p. 131). As such, high self-efficacy may assist change recipients in

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coping with the pressures associated with change, making the change seem less stressful,

onerous, or threatening than it would be for less efficacious people. Avey et al. (2008) pointed

out that, during change, highly efficacious employees:

> ". . . are characterized by tenacious pursuit and persistent efforts toward
> accomplishment and are driven by beliefs in their own successes. In other words,
> efficacy seems vitally important to effective organizational change efforts because
> employees are often required to take on new responsibilities and skills. Simply
> focusing time on early task mastery experiences, role modeling, and greater social
> support can move employees toward higher levels of efficacy in the changing
> workplace" (p.54).

During organizational change, high efficacy decreases the perception of difficulty in

making the change a success, thereby improving the change for success (Armenakis et al., 1999).

Efficacy has been found to play an important mediating role between organizational climate

variables and adjustment to the current situation or event (Martin et al., 2005). As it relates to the

model of technological change presented in this dissertation, a change recipient's efficacy belief,

as it relates specifically to a particular change initiative, should be more proximally related to

attitudinal responses to the change than generalized self-efficacy, which could be considered

more of an individual difference, and as an antecedent of change efficacy. This is consistent with

the TPB and the proposed relationships within the MTC presented in this dissertation.

Change recipients commonly avoid activities which they believe exceed their coping

capabilities, (Bandura, 1986), thus implying change recipients who do not believe they can cope

with the change are more likely to resist it. If forced into a situation, low change efficacy can be

self-fulfilling, producing failure in achieving the goals of a change initiative (Bandura, 1982).

Because of this, change agents must determine how to increase efficacy and must provide greater

support in order for the change to be successful (Gully et al., 2002; Herold et al., 2007; Vollman,

1996). When change recipients have low change efficacy, they should be provided with

education and training that will provide them with the confidence they need in order to successfully make the change (Galpin, 1996).

Collective change efficacy. Change efficacy, as defined within the change recipients beliefs conceptualization, extends beyond the individual. It includes not only a change recipient's personal sense of self efficacy as it relates to the change, but also confidence in the abilities of coworkers, supervisors, top organizational leaders, and the organization as a whole to successfully accomplish the change (cf. Bandura, 1997; Stajkovic et al., 2009). This relates to *collective efficacy*, "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" (Bandura, 1997, p. 447). Lindsley, Brass, and Thomas (1995) defined the terms group efficacy and organizational efficacy as being a little more narrowly directed, representing the belief among individuals within the collective that the group can successfully perform a specific task. In work-related contexts, collective efficacy has been related to group problem solving (Kline & MacLeod, 1997) and group learning (Edmondson, 1999), as well as to performance in service (Gibson, 1999), manufacturing (Little & Madigan, 1997), and simulated settings (Gibson et al., 2000).

The literature on technology adoption is also not silent on the role of self efficacy as it relates to IT adoption and continued use. Indeed, self efficacy has a strong link with and individual reactions to IT technology, in terms of adoption and continuance (Compeau & Higgins, 1995; Compeau et al., 1999; Hill et al., 1987; Taylor & Todd, 1995). It has also been related to learning to use new IS technology (Compeau & Higgins, 1995; Gist, 1989; Webster & Martocchio, 1993). Individuals' beliefs concerning their capacity to use technology successfully has been related to their decisions concerning whether or not they even attempt to use the technology, how much they will use the technology, what tasks they will use the technology to

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accomplish, and the degree to which he/she is willing to accept training (cf. Compeau et al., 1999). There remains a call to further examine the role of self-efficacy in computing behavior (Venkatesh, 2000).

Change efficacy hypotheses. Within the literature, change efficacy has been linked to a number of outcomes. Based on the previous research concerning change efficacy, affective commitment to the change, technology acceptance, and personal initiative, the following hypotheses are offered:

<u>Hypothesis 1c</u>: *Change efficacy will be positively related to affective commitment to the change.*

<u>Hypothesis 1c</u>: *Change efficacy will be positively related to technology acceptance.*

<u>Hypothesis 3c</u>: *Change efficacy will be positively related to personal initiative.*

Principal Support

Principal support reflects the support provided by change agents and opinion leaders. There are two categories of change agent: *global change agents*, operating at the highest level in the organization, such as the CEO and top management team, and *local change agents*, the immediate supervisors and the *opinion leaders* (i.e., horizontal change agents) who are enlisted. Principal support is especially important when past change efforts have failed to achieve their intended goals. The past failures of top managers in trying to conduct change initiatives can lead to skepticism on the part of lower level employees about whether the current change will succeed. Armenakis and colleagues (1999) described *principal support* as a means by which to "provide information and convince organizational members that the formal and informal leaders are committed to successful implementation . . . of the change" (p. 103).

Organizational members prefer dependable and consistent job functions, as well as predictable relationships with top leaders, supervisors, and coworkers (Bernerth, 2004). When they find themselves in the midst of change events, they often engage in sensemaking (Weick, 1995) by gathering information from sources that they believe are credible, and by comparing their own past experiences with their observations of present events. They sense nonverbal cues and explicit information in formulating beliefs about the change. Coworkers and others within the organizational community are looked to for meaning, and to provide guidance in how to respond to the change event (Mossholder, Settoon, Armenakis, & Harris, 2000). According to social learning theory (Bandura, 1986), employees sense the support that is available throughout the organization through their interpersonal networks. The empirical association of communication width and social consensus has been supported in a variety of experimental studies for decades (e.g., Baerveldt & Snijders, 1994; Festinger, Schachter, & Back, 1950; Lazarsfeld, Berelson, & Gaudet, 1968; Zohar & Tenne-Gazit, 2008).

Useful sensemaking information often takes the form of perceptions of whether or not change agents demonstrate behavioral integrity through the alignment of their words and deeds (Simons, 2002); in other words, whether or not they "walk the talk" when it comes to supporting the change themselves. If there is a disparity between what change agents say and what they do, and change recipients perceive that principal support is not sufficiently demonstrated, the change recipients may not support the change initiative either.

Top leaders. Change initiatives are typically initiated from the top. According to Shaw (1995), during a change initiative involving a radical transformation, a CEO must hold, ". . . a deep conviction that the change must occur " in order for it to succeed (p. 70), and the senior-management team should ". . . collectively assume responsibility for [the change initiative's]

success" (p.70). The importance of buy-in, support, and commitment by top management has been noted in several studies that pointed out that failure to bring key partners onboard in implementing a change initiative can doom it to failure before it begins (Kotter, 1996; Somers & Nelson, 2001; Vollman, 1996). While it is not necessary to have a completely unanimous front on the part of management for a change to be successful, a coalition of key managers and influential employees is needed in order to create enough impetus to drive the change forward initially (Beer, 1980).

Relevant to this point is an example from a study conducted by Kotter (1996) involving a large domestic bank. Top management failed to put together a powerful guiding coalition to support a proposed change initiative and, because several key managers were not directly involved in the process, the change initiative failed. Going even further, Kotter offered an example of a high-ranking executive in one organization who actively prevented a proposed change from succeeding simply because the executive did not believe that the change was necessary (Note: This is also a strong example of how discrepancy relates to principal support.)

In one organization that had its IS in disarray, Vollman (1996) recommended the installation of a new IT system. To the misfortune of the organization, one key executive opposed the change. Because this recalcitrant executive was so entrenched within the organization's culture, Vollman and his associates recommended that the organization should wait until after the executive retired before trying to implement the IT change.

The behaviors of leaders serve as powerful communicators of how other organizational members should behave (Bandura, 1986; Neubert, Kacmar, Carlson, Chonko, & Roberts, 2008). Top managers also serve as role models, either intentionally or otherwise. Their behavior is often emulated because employees view the words and actions of the leaders as an endorsement of

certain behaviors and norms as being appropriate and important (Bandura, 1986; Brockner & Higgins, 2001; Kark & Van Dijk, 2007). The responses of senior management to the change help shape lower level employees' beliefs about the change. In addition, trust in leaders can often compensate for a lack of information, and can reduce the speculation and reservations related to uncertainty (Weber & Weber, 2001). Covin and Kilmann (1990) noted in one study that visible top-management support and commitment led to positive perceptions of a change initiative. Conversely, a lack of visible management support and commitment foster negative perceptions.

Supervisors. Researchers have noted that when there is a high quality leader-member exchange (LMX; van den Bos, Wilke, & Lind, 1998) or more trust in a supervisor (Martin, 1998), employees are likely to view organizational efforts in a more optimistic way. Most employees view supervisors as important referents because of their power to reward behaviors or punish non-behavior (Warshaw, 1980). For instance, pressure put on employees by supervisors has been found to be positively related to the adoption of new technology (Marler et al., 2009).

In addition, change recipients who receive supervisory support and encouragement are more likely to voluntarily support a change initiative (Organ, 1988; VanYperen, Van den Berg, & Willering, 1999). These findings as a whole help express the significance of supervisor influence on the perceptions of their subordinates. Larkin and Larkin (1994) opined that frontline supervisors are the most important change agents when it comes to getting change recipients to embrace a change initiative, noting "Programs don't change workers—supervisors do" (p. 85). They found that, when a change initiative is introduced, all too often top management assumes that simply delivering the change message and publicizing it throughout the organization is enough for the change to succeed. Top management assumes that the change recipients will understand and fall into line by accepting the change. Larkin and Larkin (1994) noted, however,

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that the supervisors were the ones who change recipients turned to in seeking advice and information to understand the change. They also noted that the supervisors could be as unaware of the reasons for the change as the subordinate.

Coworkers. Employees place a lot of importance on the how their peers perceive organizational events, and the sense of community among coworkers has been found to buffer negative emotions related to feelings of inequity in the workplace (Truchot & Deregard, 2001). Similar findings have been reported by Rousseau and Tijoriwala (1999). In their study of a change initiative at a hospital concerning a shared governance initiative, they found that, while many of the staff did not trust top management, they were responsive to the opinions of their peers. Nurse leaders made speeches, prepared and distributed memos, and made informal contacts to demonstrate their support for the change. Correspondingly, in a study of a change initiative at a manufacturing facility, Chenhall and Langfield-Smith (2003) reported that one frontline employee independently calculated the potential gains of a new incentive program, explained them to his colleagues, and became a champion of the new compensation program. The employee's actions helped other employees overcome a legacy of mistrust of top management. This supports the idea that opinion leaders can strongly influence their peers by serving as horizontal change agents (Lam & Schaubroeck, 2000; Ryan & Gross, 1943).

Perceived organizational support (POS). The concept of principal support is not the same as perceived organizational support (POS), but the two are somewhat similar in domain, and an examination of POS provides some theoretical basis for the types of relationships that could be related to principal support. Several studies suggest that organizational change is often more successful when employees believe that they are being supported by the organization (Mintzberg & Westley, 1992; Mohrman et al., 1989; Schalk, Campbell, & Freese, 1998). When employees

do not feel that they are receiving organizational support, and when they think that the decision making process concerning whether to engage in the change and how the change would be conducted was unfair, they may believe that their loyalty to the organization has been misplaced and withdraw emotionally as a result (Mossholder et al., 2000).

Perceived organizational support has been defined as an employee's "global beliefs concerning the extent to which the organization values their contributions and cares about their well being" (Rhoades & Eisenberger, 2002, p. 698). When employees believe that they are being treated well by their organization, according to the norm of reciprocity (Gouldner, 1960), they are more likely to adopt a positive attitude and reciprocate the support of the organization by engaging in behaviors that benefit the organization. As such, a high level of perceived organizational support leads an employee to favor obligations and opportunities that help the organization achieve its goals (Eisenberger, Armeli, Rexwinkel, Lynch, & Rhoades, 2001). An employee's POS-related motivation to comply with their organization may also be associated with a belief that, in exchange for current efforts by employees, the organization will reward them in the future (Marler et al., 2009). POS has been associated with *affective attachment to the organization* (Eisenberger, Fasolo, & Davis-LaMastro, 1990), which "increases a person's tendency to interpret the organization's gains and losses as one's own, creates positive evaluation biases in judging the organization's actions and characteristics, and increases the internalization of the organization's values and norms" (Eisenberger, Huntington, Hutchinson, & Sowa, 1986, p. 506).

POS has been associated with job involvement, job satisfaction (Eisenberger, Cummings, Armeli, & Lynch, 1997), and organizational citizenship behaviors (Shore & Wayne, 1993). POS is also believed to nurture a favorable attitude toward IT use (Aryee & Chay, 2001; Coyle-

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Shapiro & Conway, 2005; Mahmood et al., 2000), with a high level of POS being associated with the adoption of new IT (Marler et al., 2009).

   Principal support and technology implementation. As it relates to IS research, Karahanna et al. (1999) found that top management, supervisors, and friends play the greatest role as social influences on employees adopting a new technology. Top management, coworkers, and local IT specialists were found to be the strongest source of encouragement on employees who were currently using the technology. The MIS department in particular was also found to socially influence organizational members as it relates to both adopting and continuing to use a new change.

   Managers at all organizational levels (i.e., direct supervisors, middle management, and top management) are considered vital sources of interventions (Jasperson et al., 2005). Management can intervene by providing resources, sponsoring or championing the IT change, and issuing directives and mandates. It can also intervene more directly by using features of IT, by directing modification or enhancement of IT applications, through incentive structures, and through work tasks/processes in the implementation process of an IT (Jasperson et al., 2005). Prior research has suggested that management support and championship are the most critical success factors for ERP systems (Chatterjee, Grewal, & Sambamurthy, 2002; Holland & Light, 1999; Liang, Saraf, Hu, & Xue, 2007; Purvis, Sambamurthy, & Zmud, 2001; Somers & Nelson, 2001).

   In addition to inclusion of principal support as a change recipient belief within the MROC, a similar conceptualization of management support has been included within the TAM3: "Management support refers to the degree to which an individual believes that management has committed to the successful implementation and use of a system" (Venkatesh & Bala, 2008, p.

296). Management support within the IT literature has been the focus of many studies as an antecedent to implementation success (Jarvenpaa & Ives, 1991; Leonard-Barton & Deschamps, 1988; Liang et al., 2007; Markus, 1981; Sharma & Yetton, 2003; Somers & Nelson, 2001). However, this support was not conceptualized as an intervention strategy that could influence user acceptance (Venkatesh & Bala, 2008).

In IT implementations, sensemaking often takes place due to the fact that such change initiatives require substantial changes to organizational structure, change recipients' roles and duties, reward systems, control and coordination mechanisms, and work processes. Commitment provided by top management, and supportive communication related to system implementation, are crucial in making the change legitimate and maintaining employee morale throughout the institutionalization phase of the change (Venkatesh & Bala, 2008).

It is believed that management support influences organizational members' perceptions of subjective norm and image, which are considered two important determinants of perceived usefulness (Jasperson et al., 2005). The IS literature also suggests that direct involvement in the development and implementation process helps employees form judgments concerning the job relevance, output quality, and result demonstrability of the IT system. Direct involvement by management in modifying the system features, work processes, and incentive structures is believed to help reduce anxiety related to the use of the new IT system, and is believed to influence perceived ease of use (Marler et al., 2009).

One finding from the IT acceptance literature that could have some implications within the domain of organizational change is that, over time, the impact of social influences wanes because employees who adopted a new technology develop their own opinions through their own use of the new technology (Karahanna et al., 1999). In a study involving the use of the Windows

operating system, social pressure was found to be as an effective mechanism in overcoming

initial resistance to adopting new IT (Agarwal & Prasad, 1997). However, post-implementation,

it did not have a significant relationship with intention to continue using Windows (Karahanna et

al., 1999).

There has been a call within the IT adoption literature for a better understanding of the

role of principal support as it relates to technology acceptance and continuance. As stated by

Venkatesh and Bala (2008, p. 297):

> While management support has been conceptualized and operationalized as
> organizational mandate and compliance, particularly in the individual-level IT adoption
> literature, we suggest that there is a need to develop a richer conceptualization of
> management support to enhance our understanding of its role in IT adoption contexts. We
> suggest that social network theory and analysis . . . and leader–member exchange (LMX)
> theory . . .can be used to understand the influence of management support in IT adoption
> and use. Social network analysis can help pinpoint the mechanisms through which
> management support can influence the determinants of perceived usefulness and
> perceived ease of use.

Principal support hypotheses. Based on the previous research concerning principal

support, affective commitment to the change, technology acceptance, and personal initiative, the

following hypotheses are offered:

<u>Hypothesis 1d</u>: Principal support will be positively related to affective commitment to the

change.

<u>Hypothesis 2d</u>: Principal support will be positively related to technology acceptance.

<u>Hypothesis 3d</u>: Principal support will be positively related to personal initiative.

Valence

Valence corresponds to the cost-benefit appraisal process through which a change recipient evaluates a proposed change effort in terms of potential personal gains and losses of organizational benefits. Even if top management convinces employees of the necessity of supporting a change initiative for the organization to remain successful, they still may wonder, "What is in it for me?" If they can see no gain for their efforts, they are likely to resist the change. Motivation-related balance theories dating back to the 1950s serve as the theoretical basis for valence (e.g., Adams, 1965; Festinger, 1957; Heider, 1958). Valence represents the extent to which the change is perceived as beneficial versus detrimental to him/her (Oreg, 2006). The attractiveness (from the change recipient's perspective) associated with the perceived outcome of the change constitutes the ''rational'' component of resistance. Scholars have pointed to valence as perhaps the most valid reason to resist change (Dent & Goldberg, 1999; Nord & Jermier, 1994). Research has found that an employee's perceptions of the value of possible outcomes can strongly impact his/her overall evaluation of whether or not to support the decision (Tichy, 1983; Zaltman & Duncan, 1977). According to Vroom's (1964) research on motivation, valence is one of the primary determinants of whether a change recipient will accept or resist change.

Valence-related perceptions can be segmented into two categories: extrinsic and intrinsic. Extrinsic valence refers to gain through financial and other equally tangible rewards and benefits that will be derived from adopting a new behavior. Incentive systems, such as gainsharing, pay for performance, and so forth can contribute through extrinsic benefits to valence perceptions, thus influencing change outcomes (cf. Bullock & Tubbs, 1990). Intrinsic valence refers to self-actualization gains derived in the form of cognitive and affective satisfaction with the process or

outcomes of participating in the activity, and other, less tangible rewards. Bandura (1986) stressed the value of intrinsic valence to organizational change efforts. Also, Morse and Reimer (1956) noted that organizational change can provide an intrinsic reward in the form of decision-making control.

Change recipients are more likely to "buy in" to a change initiative when the consequences of the proposed change are more easily identified as personally beneficial, and, unless benefits are seen early, change recipients are likely to anticipate that personal losses will result from the change rather than gain (Rousseau & Tijoriwala, 1999). In turn, research has found that when employees believe that they will suffer losses of organizational benefits in a change situation, they will also question the legitimacy of the change and the intentions of management, thereby jeopardizing the entire employment relationship (Korsgaard et al., 2002).

Asking a change recipient to embrace a change that may cost his/her job or cause a loss in status will result in a less than enthusiastic response. The importance of the relationship between valence and distributive justice should not be overlooked. Change events will likely result in the redistribution of organizational resources, power, prestige, responsibilities, and rewards (Cobb et al., 1995). Change recipients will be concerned about this redistribution and negative valence, and many who are impacted negatively may view the change initiative as unfair. This negative perception can lead to feelings of anger, outrage, and resentment (e.g., Folger, 1986; Greenberg, 1990; Sheppard, Lewicki, & Minton, 1992; Skarlicki & Folger, 1997). Scholars suggest that the influence of negative valence can be mitigated through conscientious efforts on the part of management in terms of how they treat their employees (Armenakis et al., 1993, 1999; Kernan & Hanges, 2002; Skarlicki & Folger, 1997).

Valence remains unaddressed within the IS literature except in the form of perceived usefulness. Certainly more work is needed, because new IS systems produce an even playing field in terms of employee expertise with the technology, and since information access and control is often redistributed as a result of the change. Positions that were once integral to the organization due to their access and control over certain information may be rendered unimportant after the change.

Personal valence hypotheses. Personal valence as a predictor has been linked to a number of outcomes. Based on the previous research concerning personal valence, affective commitment to the change, technology acceptance, and personal initiative, the following hypotheses are offered:

<u>*Hypothesis 1e*</u>: *Personal valence will be positively related to affective commitment to the change.*

<u>*Hypothesis 1e*</u>: *Personal valence will be positively related to technology acceptance.*

<u>*Hypothesis 3e*</u>: *Personal valence will be positively related to personal initiative.*

Interrelationships Among the Five Change Beliefs

The five change recipient beliefs are believed to function together in creating an attitude concerning readiness for change, even though each belief is distinct in terms of domain content (Armenakis et al., 2007). For an example of all five of these beliefs working in tandem within a change initiative, see Schweiger and DeNisi's (1991) examination of an organization preparing for a merger.

Beliefs Concerning Technology Acceptance

Just as the previous section on change recipient beliefs illustrated the importance of beliefs in shaping attitudes toward organizational change, so too IT acceptance research supports

the idea that beliefs shape attitude toward IT innovation (Davis, 1989; Davis et al., 1989; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000). As it applies to new technology, Rogers (2003) pointed out that "the individuals' perceptions of the attributes of an innovation, not the attributes as classified objectively by experts or change agents, affect its rate of adoption" (p. 223). The beliefs held by individuals about the new technology strongly contribute to whether or not the technology will be adopted.

IT researchers (Venkatesh & Davis, 2000; Venkatesh & Bala, 2008) note that far more scholarly effort is needed in identifying the organizational and psychological mechanisms that influence IT user beliefs and attitudes. The TAM has been effective in predicting attitude toward technology use through two beliefs across a wide variety of domains, including accountants' acceptance of an electronic bulletin board system (Mathieson, Peacock, & Chin, 2001), physicians' acceptance of telemedicine technology (Hu, Chau, Sheng, & Tam, 1999), and students' acceptance of Microsoft Access (Thompson et al., 2006).

The two belief constructs that have been found to be extremely beneficial in predicting attitudes toward using technology are ease of use (PEOU) and perceived usefulness (PERUSE; Marler & Dulebohn, 2005; Venkatesh, 2000). Scholars (Venkatesh & Bala, 2008) have suggested that these two beliefs align to some degree to the two main classes of motivation, intrinsic and extrinsic (Vallerand, 1997). *Extrinsic motivation* relates to the desire to perform a behavior in order to gain specific goals and rewards (Deci & Ryan, 1987), while *intrinsic motivation* relates to the perceptions of pleasure and satisfaction experienced from actually performing the behavior (Vallerand, 1997). PEOU somewhat relates to intrinsic motivation, at least within the current conceptualization of the TAM (Venkatesh, 2000), though the two are not analogous. PERUSE more closely relates to extrinsic motivation and associated instrumentality

(Davis et al., 1989; Davis et al., 1992; Venkatesh & Davis, 2000; Venkatesh & Speier 2000; Venkatesh, 2000). The research has largely been restricted to features of the technology itself such as ease of use and perceived usefulness, creating the need to examine other beliefs that contribute to technology acceptance (Marler et al., 2009).

The basic premise for the inclusion of these two beliefs in the model of technological change is that, if the new technology is easy to use and helps job performance, individuals are more likely to have a positive attitude toward using the technology (Davis, 1989; Davis et al., 1989). These two beliefs have been found to be important determinants of technology use in several studies (Adams et al. 1992; Davis 1989, 1993; Davis et al. 1989; Hu et al., 1999; Mathieson 1991; Taylor & Todd, 1995; Thompson et al., 2006; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000). Because of the prevalence of these two variables within the IT acceptance literature, they are examined within this dissertation.

Perceived Ease of Use

Perceived ease of use (PEOU) has been defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320). The construct reflects the amount of effort that would be required, relative to the person's perceived capabilities, in terms of being able to use the technology to accomplish the intended functions.

A theoretical model put forth by Venkatesh (2000) found a number of control-, intrinsic motivation-related and emotion-related determinants for PEOU. Control was divided into perceptions of internal control (computer self-efficacy) and perceptions of external control (facilitating conditions). Intrinsic motivation was conceptualized as computer playfulness, while emotion was conceptualized as computer anxiety. Thus, computer self-efficacy, facilitating conditions, computer playfulness, and computer anxiety were system independent variables.

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They were examined and all of them were found to play a critical role in shaping perceived ease of use beliefs related to the new system. The influence of these determinants was reduced over time due to increasing experience with the system. Venkatesh put forth that objective usability, perceptions of external control (facilitating conditions) over system use, and perceived enjoyment would have a stronger influence on perceived ease of use during continuance.

Findings concerning the relationships between PEOU and attitude toward adoption and behavioral intentions have proven inconsistent (Lee et al., 2003). For instance, out of 18 studies examined, 12 studies did not show a significant relationship between PEOU and behavioral intention. PEOU has shown a significant effect on perceived usefulness in many studies (Amoako-Gyampah & Salam, 2004; Davis, 1989; Davis et al., 1989; Mathieson, 1991; Taylor & Todd, 1995; 1995b; Szajna, 1996; Venkatesh & Davis, 2000). In fact, in a review by Venkatesh and Bala (2004), 43 out of 50 studies revealed a significant relationship between PEOU and PERUSE. In one exception, where PEOU had no effect on PERUSE, the users were physicians who differed from many technology users in education, intellectual capacity, and independence, suggesting that individual differences among technology users are important to consider (Chau & Hu, 2002).

In addition, in a longitudinal study, no effect by PEOU on PERUSE was found for more experienced users of technology (Szajna, 1996). The rationale behind the decreasing importance of PEOU is that, once in use, a feedback mechanism derived by widespread "use" sets off a cycle: increased usage leads to increased perceptions of ease, which, in turn, increase perceptions of usefulness (Goodhue & Thompson, 1995). The speed and impact of this cycle is determined, for the most part, by a given user's learning curve. One interesting finding relating to this idea of a virtuous cycle in increasing PEOU is that training involving actual use of the technology will

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increase the PEOU, imitating the natural learning cycle that occurs through use (Amoako-Gyampah & Salam, 2004).

Perceived ease of use hypotheses. Based on the previous research concerning PEOU, affective commitment to the change, technology acceptance, and personal initiative, the following hypotheses are offered:

Hypothesis 1f: *Perceived ease of use will be positively related to affective commitment to the change.*

Hypothesis 2f: *Perceived ease of use will be positively related to technology acceptance.*

Hypothesis 3f: *Perceived ease of use will be positively related to personal initiative.*

Perceived Usefulness

Perceived usefulness (PERUSE) has been defined as "the degree to which a person believes that using a particular system would enhance his/her job performance" (Davis 1989, p. 320). The construct reflects an employee's level of conviction that a particular system will increase their work performance (Davis et al., 1989). The relationship between PEOU and PERUSE may be reduced over time (Szajna, 1996).

The quality of the output, particularly the more precise and up-to-date the information provided, the greater the PERUSE. In addition, the greater the ease of information accessibility, comprehension, and analysis, the greater the PERUSE (Kraemer, Danziger, Dunkle, & King, 1993). Goodwin (1987) opined that perceived usefulness depends on the usability of the technology, represented by PEOU. Mathieson (1991) and Szajna (1996) reported that PEOU accounts for a significant portion of the variance in PERUSE. In the TAM2, PERUSE's significant antecedents have included subjective norm, image, job relevance, output quality, and result demonstrability (Venkatesh & Davis, 2000). Together, across four longitudinal studies,

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these variables accounted for 40–60% of PERUSE's variance. In particular, subjective norm has been empirically confirmed as the most influential determinant of PERUSE, especially in situations in which end users have little or no experience with the technology (Venkatesh & Davis, 2000).

Similar constructs have been offered as outcome expectations in the Computer Self-Efficacy model. Also, PERUSE matches the description of extrinsic motivation in the Motivational Model. These models have produced similar findings, further indicating that PERUSE plays an important role in forming a technology user's attitude and behavioral intentions regarding IT acceptance and continuance (Amoako-Gyampah & Salam, 2004). Unlike PEOU, which has produced inconsistent findings, PERUSE has consistently served as the best predictor of a user's attitude toward IT usage, especially during later stages of usage (Venkatesh, Morris, Davis, & Davis, 2003). PERUSE has also served as a significant predictor of behavioral intention and technology usage in almost all (71 out of 72) of the prior studies involving the TAM (Venkatesh, Morris, Davis, & Davis, 2003).

Perceived usefulness hypotheses. Perceived usefulness has been the most useful predictor in predicting technology acceptance. Based on the previous research concerning PERUSE, affective commitment to the change, technology acceptance, and personal initiative, the following hypotheses are offered:

<u>Hypothesis 1g</u>: *Perceived usefulness will be positively related to affective commitment to the change.*

<u>Hypothesis 2g</u>: *Perceived usefulness will be positively related to technology acceptance.*

<u>Hypothesis 3g</u>: *Perceived usefulness will be positively related to personal initiative.*

Limitations of Perceived Ease of Use and Perceived Usefulness

Scholars have made claims that PEOU and PERUSE actually encompass many different user meanings and theoretical constructs (Chau, 1996; Moore & Benbasat, 1991; Segars & Grover, 1994). For instance, it is unclear if PEOU evaluations are based on the actual ease with which users interact with the system or if it is based on the ease with which users interact with the task themselves (McFarland & Hamilton, 2006). Research has not attempted to clarify such issues. Due to the vagueness of these constructs, Goodhue (1995) concluded that "there are so many different underlying constructs, it is probably not possible to develop a single general theoretical basis for user evaluations" (p. 1828). The mental averaging of an activity domain has been opposed by cognitive psychologists. Bandura stated that "combining diverse attributes into a single index creates confusions about what is actually being measured and how much weight is given to particular attributes in the forced summary judgment" (Bandura, 1997, p. 11).

For example, if attempting to solve a complex statistical analysis, users of computer software to perform the analysis may not even consider the system's usability if they lack the requisite statistical expertise, believing it is not even possible to interact with the system in order to accomplish the analysis. Consequently, without any real understanding of the actual differences among different software packages, any software related to accomplishing statistical applications may receive an equally poor PEOU evaluation. Similarly, PERUSE measures might be interpreted as an evaluation of either task usefulness or technological usefulness. To illustrate, consider an IT system designed to monitor the operation of an expensive piece of equipment. Without considering the system's effectiveness and capabilities, a technology user might evaluate the system as very useful simply because of the importance of the task rather than because the system does a better job than other systems could (McFarland & Hamilton, 2006).

Model Comparison

Together, the seven beliefs in the MTC (i.e., discrepancy, appropriateness, change efficacy, principal support, personal valence, perceived ease of use, and perceived usefulness) should be more effective in predicting technological change-related outcomes than either the beliefs from the model of readiness for change or the TAM beliefs independently. When combined, these variables capture a broader perspective of attitude concerning technological-related organizational change. As such, the following hypotheses are offered:

Hypothesis 4: The combination of organizational change recipient beliefs and TAM beliefs as one set of predictors will explain more variance in affective commitment to the change than organizational change recipient beliefs alone or TAM beliefs alone can explain.

Hypothesis 5: The combination of organizational change recipient beliefs and TAM beliefs as one set of predictors will explain more variance in technology acceptance than organizational change recipient beliefs alone or TAM beliefs alone can explain.

Hypothesis 6: The combination of organizational change recipient beliefs and TAM beliefs as one set of predictors will explain more variance in personal initiative than organizational change recipient beliefs alone or TAM beliefs alone can explain.

Development of Technological Change Beliefs

Sensemaking and the Formation of Beliefs

When a change occurs, employees are never sure about what to expect if they support the change. Uncertainty is ingrained within mergers, acquisitions, business process reengineering, and changes in structure, thus challenging existing paradigms (Harrison & Shirom, 1999) and evoking sensemaking (Weick, 1995). Cognitive appraisal of a change's potential consequences is

a vital aspect of determining an employee's willingness to actively partake in the change (Bartunek et al., 2006; Rousseau, 1995). In addition, there is also an emotional aspect of belief formation that takes place during organizational change (Piderit, 2000) derived from affective reactions to the change.

Sensemaking, as Weick (1995) explained it, is the effort a change recipient makes in trying to create orderly and coherent understandings that enable change to take place. Organizational change represents a difficult challenge for sensemaking due to the elements of complexity, ambiguity, and equivocality (Lüscher & Lewis, 2008). *Complexity* exists because various demands transform, shift, grow and conflict with one another, thus presenting difficult and intricate issues (Hatch & Ehrlich, 1993). *Ambiguity* exists in terms of new demands having unknown meaning and ramifications, plus the chance that they are even misunderstood (Warglien & Masuch, 1996). *Equivocality* exists in that there is confusion over the varied, even contradictory interpretations of demands (Putnam, 1986). Without a clear understanding of the changing roles, processes, and relationships, a change recipient may not know what to think or what to do (Davis, Maranville, & Obloj, 1997; Smircich & Morgan, 1982). Bartunek and Moch (1987) focused on the role of schemata, which are conceptually similar to paradigms (Kuhn, 1970), frames (Goffman, 1974), and theories-in-use, (Argyris & Schon, 1978). They pointed out that, in a change situation, one schema phases out, while another is phased in.

When change initiatives take place, reframing occurs as change recipients try to make sense of their expectations and their new experiences (Balogun & Johnson, 2004; Bartunek, 1984; Lüscher & Lewis, 2008). In many cases there are changes in roles, responsibilities, power status, benefits, and demands (Eby et al., 2000). There can also be information overload that makes it hard to sift out meaning (Cummings & Huse, 1989). Throughout the change initiative,

change recipients form impressions about the organization, its ability to achieve change initiative goals, the impact of the change on themselves, others in the organization, and the organization as a whole. Frames provide structure in the form of assumptions, rules, and boundaries that guide sensemaking and, over time, become embedded and are taken for granted. The very meaning of the change event itself can be shaped into a variety of beliefs through reframing (Watzalawick, Weakland, & Fisch, 1974). These beliefs about the change may be expressed socially as an attitude that reflects readiness for change (Armenakis et al., 1993; Jones & Bearley, 1986; Oreg, 2006).

Antecedents of Change-Related Beliefs

Change beliefs derived through the sensemaking process do not evolve out of nothingness; they are grounded in four types of antecedents (i.e., content, process, context, and individual differences) that inform the sensemaking process (Armenakis & Bedeian, 1999; Holt et al., 2007a). These beliefs, in turn, are linked with attitudes, which link to intentions, which link to behaviors (Fishbein & Ajzen, 1975). Insufficient research has focused attention on the simultaneous assessment of multiple antecedents from each of the categories of antecedents.

Some scholars suggest that to effectively manage change, change agents must understand what resistance to change actually entails in terms of the sensemaking process (Nord & Jermier, 1994; Oreg, 2006), and must address the needs of the change recipients (Armstrong-Stassen, 1998). It could be that change recipients are actually resisting perceived undesirable outcomes of change (Orlikowski, 2000; Boudreau & Robey, 2005), loss of feeling in control (Beaudry & Pinsonneault, 2005), or the processes of decision making and communication (Matheny & Smollan, 2005; Paterson & Hartel, 2002; Weiss et al., 1999), not the change itself (Dent & Goldberg, 1999). As Walinga (2008, p. 320-321) noted:

When studying individual change, it is also important to take into account the infinite variables at play within the individual system and the infinite beliefs and values that arise from a multitude of historical, psychological, emotional, biological, and situational factors; individuals change for infinite reasons. Acknowledging the complexity and variability of an individual facing change may enhance a leader's readiness to better respond to and facilitate change.

While not focusing specifically on the concept of readiness for change, research has found that conditions of change, such antecedents as uncertainty and perceived managerial pressure can directly predict job satisfaction, organizational commitment, and intention to leave the organization (Rush et al., 1995; Schweiger & DeNisi, 1991). Rather than looking at direct effects of these conditions of change on outcomes, this dissertation examines their indirect effects on outcomes, transmitted through change recipient beliefs, thereby treating these conditions of change as the determinants of those beliefs. Studies that have investigated resistance to change have produced results that suggest context, change implementation actions (i.e., process), and personality (i.e., individual differences) influence success (Anderson, 1996; Bernerth, 2004; Callan, Terry & Schweitzer, 1994; Eby et al., 2000; Judge et al., 1999; Madsen et al., 2005; McLain & Hackman, 1999; Oreg, 2006; Reichers et al., 1997; Wanberg & Banas, 2000).

In the study of process variables in organizational change, procedural fairness (e.g., Brockner, 2002), communication (e.g., Schweiger & DeNisi, 1991), and leadership (e.g., Kotter, 1996) are just some examples of antecedents that have been linked to change-specific attitudes like openness to the change (e.g., Wanberg & Banas, 2000), and organizational commitment (e.g., Judge et al., 1999). Many studies of change have examined contextual variables as they relate to resistance to change (Armenakis & Harris, 2002; Coch & French, 1948; Goltz & Hietapelto, 2002; Lines, 2004; Rosenblatt, Talmud, & Ruvio, 1999; Trade-Leigh, 2002), but few have examined individual differences (e.g., Cunningham et al., 2002; Judge et al., 1999). Even

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fewer have taken an interactionalist approach of looking at context in conjunction with

individual differences (Wanberg & Banas, 2000).

Antecedents in the Technology Acceptance Model

The TAM has contributed to research by serving as a highly parsimonious yet effective

model for predicting IT acceptance. It is notable that the TAM, while explaining a large amount

of variance in the laboratory, varies greatly in its predictive power in field studies, varying

between 4% (Adams et al., 1992) and 45% (Igbaria et al., 1995a). Early after the introduction of

new IS into organizations, IT acceptance received an extensive research attention (Rogers, 2003;

Kwon & Zmud, 1987; Swanson, 1988). Effort was directed toward investigating potential

determinants of user beliefs and attitudes, and what factors created resistance to change (Lucas et

al., 1990). In their presentation of the TAM, Davis and colleagues (1989) stated the investigative

purpose of the model was to "provide an explanation of the determinants of computer acceptance

that is general, capable of explaining user behavior across a broad range of end-user computing

technologies and user populations, while at the same time being both parsimonious and

theoretically justified" (p. 985). Around the time that the TAM was created, tremendous strides

were being made in developing a "greater understanding [that] may be garnered in explicating

the causal relationships among beliefs and their antecedent factors" (Chin & Gopal, 1995, p. 46).

Karahanna et al. (1999) noted that, by the late 1990s, researchers had quit focusing on

factors that had yet to be examined that could possibly influence the two primary TAM beliefs,

PEOU and PERUSE. They called for an investigation of antecedent variables to help explain the

core TAM variables and extend TAM in through antecedents to enhance its usefulness in

explaining and predicting IT acceptance and usage. As one person interviewed in the Lee et al.

(2003) meta-analysis stated, "Imagine talking to a manager and saying that to be adopted

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technology must be useful and easy to use. I imagine the reaction would be 'Duh! The more important questions are what makes technology useful and easy to use'" (p. 766).

Agarwal and Prasad (1999) attempted to extend the TAM by including five individual difference variables as determinants of PERUSE and PEOU. A significant relationship was found between participation in training and PERUSE. For antecedents of PEUO, prior experiences, technology role, organizational tenure, and education were found to be significant. Further, effort was also made to examine antecedents of PEOU and PERUSE (Amoako-Gyampah & Salam, 2004; Venkatesh & Davis, 2000). Xia and Lee (2000) examined persuasion, training, and user direct-use experience in a longitudinal experimental design. Karahanna and Limayem (2000) conducted a study involving usage of e-mail and voice-mail and found that the determinants of system usage, including PERUSE and PEOU, differed in their effect among the two technologies. PERUSE did not influence e-mail usage though social influence was significant. The results were reversed for voice-mail.

Therefore, research needs to take into account differences in technology, target users, and context, which are likely to contribute to differences in the acceptance of an IT (Moon & Kim, 2001). The TAM has also been criticized for its focus on extrinsic determinants (Moon & Kim, 2001), and it has been suggested that intrinsic motivational factors may also contribute to an understanding of IT adoption (Malone, 1981). McFarland and Hamilton (2006) examined contextual specificity in particular, using social cognitive theory as the theoretical reasoning for including computer anxiety, prior experience, others use, organizational support, task structure, and system quality as independent variables, and computer efficacy as an intervening variable. Among the most frequently included antecedents in TAM research are system quality (Igbaria et

al., 1995b), training (Igbaria et al., 1995a), compatibility, computer anxiety, self-efficacy, enjoyment, computing support, and experience (Chau, 1996).

A whole host of variables has been offered up in the last ten years, such as math anxiety, math aptitude, reading aptitude, organizational structure, management style, prior task training, and prior technology training (cf. McFarland & Hamilton, 2006). The TAM2 by Venkatesh and Davis (2000) and Venkatesh (2000) integrated the previous research efforts, and defined the external variables of PERUSE, such as gender, social influence (subjective norms), and cognitive variables (job relevance, image, quality, and result demonstrability). Venkatesh (2000) described the relevant external variables of PEOU as anchor (perceptions of external control, computer anxiety, computer self-efficacy, and computer playfulness) and adjustments (objective usability and perceived enjoyment). The results increased the variance explained up to 60% on average.

Venkatesh, Morris, Davis, and Davis (2003) noted that the TAM's fundamental constructs do not take into account aspects of user task environments, and that almost no research addressed the link between technology acceptance and continuous usage. Their model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), was used to examine the short-term and long-term effects of IT implementation on job-related outcomes, including productivity, job satisfaction, organizational commitment, and other performance-oriented constructs (Venkatesh, Morris, Davis, & Davis, 2003).

Another complaint about the TAM is its lack of moderators. Several studies have called for more inclusion and examination of moderating factors within the TAM (Adams et al., 1992; Agarwal & Prasad, 1998; Lucas & Spitler, 1999; Venkatesh, Morris, Davis, & Davis, 2003). A study conducted by Venkatesh and colleagues (2003) involving the testing of eight models revealed that the predictive validity of six of the eight models increased significantly when

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moderating variables were introduced. They made their case, stating "it is clear that the extensions (moderators) to the various models identified in previous research mostly enhance the predictive validity of the various models beyond the original specifications" (Venkatesh et al., 2003, p. 21). In a similar study, Chin et al. (2003) empirically examined moderating factors that have been previously introduced in TAM-related research, confirming the significance of their influence in predicting user technology acceptance.

There is some IT acceptance research more specific to the examination of antecedents in regard to ERP systems. Sauer's (1993) effort provides a typology of antecedents that focus on process, including: context (interdepartmental co-operation, interdepartmental communication), supporters (top management support, project champion, vendor support), and project organization (project team competence, clear goals and objectives, project management, management of expectations, careful package selection). It is clear that some of these influencing factors relate directly to addressing the five change recipient beliefs, such as careful package selection as it relates to appropriateness, project team competence and clear goals and objectives as they relate to efficacy, project championing and both top management and vendor support as they relate to principal support, and management of expectations as it relates to valence.

Typology of Antecedents of Beliefs

This dissertation categorizes antecedents of technology change-related beliefs into four categories: content, process, context, and individual differences. This is in keeping with Damanpour's (1991) statement that change success may ultimately be related to the fit between content, contextual, and processual factors. This typology was developed within a review of organizational change research conducted during the 1990s by Armenakis and Bedeian (1999).

Within their review, they noted that there were three very broad factors common to all change efforts – content issues, contextual issues, and process issues.

In addition to these factors, the importance of individual differences within a change context has also been noted (Judge et al., 1999; Lau & Woodman, 1995; Oreg, 2006; Wanberg & Banas, 2000). Walker, Armenakis, and Bernerth (2007) suggested including individual differences as a fourth category within the typology. They stated that all four of these categories influence the outcomes of change efforts. There have been a few studies that have examined all four categories of antecedents simultaneously (e.g., Brown et al., 2009a, 2009b; Holt et al., 2007a, 2007b; Walker et al., 2007; Self et al., 2007). Walker et al. (2007) and Holt et al., (2007a, 2007b) also suggested that by gaining a greater understanding of how these factors interact within one another can assist in developing a better grasp on how management can ensure change readiness. Each of the four different categories of antecedents of change beliefs are described in sections that follow.

Change-Related Content

Content as a category includes all of the aspects of the change itself. This includes specific features of the change, as well as its specific application within the organization (Walker et al., 2007). For example, researchers have found that the perceptions of the type and extensiveness of the change (Caldwell, Herold, & Fedor, 2004), the outcomes of change (Brockner & Wiesenfeld, 1996; Novelli, Kirkman, & Shapiro, 1995), and the impact of the change at both a job and a work-unit level (Fedor et al., 2006) all affect change perceptions and reactions. For purposes of this dissertation, only one content variable is examined, being the differences among the three subsystems of the ERP system.

Information System-Related Characteristics

Research suggests that the content of the change matters greatly when it comes to new information technology (Venkatesh & Bala, 2008). The decision as to whether or not to use a technology is influenced by its design characteristics (DeLone & McLean, 1992, 2003; Davis, 1993; Wixom & Todd, 2005). These design characteristics may be categorized as either information-related or system-related (DeLone & McLean, 1992). Information-related characteristics shape perceptions of whether a system seems to be useful in terms of improving productivity and performance (Dennis & Valacich, 1993, 1999; Valacich, Dennis, & Connolly, 1994; Dennis, Valacich, Carte, Garfield, Haley, & Aronson, 1997; Speier, Valacich, & Vessey, 1999). The timeliness, accuracy, and interpretability of the information relevant to the change recipient's job matter as well (Speier, Valacich, & Vessey, 2003). The greater the information quality, the better the technology will appear to be.

In addition, the better the system characteristics, (i.e., the reliability, flexibility, and user friendliness), the more likely new users will find the experience enjoyable (Wixom & Todd, 2005). These qualities are also known to reduce the anxiety generated by attempting to use a new technology, generating a greater sense of being in control of the system (Venkatesh & Bala, 2008). These design characteristics are particularly important for ERP systems because such systems are inherently difficult to use and understand (Venkatesh & Bala, 2008).

Change-Related Content Hypotheses

Based on the previously discussed theory and research concerning affective commitment to the change, change recipient beliefs, TAM-related beliefs, and the MTC, the following hypotheses are offered:

Hypotheses 7a-e: The quality of the Finance subsystem will be indirectly associated with affective commitment to change through (7a) appropriateness, (7b) change efficacy, (7c) principal support, (7d) perceived ease of use, and (7e) perceived usefulness.

Hypotheses 8a-e: The quality of the HR subsystem will be indirectly associated with affective commitment to change through (8a) appropriateness, (8b) change efficacy, (8c) principal support, (8d) perceived ease of use, and (8e) perceived usefulness.

Hypotheses 9a-e: The quality of the Student subsystem will be indirectly associated with affective commitment to change through (9a) appropriateness, (9b) change efficacy, (9c) principal support, (9d) perceived ease of use, and (9e) perceived usefulness.

Also, based on the previously discussed theory and research concerning technology acceptance, change recipient beliefs, TAM-related beliefs, and the MTC, the following hypotheses are offered:

Hypotheses 10a-e: The quality of the Finance subsystem will be indirectly associated with technology acceptance through (10a) appropriateness, (10b) change efficacy, (10c) principal support, (10d) perceived ease of use, and (10e) perceived usefulness.

Hypotheses 11a-e: The quality of the HR subsystem will be indirectly associated with technology acceptance through (11a) appropriateness, (11b) change efficacy, (11c) principal support, (11d) perceived ease of use, and (11e) perceived usefulness.

Hypotheses 12a-e: The quality of the Student subsystem will be indirectly associated with technology acceptance through (12a) appropriateness, (12b) change efficacy, (12c) principal support, (12d) perceived ease of use, and (12e) perceived usefulness.

Finally, based on the previously discussed theory and research concerning personal initiative, change recipient beliefs, TAM-related beliefs, and the MTC, the following hypotheses are offered:

Hypotheses 13a-e: The quality of the Finance subsystem will be indirectly associated with personal initiative through (13a) appropriateness, (13b) change efficacy, (13c) principal support, (13d) perceived ease of use, and (13e) perceived usefulness.

Hypotheses 14a-e: The quality of the HR subsystem will be indirectly associated with personal initiative through (14a) appropriateness, (14b) change efficacy, (14c) principal support, (14d) perceived ease of use, and (14e) perceived usefulness.

Hypotheses 15a-e: The quality of the Student subsystem will be indirectly associated with personal initiative through (15a) appropriateness, (15b) change efficacy, (15c) principal support, (15d) perceived ease of use, and (15e) perceived usefulness.

Change-Related Process

Within the conceptualization of the MTC presented here, process refers to planned actions undertaken by change agents (communication, employee participation, goal setting) during the introduction and implementation of a proposed change and emergent attributes of those processes (procedural justice, distributive justice, quality of leadership). Out of the four types of antecedents of change recipients' beliefs, change processes have received the most attention from researchers and practitioners alike (Ford & Greer, 2006). Activities by change agents are powerful determinants of reactions to organizational change (Ford & Greer, 2006; Herold et al., 2008; Kotter, 1996). Likewise, process strategies have also been examined within the literature on IT adoption (Ajzen, 2002; Galpin, 1996; Jimmieson et al., 2008).

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Process has been examined for over 60 years, dating back to Lewin's (1947) three stages of change, namely, unfreezing, moving, and freezing (Herold et al., 2008). Since Lewin's efforts, scholars and practitioners have focused on how change agents can manage the processes involved in shaping employees' attitudes toward change and related behaviors. Coch and French (1948) demonstrated that during times of change employee participation had an impact on productivity and satisfaction. Sets of change process factors have been proposed by a number of scholars (Armenakis et al., 1999; Burke & Litwin, 1992; Kotter, 1996; Nadler & Tushman, 1980; Tichy, 1983). For instance, Armenakis et al. (1999) described seven strategies to achieve institutionalization. These include: (a) persuasive communication; (b) active participation by change recipients; (c) HR management practices; (d) symbolic activities; (e) diffusion practices; (f) management of internal and external information; and (g) the formal activities that demonstrate support for change initiatives. These strategies have served as "reference models" in shaping both theoretical and practical perspectives (e.g., Ford & Greer, 2006; Van de Ven & Poole, 1995).

Understanding the management processes is essential for successful implementation of change initiatives, prompting many calls for additional research (e.g., Huy, 2001; Pettigrew et al., 2001). Change processes occur over a period of time, and they can be viewed as sequences of individual and collective events, actions, and activities (Pettigrew et al., 2001). Together, change processes enable change agents to intentionally and strategically move the organization and its members successfully into and ultimately through the adoption phase into institutionalization.

Communicating the Change Message

Feelings of fear and anxiety are common negative appraisals of organizational change events (Fugate, Kinicki, & Prussia, 2008). It is the duty of change agents to mitigate perceptions

of loss and threat and enhance a positive sense of challenge. This is done by communicating information that reduces change recipients' concerns, especially relating to jeopardized job security and advancement, as well as undesirable job changes. The goal of the communication is to influence attitude and behavior (Habermas, 1987). Articulating a clear vision for the change initiative, and delineating change recipients' roles in the post-change environment help them to influence the process.

Luthans (1988) investigated the activities of managers and found that the most effective managers spent 44% of their time communicating with others. If management is communicative, it can become involved in the change recipients' sensemaking and belief formation processes through interventions, such as the use of project champions as opinion leaders, the appropriate information dissemination, and change-specific support and training, which have the power to communicate feelings and information thereby shaping beliefs (Amoako-Gyampah & Salam, 2004). Specifically, favorable cognitive and affective reactions can be achieved through a high quality message. On the other hand, if the case being made is of a low quality, the message will probably lead to negative responses (Petty & Cacioppo, 1984; Petty et al. 1981).

Communication of a strong and acceptable change message should lead to a sense of mutual trust between the change agents and change recipients, as well as the continuous exchange of information needs to occur for the change to succeed (Amoako-Gyampah & Salam, 2004; Pinto & Pinto, 1990; Zmud & Cox, 1979). It is through such communication that persuasion can occur. *Persuasion* has been defined as "an active attempt to influence people's action or belief by an overt appeal to reason or emotion" (Wright & Warner, 1962, p. 7), and "communication intended to influence choice" (Brembeck & Howell, 1976, p. 19).

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Since beliefs are the determinants of intentions and behavior to influence behavior change agents must change the underlying beliefs. Persuasion is considered to be a major strategy for influencing beliefs and behavior (Ajzen & Fishbein, 1980). It is viewed as a social mechanism for creating, transmitting, and changing social norms (Cialdini & Trost, 1998). This occurs through compliance, identification, and internalization (Kelman, 1961). In a change situation, *compliance* occurs when change recipients submit to carrying out the dictates of management within a mandatory change initiative. *Identification* results when change recipients identify with the change message or change agents and willingly carry out the change request. *Internalization* results when change recipients accepting information as evidence of reality from those they deem to be credible sources, and integrate that information into their own cognitive system as beliefs. During the early stage of a change event, since change recipients' knowledge of the change and its social context, persuasion not only conveys information about the change itself but also signals to the change recipients what important others believe in and expect them to do with respect to their behavior.

Two basic routes of persuasion have been proposed: central and peripheral (Petty & Cacioppo, 1981). The central route is centered on the arguments vital to the issue under consideration. It emphasizes the quality of the content presented within persuasive arguments. The peripheral route emphasizes various subtle cues associated with the arguments, such as the length of the argument, source credibility and attractiveness. It has been suggested that the personal relevance of the issue is the deciding factor as to which persuasion route should be followed (Petty & Cacioppo, 1981). Under high relevance, change recipients' beliefs are principally influenced by the quality of the arguments in the change message. Under low relevance, beliefs are mainly influenced by peripheral cues.

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The change message has been examined in terms of being a discourse and dialogue between management and other organizational members (Frahm & Brown, 2007). Butcher and Atkinson (2001) highlight "framing" as a topic within the area of change management that needs more research. They posit that the active management of the message sent during organizational change has received little attention, and suggest that language norms and taboos can be anchors in maintaining the status quo of the organization. Similarly, Graetz's (2000) case study findings on strategic change leadership supported the importance of conveying the right message. She found that, because top management did not communicate with the appropriate level of "enthusiasm and vigor" apathy resulted as part of the framing of the change. Given that change agents have a great deal of discretion over the content of change messages and its conveyance. The message must encourage the right framing of the change initiative. Armenakis et al. (1999) noted the symbolic nature of giving attention to the change message delivered by the change agent fosters perceptions of authenticity and honest support and guides the sensemaking process.

At the core of change process is the content of the change message communicated. Change message content serves as a guide for change recipient sensemaking (Weick, 1995). The change message represents not only the information provided, but guidance in framing that information within new schemata. The change message is transmitted by global and local change agents by the overall change process (Armenakis et al., 1999). Based on Lewin's model of unfreezing, moving, and freezing, as well as Bandura's social learning theory, the model proposes that the change message should directly address each of the five change recipient beliefs (i.e., discrepancy, appropriateness, efficacy, principal support, and valence).

The discrepancy component of the change message contains information and guidance in recognizing that there is a need for a change. Change agents can frame the change message to

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account for the necessity of the change as it relates to the survival and well-being of the organization. The appropriateness component should provide guidance in recognizing the proposed change as one that will bridge the gap between where the organization is currently and where it needs to be. The change message should address why and even how the content of the change was determined, even comparing it against other possible courses of action. The efficacy component serves to inspire confidence in the individual change agent that he/she personally, as well as his/her work group, and the organization as a whole, can achieve the change initiative goals. Management can do this through encouragement, role modeling, testimonials and so forth that relieve anxiety. The principal support component provides evidence that the prevailing behavior throughout the organization is to support the change initiative rather than to resist it. This aspect of the change message should provide proof that organizational leaders, middle management, supervisors, and coworkers are serious about reaching the goals of the change initiative and are not just paying lip service. The valence component should specify the various future benefits that will be derived by change recipients, and the organization as a whole, from achieving the change initiative goals. This could take the form of incentives and long term wage increases.

Change-Related Training

To effectively meet the challenges that face change recipients, especially in situations involving new technologies, change agents must provide adequate training programs. Many studies have found training to be one of the most important support mechanisms for successfully implementing a change (Buller & McEvoy, 1989). Resistance to change can develop among change recipients out of the fear of not being capable of performing their jobs once the change has been made (Martin et al., 2005). Training can allay those fears by providing the

competencies necessary and also by indirectly providing opportunities for peer support (Michela & Burke, 2000).

Research suggests that training can influence attitudes, behavior, and performance of change recipients (Amoako-Gyampah & Salam, 2004). Managers can proactively influence change recipients' beliefs directly through broad-based information dissemination and use of opinion leaders to conduct part of the training. The impact of training on behavioral intentions is mediated by belief mechanisms (Galletta, Ahuja, Hartman, Teo, Peace, 1995; Yi & Davis, 2001). This mediation assumption, as well as the assumed centrality of beliefs, fit with the TPB and extant research (Amoako-Gyampah & Salam, 2004). Training influences beliefs through the change message itself, providing reasons for and the appropriateness of the change. Additionally, training influences change efficacy by providing confidence that the new behaviors can be achieved. Principal support is demonstrated through endorsement of the training by senior management and through the use of organizational members as trainers. Finally, the accomplishment of new work duties and the successful use of new technology as a result of having learned new skills can lead to positive feelings through tangible (pay for performance, job security) and intangible rewards (intrinsic motivation, positive emotions).

Training has also been examined as a mechanism for the diffusion of innovation by virtue of its influence on beliefs (Agarwal & Prasad, 1999). Extant research suggests training can influence change recipients' innovation-related perceptions, such as complexity, compatibility, visibility, and trialability (Xia & Lee, 2000), and perceived ease of use (Venkatesh 1999; Venkatesh & Davis, 1996). During the implementation of IT, organizations that offer training during the early stages of the change can reduce uncertainty (Bostrom et al., 1990; Davis & Bostrom, 1993).

Training is also touted as a means of institutionalizing technological change (Sharma & Yetton, 2007). There is an abundance of research concerning the critical role of training in enhancing technology adoption and use (Davis & Bostrom, 1993; Davis & Yi, 2004; Venkatesh, 1999; Venkatesh & Bala, 2008; Venkatesh & Speier, 1999; Wheeler & Valacich, 1996). Studies that have examined failed technology change initiatives have attributed it to a lack of satisfactory education and training programs for end users (Lee, Kim, & Lee, 1995).

To training programs for new technology should foster self confidence and positive perception concerning the system. Training serves to provide change recipients with conceptual and procedural knowledge about the target system (Venkatesh 1999). This may help establish the appropriateness of the choice of systems. Change recipients without adequate training are likely to experience problems using the system, which may make them believe that the system is difficult and not worth the efforts required to learn it (Igbaria et al., 1997). By encouraging interaction with the system, training can make change recipients more comfortable.

Training has been found to specifically influence the formation of PERUSE and PEOU (Amoako-Gyampah & Salam, 2004). More specifically, empirical research suggests that training increases procedural knowledge, which, in turn, influences PEOU (Venkatesh & Davis, 1996), attitudes (Raymond 1990), and PERUSE (Igbaria et al., 1989). The importance of training as an influence on beliefs regarding ERP systems has also been noted (Amoako-Gyampah & Salam, 2004; Cooke & Peterson, 1997). IT research has also found that types of training can have different effects on change recipients' skills and change beliefs (Venkatesh, 1999; Venkatesh & Bala, 2008). For instance, Venkatesh (1999) found that game-based training was more effective than traditional training on enhancing technology acceptance of a new system. He also

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discovered that the effect of PEOU on behavioral intention to use a system was stronger for those who received game-based training.

Training should occur starting early in the change implementation, since it is in the earliest stages of the change that change recipients will begin making cognitive assessments. These cognitive assessments by change recipients concern estimations of their own abilities, and the abilities of their coworkers and other organizational members, as well as the organization's overall ability to successfully carry out the change. Xia and Lee (2000) found that training provided in the introduction stage of IT innovation also helped change recipients form more realistic expectations.

Change-Related Process Hypotheses

Based on the previously discussed theory and research concerning training, affective commitment to the change, technology acceptance, personal initiative, change recipient beliefs, TAM-related beliefs, and the MTC, the following hypotheses are offered concerning training's indirect influence on various change outcomes through different beliefs.

> *<u>Hypotheses 16a-e</u>: Training will be indirectly positively associated with affective commitment to change through (16a) appropriateness, (16b) change efficacy, (16c) principal support, (16d) perceived ease of use, and (16e) perceived usefulness.*
>
> *<u>Hypotheses 17a-e</u>: Training will be indirectly positively associated with technology acceptance through (17a) appropriateness, (17b) change efficacy, (17c) principal support, (17d) perceived ease of use, and (17e) perceived usefulness.*
>
> *<u>Hypotheses 18a-e</u>: Training will be indirectly positively associated with personal initiative through (18a) appropriateness, (18b) change efficacy, (18c) principal support, (18d) perceived ease of use, and (18e) perceived usefulness.*

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Change-Related Context

Organizational change does not take place in a vacuum. Change initiatives take place within the context of organizations composed of social structures, organizational identities, organizational cultures (and subcultures), competing constituencies, practices, histories, and so forth, and the organization takes place within the context of the external environment composed of competitors, regulations, trends, etc. Within the model of technological change, context represents all conditions within an organization's external and internal environment.

The sub-category of external contextual factors refers to everything that exists outside of the organization. It takes into account that organizations are not closed systems (Daft & Weick, 1984). Often organizations are driven to make a change by pressures within the external environment (i.e., competition, new technology, regulation). Organizations typically have no control over external forces, rather, according to organizational ecology (Singh & Lumsden, 1990), they must respond to the environmental pressures by adapting the organization as much as possible in order to survive. Among the various external contextual factors are the organization's industry (banking, airlines, health care, etc.), as well as that industry's fundamental characteristics (direction, competition, customers, market size, demand, level of technology, knowledge needed; Armenakis & Bedeian, 1999; Walker et al., 2007).

The sub-category of internal contextual factors consists of everything that comprises the organization. The role played by the internal context in which a change is embedded has not been adequately explored in the literature (Herold et al., 2007). A change initiative will upset the equilibrium that exists within an organization. New burdens are placed on work groups that often require new KSAs. Power may shift among organizational members and the past organizational experience may be rendered valueless.

Internal contextual factors can include such things as specialization, levels of professionalism, managerial attitudes toward the change, managerial tension, managerial tenure, technical knowledge resources, organizational slack, the organization's prior history of change, and technical knowledge resources (Armenakis & Bedeian, 1999; Damanpour, 1991; Walker et al., 2007). One extension of Damanpour's investigation suggests that organizational design variables, such as mission, technology, size, structural complexity, perception of change, and involvement are all strong contextual determinants of employee reactions to change (Gresov, Haveman, & Oliva, 1993).

The degree to which a change initiative taxes an employee's abilities to cope with the event often depends on the availabilities of resources. When resources are available, an employee will have an easier time coping with increased demands. When resources are already being consumed in adapting to other environmental events or no organizational slackness exists, then the change initiative may be jeopardized (Herold et al., 2007).

Notably, out of the articles that Armenakis and Bedeian (1999) examined within their 10 year review of the change literature, only one study focused on internal contextual factors rather than on external factors. An extensive variety of contextual variables have been proposed as related to employees' resistance to change (e.g., Armenakis & Harris, 2002; Brown et al., 2008a, 2008b; Holt et al., 2007a, 2007b; Kotter, 1995; Miller et al., 1994; Oreg, 2006; Self et al., 2007; Tichy, 1983; Wanberg & Banas, 2000; Zaltman & Duncan, 1977). However, few studies have examined the influence of internal context on individual change recipients' responses to specific change initiatives (Herold et al., 2007). Ruta (2005) suggested that by analyzing the context of the change (at both the external and internal levels), more appropriate change strategies can be developed by change agents to support a change initiative.

Within the technology acceptance literature, contextual issues have been primarily defined as the extent to which change recipients believe that organizational and technical infrastructures exist to support the use of a new system (Venkatesh, Morris, Davis, & Davis, 2003). As conceptualized within the literature, the overall internal environment has been defined as three different constructs: perceived behavioral control (TPB), representing the amount of discretion a change recipient has in making the choice as to whether or not to use a technology; compatibility (IDT), representing differences between the old and new technology as well as the ability of the new technology to be integrated into other existing systems; and facilitating conditions (TAM3), representing support mechanisms that encourage technology adoption and the availability of organizational resources.

The TAM conceptualization of context could prove useful if applied to organizational change research. First, more research could be done to determine how change recipients differ in their reactions to mandatory versus discretionary change initiatives. From a human agency perspective (Emirbayer & Mische, 1998), even when a change is mandatory, change recipients are relatively free to handle the change process in a variety of ways. Second, very little research has examined the context gap, meaning what is the organization like before the change and how different will it be after the change. The degree to which the organization changes itself may have serious consequences on the potential success of the change. For instance, investigations have revealed that when changes are made to organizational climate, the changes must not stray too far from existing organizational values and identity or else employees may view the change unfavorably (Schneider, 1990; Schneider & Bowen, 1993). Third, more attention should be given to the facilitating conditions as a concept within the change literature. Facilitating conditions typically refer to contextual variables, but it can also include process variables. Use of the job

demands-resources model (cf. Bakker, Demerouti, & Schaufeli, 2005; Llorens, Bakker, Schaufeli, & Salanova, 2006) and other coping-related heuristics (Lazarus & Folkman, 1984) might prove beneficial in understanding the interrelatedness of content and process support.

Leader-Member Exchange (LMX)

The quality known as *leadership* refers to "the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organizations of which they are members" (House, Hanges, Javidan, Dorfman, & Gupta, 2004, p. 15). One theory that examines how leaders influence members is known as Leader-Member Exchange (LMX). This theory got its start as a construct in 1972 with the work of Graen, Dansereau, and other researchers (e.g., Dansereau, Graen, & Haga, 1975) who initially coined it as the Vertical Dyad Linkage (VDL) model of leadership.

LMX theory (Graen & Uhl-Bien, 1995) is based upon social exchange (Blau, 1964; Gouldner, 1960), and it proposes that leaders develop unique dyadic relationships with each of their subordinates. IS managers have a finite amount of personal, social, and organizational resources, and, because of this, they must selectively divide those personal resources among their subordinates (Dansereau et al., 1975; Graen & Scandura, 1987; Graen & Uhl-Bien, 1995). The way that a supervisor divides up his or her attention and other resources among different employees leads to the formation of unique dyadic relationships that vary in terms of their LMX quality.

Subordinates are more likely to meet the expectations of their supervisors when they share mutual respect, liking, admiration, trust, respect, and obligation with their supervisor (Katz & Kahn, 1978; Uhl-Bien et al., 2000). Leader-member exchange relationships that are positive and strong, involving mutual exchanges that go beyond the basic requirements of the

employment contract, are called *high-quality LMX relationships*. Employees in high-quality

exchanges are likely to invest their energy, time, personal resources, and effort because they

expect that they will be rewarded (intrinsically or extrinsically), based upon the social exchange

norm of reciprocity (Coyle-Shapiro & Conway, 2005). More specifically, these relationships

provide greater autonomy and assistance to the subordinate and promote greater commitment and

loyalty directed toward the leader (Yukl, 2005). Often subordinates in high-quality relationships

reciprocate through role expansion and citizenship behaviors (Liden, Sparrowe, & Wayne, 1997;

Settoon, Bennett, & Liden, 1996; Wayne, Shore, & Liden, 1997), and there is typically more

collaborative problem solving involving both the leader and subordinate (Hofmann, Morgeson,

& Gerras, 2003). As such, previous research has found high-quality LMX relationships to be a

valuable predictor of job effectiveness, extrarole behaviors, open and honest communication, job

satisfaction and greater access to resources (Gerstner & Day, 1997; Graen & Uhl-Bien, 1995;

Liden et al., 1997). Strong relationships with immediate supervisors are also considered integral

for building employee engagement (Bates, 2004; Frank et al., 2004).

Relationships that lack respect, liking, admiration, trust, and a sense of obligation are

called *low-quality LMX exchanges*. These are simple exchanges between the subordinate and

leader that do not go beyond the requirements of the employment contract. In these relationships,

subordinates are more likely to simply perform their assigned tasks without any additional effort.

Low-quality exchange relationships have been linked to less access to supervisors, restricted

information, job dissatisfaction, lower organizational commitment, employee turnover, and

lower access to resources (Gerstner & Day, 1997), as well as disadvantages in career progress

and job benefits as well (Vecchio, 1997). Low-quality LMX relationships with immediate

supervisors are also believed to be linked with disengagement and burnout (Bates, 2004; Frank et al., 2004).

LMX produces "social capital" for organizations and may impact organizational performance (Uhl-Bien et al., 2000), providing competitive advantage in retention and motivation of talented workers (Erdogan, Liden, & Kraimer, 2006). A meta-analysis by Gerstner and Day (1997) suggests that the quality of LMX is negatively related to turnover, and a field study by Griffeth (2000), supports this, suggesting that LMX helps embed employees within organizations, providing a disincentive for employees to quit. High LMX also demonstrates a significant correlation to increased subordinate satisfaction (Graen et al., 1982), increased subordinate performance (Dansereau, Alutto, Markham, & Dumas, 1982), enhanced subordinate career outcomes (Wakabayashi & Graen, 1984), and decreased propensity to quit (Vecchio, 1982). Low LMX is generally recognized as a determinant of voluntary turnover (Griffeth & Hom, 2001).

While LMX has not been examined (to my knowledge) within the TAM, technology acceptance literature has confirmed the importance of manager support as a predictor of PERUSE and PEOU (Igbaria et al., 1997). Manager support was also found to have an indirect effect through perceived usefulness on actual usage of technology.

Change-Related Context Hypotheses

Based on the previously discussed theory and research concerning LMX, ERP subsystems, training, affective commitment to the change, technology acceptance, personal initiative, change recipient beliefs, TAM-related beliefs, and the MTC, the following hypotheses are offered:

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Hypotheses 19a-e: Leader-member exchange will moderate the indirect effects of Finance subsystem on affective commitment through (19a) appropriateness, (19b) change efficacy, (19c) principal support, (19d) perceived ease of use, and (19e) perceived usefulness.

Hypotheses 20a-e: Leader-member exchange will moderate the indirect effects of HR subsystem on affective commitment through (20a) appropriateness, (20b) change efficacy, (20c) principal support, (20d) perceived ease of use, and (20e) perceived usefulness.

Hypotheses 21a-e: Leader-member exchange will moderate the indirect effects of Student subsystem on affective commitment through (21a) appropriateness, (21b) change efficacy, (21c) principal support, (21d) perceived ease of use, and (21e) perceived usefulness.

Hypotheses 22a-e: Leader-member exchange will moderate the indirect effects of Finance subsystem on technology acceptance through (22a) appropriateness, (22b) change efficacy, (22c) principal support, (22d) perceived ease of use, and (22e) perceived usefulness.

Hypotheses 23a-e: Leader-member exchange will moderate the indirect effects of Finance subsystem on technology acceptance through (23a) appropriateness, (23b) change efficacy, (23c) principal support, (23d) perceived ease of use, and (23e) perceived usefulness.

Hypotheses 24a-e: Leader-member exchange will moderate the indirect effects of Finance subsystem on technology acceptance through (24a) appropriateness, (24b)

change efficacy, (24c) principal support, (24d) perceived ease of use, and (24e)

perceived usefulness.

Hypotheses 25a-e: Leader-member exchange will moderate the indirect effects of ERP

subsystem on personal initiative through (25a) appropriateness, (25b) change efficacy,

(25c) principal support, (25d) perceived ease of use, and (25e) perceived usefulness.

Hypotheses 26a-e: Leader-member exchange will moderate the indirect effects of ERP

subsystem on personal initiative through (26a) appropriateness, (26b) change efficacy,

(26c) principal support, (26d) perceived ease of use, and (26e) perceived usefulness.

Hypotheses 27a-e: Leader-member exchange will moderate the indirect effects of ERP

subsystem on personal initiative through (27a) appropriateness, (27b) change efficacy,

(27c) principal support, (27d) perceived ease of use, and (27e) perceived usefulness.

Hypotheses 28a-e: Leader-member exchange will moderate the indirect effects of

training on affective commitment through (28a) appropriateness, (28b) change efficacy,

(28c) principal support, (28d) perceived ease of use, and (28e) perceived usefulness.

Hypotheses 29a-e: Leader-member exchange will moderate the indirect effects of

training on technology acceptance through (29a) appropriateness, (29b) change efficacy,

(29c) principal support, (29d) perceived ease of use, and (29e) perceived usefulness.

Hypotheses 30a-e: Leader-member exchange will moderate the indirect effects of

training on personal initiative through (30a) appropriateness, (30b) change efficacy,

(30c) principal support, (30d) perceived ease of use, and (30e) perceived usefulness.

Individual Differences

For a change initiative to succeed, change agents must understand not only how change

recipients might react to a change initiative and what strategies can be taken to support the

initiative, but also the attributes of organizational members that may influence their reactions to the change. Organizations are filled with a variety of people unique in their dispositional and personality characteristics. These individual differences can cause individual change recipients to demonstrate particular organizational attitudes and behaviors to resist or adopt changes (Oreg, 2003; Schneider, 1987; Staw & Ross, 1985).

Some change recipients may automatically interpret change events in ways that produce in them dysfunctional attitudes (Avey et al., 2008). Many individual differences can influence sensemaking. For instance, someone with a high tolerance for ambiguity is likely to be better able to cope with the uncertainty associated with organizational change than others who do not have a high tolerance (Judge et al., 1999). Also, a person with a high openness to experience (McCrae & Costa, 1986), high sensation-seeking (Zuckerman & Link, 1968), or low in risk-aversion (Slovic, 1972) might be better equipped for change, and might even enjoy the challenges of a change initiative.

In addition to inclusion within the model of change readiness, individual differences have also been included within many studies involving the TAM (Agarwal & Prasad, 1999; Alavi & Joachimsthaler, 1992; Harrison & Rainer, 1992; Venkatesh, 1999; Venkatesh & Bala, 2008). In the overall IS literature, relationships between individual differences and a variety of IS-related outcomes have been theoretically posited and empirically demonstrated (Zmud, 1979; Harrison & Rainer, 1992). Numerous individual differences have been examined, such as personality traits, demographics, and attitudes (Agarwal & Prasad, 1999).

Core Self Evaluation

For this dissertation, core self evaluation was chosen as an individual difference for examination. Core self-evaluation (CSE) is a construct composed of four lower order personality

traits (self-esteem, generalized self-efficacy, emotional stability, and locus of control) that have

been widely studied individually. The four traits are so closely related on conceptual and

empirical grounds that they are all considered to be dimensions of a single dispositional trait

(Johnson, Rosen, & Levy, 2009; Judge, Erez, Bono, & Thoresen, 2003; Judge, Locke, &

Durham, 1997; Kammeyer-Mueller, Judge, & Scott, 2009). Judge et al. (1997) were the first to

study these four constructs as reflections of a broader construct even though these four constructs

had high intercorrelations and poor discriminant validity. *CSE* was introduced as a dispositional

construct to represent the "fundamental premises that individuals hold about themselves and their

functioning in the world" (Judge et al., 1998, p. 168).

It has been explained that "individuals with positive core self-evaluations appraise

themselves in a consistently positive manner across situations; such individuals see themselves

as capable, worthy, and in control of their lives" (Judge, Van Vianen, & De Pater, 2004, pp. 326–

327). CSE was created as a dispositional explanation for life and job satisfaction. Separately, as

well as together, they are significantly related to life satisfaction and job satisfaction (Judge &

Bono, 2001; Judge, Locke, Durham, & Kluger, 1998), task motivation (Erez & Judge, 2001), job

performance, and perceptions of the work environment (Erez & Judge, 2001; Judge et al., 2003).

Even before CSE was developed as a construct, organizational behavior researchers had

been investigating the role of self-esteem, locus of control, and emotional stability in coping with

stressful situations (Cohen & Edwards, 1989; Ganster & Schaubroeck, 1995; Spector, Zapf,

Chen, & Frese, 2000). After its inception as a higher-order factor structure construct, CSE

proved useful in understanding individual differences in stressor appraisals and response

processes (Kammeyer-Mueller et al., 2009). Extant research suggests that, "chronic beliefs about

the self, control, and outcomes reflect key components of an individual's view of the world and

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of his/her ability to function successfully in that world, and thus should be especially potent in shaping reactions to stressful life events" (Cozzarelli, 1993, p. 1224). Individuals with low CSE are likely to feel more anxiety and encounter stressful life situations as a result (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007; Bolger & Schilling, 1991; Ormel & Wohlfarth, 1991). Individuals with high CSE tend to be somewhat less emotion-focused in their coping, and are more capable of problem-solving coping than individuals low in CSE (Kammeyer-Mueller et al., 2009).

Individual Difference-Related Hypotheses

Given the content domain of CSE, it seems most likely, theoretically, that CSE would play a moderating role of the relationships that are mediated by change efficacy and perceived ease of use, since those two beliefs concern perceptions of capability and likelihood of mastering whatever needs to be achieved. Thus, based on the previously discussed theory and research concerning CSE, training, affective commitment to the change, technology acceptance, personal initiative, change efficacy, perceived ease of use, and the MTC, the following hypotheses are offered:

> *Hypotheses 31a-b: Core self-evaluation will moderate the indirect effects of Finance subsystem on affective commitment to the change through (31a) change efficacy and (31b) perceived ease of use.*

> *Hypotheses 32a-b: Core self-evaluation will moderate the indirect effects of Finance subsystem on affective commitment to the change through (32a) change efficacy and (32b) perceived ease of use.*

Hypotheses 33a-b: Core self-evaluation will moderate the indirect effects of Finance subsystem on affective commitment to the change through (33a) change efficacy and (33b) perceived ease of use.

Hypotheses H34a-b: Core self-evaluation will moderate the indirect effects of HR subsystem on technology acceptance through (34a) change efficacy and (34b) perceived ease of use.

Hypotheses H35a-b: Core self-evaluation will moderate the indirect effects of HR subsystem on technology acceptance through (35a) change efficacy and (35b) perceived ease of use.

Hypotheses H36a-b: Core self-evaluation will moderate the indirect effects of HR subsystem on technology acceptance through (36a) change efficacy and (36b) perceived ease of use.

Hypotheses H37a-b: Core self-evaluation will moderate the indirect effects of Student subsystem on personal initiative through (37a) change efficacy and (37b) perceived ease of use.

Hypotheses H38a-b: Core self-evaluation will moderate the indirect effects of Student subsystem on personal initiative through (38a) change efficacy and (38b) perceived ease of use.

Hypotheses H39a-b: Core self-evaluation will moderate the indirect effects of Student subsystem on personal initiative through (39a) change efficacy and (39b) perceived ease of use.

Hypotheses H40a-b: Core self-evaluation will moderate the indirect effects of training on affective commitment to the change through (40a) change efficacy and (40b) perceived ease of use.

Hypotheses H41a-b: Core self-evaluation will moderate the indirect effects of training on technology acceptance through (41a) change efficacy and (41b) perceived ease of use.

Hypotheses H42a-b: Core self-evaluation will moderate the indirect effects of training on personal initiative through (42a) change efficacy and (42b) perceived ease of use.

CHAPTER 3

METHOD

The research presented in this dissertation follow a sequential, mixed-methods approach (Creswell, 2008; Creswell & Plano Clark, 2007; Sandelowski, 2003). The design consists of two studies, the first being qualitative and the second being quantitative. A sequential mixed methods approach of inquiry combines both qualitative and quantitative strategies, which facilitate a deeper understanding of a research problem than could using either a quantitative or qualitative method alone (Creswell, 2008). This assertion recognizes the differing natures of quantitative and qualitative research. While quantitative approaches to research are generally characterized by the researcher focusing on using positivistic claims for developing knowledge, a qualitative approach develops knowledge claims based on a constructivist viewpoint that acknowledges multiple individual perspectives.

Many scholars note the value of a mixed method approach (Creswell & Plano Clark, 2007; Onwuegbuzie & Johnson, 2006; Sandelowski, 2003; Tashakkori & Teddlie, 2003). In addition, there are many successful research studies that combined qualitative inquiry to build theory and quantitative assessment to test hypotheses (Shah & Corley, 2006; Ziedonis, 2004).

Research Design

The research conducted within this dissertation consists of two separate studies. Study 1 was conducted over a period of 7 months (February, 2007, through September, 2007). It was followed by Study 2, which was conducted over a period of 5 months (January, 2008, through June, 2008). A more detailed timeline is presented in Table 4 below.

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Table 4
Timeline for Studies 1 and 2

	Study 1
Dates	*Action*
02/07	Initial meetings with change agents, reading of documents related to the change
02/07-04/07	ERP system feedback session attendance
02/07-08/07	Informal conversations with change recipients
04/07-06/07	In-person qualitative interviews
07/07-08/07	Web-based qualitative interviews
08/07-09/07	Analysis of qualitative data
10/07	Report to change agents concerning findings from Study 1

	Study 2
Dates	*Action*
01/08-03/08	Development of quantitative instrument with change agent assistance
04/08-05/08	Development of the Web-based survey
06/08	Web-based survey data collection

Study 1 represents an inductive, exploratory approach. It involved gathering and content analyzing rich qualitative data using an inductive approach, answering research questions, and designing a quantitative survey instrument based on the qualitative findings. The qualitative data collected in Study 1 provided organizational members' perceptions of the change event via semi-structured interviews, open-ended Web-based questionnaires, group feedback sessions, conversations with individuals, meetings with change agents, and documentation, such as e-mail. Content analysis and narrative analysis were used to answer the research questions. In addition, qualitative data were organized into highly-developed themes to create a custom quantitative survey as an alternative to using a deductive methodology.

Study 2 represents a deductive, confirmatory approach. It consisted of developing custom measures for the quantitative survey research, followed by gathering and analyzing empirical data to test hypotheses. The data collection in Study 2 was conducted via a Web-based

quantitative survey instrument with both close-ended and open-ended items measuring various self-reported work and change related attitudes, perceptions, and beliefs. Analysis of the empirical data from Study 2 was corroborated by the qualitative findings from Study 1.

Reasons for a Mixed Method Design

The major characteristics of traditional qualitative research include induction, discovery, exploration, the researcher as the primary instrument in data collection, qualitative analysis, theory building, and proposition creation. The major characteristics of quantitative research include deduction, confirmation, theory/hypothesis testing, explanation, prediction, standardized data collection, and statistical analysis.

Mixed methods research exists when a researcher combines quantitative and qualitative research techniques, methods, approaches, concepts, or language into a single study. Such research combines inquiry methods of induction (discovery of patterns), deduction (testing of theories and hypotheses), and abduction (developing and relying on a set of explanations for understanding). The fundamental principle of mixed methods involves understanding the strengths and weaknesses of each approach to produce a superior study design to mono-methodological studies because they combine complementary strengths and non-overlapping weaknesses (Johnson & Turner, 2003). One example might be adding qualitative interviews to quantitative experiments as a manipulation check. Another could be adding a quantitative survey to a qualitative study in order to systematically measure constructs considered integral to the resulting theory.

Purists on both sides of the qualitative (cf. Lincoln & Guba, 1985) and quantitative divide (cf. Maxwell & Delaney, 2004; Schrag, 1992) advocate the incompatibility thesis (Howe, 1988), which argues that the two research paradigms cannot, and should not, be combined. In

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opposition are those who favor combining the two methods, drawing from the strengths of both, while minimizing their weaknesses in a single research study or across several studies. A mixed methods approach represents the middle ground between the opposing viewpoints in the quantitative versus qualitative argument.

The first application of mixing methods has been accredited to Campbell and Fiske (1959) in using multiple methods in their study of psychological trait validity (Creswell, 2008). Since then, many researchers have come to recognize the value of integrating both qualitative and quantitative data collection into their repertoire, recognizing that reliance solely on either of the two approaches alone presents an incomplete view (Di Pofi, 2002). Van Maanen and colleagues (1982, p. 12) pointed out, "in organizational research, well-established qualitative practices are rather hard to find...and virtually any qualitative method applied to the analysis of organizational matters is an innovation." Researchers suggest organizations are better understood through qualitative comments because they have storytelling values (Van Buskirk & McGrath, 1992). Rousseau (2006, pp.1091-1092) said:

> I put my money on qualitative research playing a central role in identifying the meanings playing a central role in identifying the meanings underlying observed patterns and, as important, in helping translate evidence into practice by exploring the subjectivity, politics, and conflicts involved in changes to organizational practices.

Numerous researchers are now producing books and articles on mixed methods (Brewer & Hunter, 1989; Creswell, 2008; Greene, Caracelli, & Graham, 1989; Johnson & Christensen, 2004; Newman & Benz, 1998; Reichardt & Rallis, 1994; Tashakkori & Teddlie, 1998, 2003). In addition, the *Journal of Mixed Methods Research* was founded in 2007 by Sage Publishing through the support of noted mixed method researchers (i.e., Bryman, Creswell, Fetters, Mertens, Morgan, Patton, Tashakkori, and Teddlie).

Qualitative research can be accurate, but it can also be overly complex. Quantitative data collection is very useful for theory testing. Weick (1979) suggests that the solution to making trade-offs is not to find one method that achieves all three dimensions of accuracy, generalizability, and simplicity, but rather alternating among data sets that provide one or more of these elements and complementing it with other research. By combining the use of qualitative and quantitative techniques, the weaknesses of each method can be suppressed, as other researchers have pointed out in the past (Gioia & Pitre, 1990; Jick, 1979; Van Maanen, 1977; Webb et al., 1966). Even many managers and consultants praise the value of integrating both qualitative and quantitative data collection, claiming reliance solely on either approach presents an incomplete view (Di Pofi, 2002).

Advantages of a Mixed Method Design

The use of mixed methods affords several benefits, including: triangulation, complementarity, initiation, development, and expansion. Triangulation of results means that a mixed method allows the researcher to corroborate the results through different methods and designs for more assurance (Jick, 1979). Utilizing multiple methods improves validation so that variation reflects the trait being analyzed, rather than the method utilized to collect the data (Campbell & Fiske, 1959). Similarly, the use of multiple perspectives can provide greater insights by allowing the research issue to be observed from different points of view (Cunningham, 1993). Within the research process itself, triangulation can inform the process since results from one method can in turn help inform the other method (Creswell, 2008; Greene et al., 1989). Complementarity means that researchers can gain elaboration, clarification and further expounding of the results by getting different kinds of data through different methods. Initiation means that the researchers may be confused by apparent contradictions and paradoxes

that force them to reframe their research questions to gain clarity. Development means that using one method will inform another method. Expansion means that the researchers simply seeks to expand the breadth and range of research-produced knowledge by choosing a method that is not often used to see if it produces a different kind of information.

A second advantage of using a qualitative method is that the technique allows individuals to report specific issues (events, incidents, processes, or issues) that are taking place within the organization that may not be captured in prefabricated scales focused on global attitudes toward a job or organization. By allowing respondents to define their schemata in their own words, researchers are able to gain a greater understanding of the issues and concerns most important to each respondent. Each respondent is able to identify concerns that are the most personally salient, without being primed or biased. This improved understanding of respondent realities through open responses helps reduce the likelihood of bias in diagnosing an organization's issues (Gregory, Armenakis, Moates, Albritton, & Harris, 2007).

As responses are gathered, specific issues can be identified. In contrast, results from a prefabricated instrument may not provide data that are as descriptive or insightful (Gregory et al., 2007). While some of these prefabricated instruments were developed to be comprehensive, one must act cautiously and carefully to assess if a given instrument is representative of an organization's relevant issues (Moates, Armenakis, Gregory, Albritton, & Feild, 2005). For example, data collected from a prefabricated instrument focusing on satisfaction with supervisor (e.g., Scarpello & Vandenberg, 1987) may indicate that subordinates are dissatisfied with their supervisor, but may not identify specific behavior, such as yelling at employees or gossiping about employees, that resulted in the dissatisfaction. In contrast, these specific behaviors could readily be captured through interviews.

The collection of specific issues leads to a third advantage from including a qualitative approach; it saves time in identifying specific challenges to be addressed. Because results of a prefabricated instrument may only indicate an undesirable state exists (i.e., low supervisor satisfaction), additional information would subsequently need to be collected from employees if researchers wanted to gain a better understanding of the specific issues influencing survey responses. Such additional collection of information would require more time and resources.

A final advantage of an empirical survey created from a qualitative methodology is that the data it provides for the development of a highly face-valid quantitative survey addressing specific, salient organizational issues identified by respondents. Such a quantitative survey is likely to be interpreted as more personally relevant to members of the organization than a prefabricated instrument developed for general use. The greater personal relevance of a customized and highly-informed quantitative survey is likely to result in greater motivation by employee respondents to complete the survey completely and accurately.

CHAPTER 4

STUDY 1: QUALITATIVE RESEARCH

The results presented within this chapter focus solely on the narrative of the change

initiative and the qualitative themes. The qualitative findings provided a great deal of insight into

the organizational change and served an important function by informing the development of a

quantitative survey.

Schein (2004) pointed out that quantitative assessment via survey research only reflects

preconceived conceptual categories, not the actual views of organizational members. As

Mintzberg (1979, p. 113) said: "I believe that the researcher who never goes near the water, who

collects quantitative data from a distance without anecdote [sic.] to support them, will always

have difficulty explaining interesting relationships . . ." Pfeffer and Sutton (2006) likewise

stated:

> . . . indeed, we reject the notion that only quantitative data should qualify as
> evidence. . . . Good stories have their place in an evidence-based world, in
> suggesting hypotheses, augmenting other (often quantitative) research, and
> rallying people who will be affected by a change (p. 67).

While actual theory development is highly valued, it is seldom practiced, and, when it is,

it is primarily through a quantitative, deductive method involving pre-existing theory as the

foundation for the development of testable hypotheses (Shah & Corley, 2006). Many researchers

have opined that theory building requires more than cross-sectional, survey-based data collection

and analysis methods (e.g., Echambadi, Campbell, & Agarwal, 2006). Alternatively, rich

descriptions of patterns available qualitatively, through "soft data," may help to build theory (Shah & Corley, 2006).

Qualitative methods are process-oriented, contextually-grounded, emphasize experiential data, and provide meaning to the data. These methods provide such meaning by seeking an understanding of the perspectives of the actors who are participating in the phenomenon under study. In the present case, an organizational change is analyzed in an effort to reveal the inner workings of complex systems, new variables, and unexpected relationships (Miles & Huberman, 1994).

Organizational Setting for Study 1 and 2 and a Narrative of the Change Event

This study concerns a technology-related organizational change that took place at a major Southeastern university. As Gioia and Chittipeddi (1991) pointed out in their own study, universities are often characterized by chaotic decision-making processes, a multiplicity of goals, political factions, and diffused power, making it an excellent environment for conducting organizational change research. The change initiative investigated concerned the implementation of a complex ERP system as a replacement for legacy IT systems that were either no longer supported by the manufacturers or would soon lose that support.

The ERP system manufacturer that oversaw the primary legacy IT system used by university administrators and other employees offered the university a deal in exchange for purchasing their ERP software system. They also notified the university that the company would only support the old legacy IT system for two more years. The university also had issues with the storage of information as multiple data base silos. The information was not integrated and was not being handled as efficiently or as securely as possible. The administrators made the decision to overhaul the university's entire IT system with the new ERP system. The new ERP system

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would provide four subsystems, each one with two interfaces, one administrative interface for employees who used the subsystem as part of their job, and one self-service interface for occasional users.

The new ERP system was well established and had been implemented many times, as the manufacturer's website noted:

> [Manufacturer] offers [ERP system], a complete suite of enterprise resource planning (ERP) solutions designed for higher education. [ERP system] is the world's most widely used collegiate administrative suite of student, financial aid, advancement and enrollment management systems. It is a tightly integrated suite of proven, scalable, enterprise-wide applications on a single database, designed to support institutions of all sizes and types. [ERP system] runs on the Oracle RDBMS. [ERP system] works seamlessly with portal, content management, performance reporting and analytics, and other solutions to enable you to build your institution's unique vision of a unified digital campus. More than 900 institutions worldwide rely on [ERP system] to help them achieve measurable improvements in performance.

The replacement of the legacy systems with a university wide, single shared data base system was expected to disrupt the lives of every administrator and staff employee to some degree, based on how central the ERP system was to their job duties and which subsystems they would interact with in performing specific tasks. Many older employees felt threatened by the change or simply did not want to go through it, prompting over 30 retirements campus-wide. In addition, faculty would be slightly affected in terms of how they interacted with the HR portal subsystem in accessing information on their pay or the finance subsystem in accessing information on any special accounts they might oversee. Students would also be slightly affected in terms of how they registered for classes, accessed their financial aid, and received information from the university's administration.

It is worth noting that the highest levels of the university's administrators made the decision to purchase and implement the technology change without first getting input from any

of the university employees affected. They also did not compare the new ERP system to other systems, and went with the new ERP system simply because of the financial savings on the implementation and contracts for future support by the ERP system manufacturer. During the decision process in choosing to purchase the new ERP system, a 200+ page strategic guide was developed, but it was never circulated beyond senior administrators. It was later posted to the university website. An e-mail was sent out shortly after the decision was made to all top administrators throughout the campus notifying them that the legacy IT systems would soon be replaced. The e-mail did not contain any of the change message components (Armenakis et al., 1993) and very few specifics about the implementation or the ERP system itself. Over the next few months, after the creation of a team of change agents called the implementation team, more e-mails were sent out by the global change agent guiding the implementation team.

Eventually e-mails were sent out to notify administrators that all users of the existing legacy systems were to attend mandatory sessions to introduce the new ERP system. Most administrators and staff employees who interacted with the legacy systems attended a short 1 to 2 hour presentation of what the new ERP system would do. A month or so later, e-mails were sent out notifying employees, who used the old financial system as part of their job duties, to sign up for training in the new system.

The training for the finance subsystem of the new ERP system became the stuff of horror stories, and, indeed, became passed around as organizational stories (Schein, 2004). The change agents and change recipients interacted with in this study all reported that the training was not good, using terms like "waste of time," "they didn't know what the hell they were doing," and "disaster." This did not create a positive impression in the minds of the trainees, who carried

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stories back to their coworkers about the quality of the training and what they could derive concerning the new system.

The qualitative research that composes Study 1 began roughly 10 months after the initial rollout of the first of four interrelated software subsystems that were part of the new ERP system. The ERP system as a whole changed work flow, job descriptions, access to information, and the distribution of power among the change recipients. The implementation of each subsystem made the change initiative incremental in nature, especially given that it replaced existing legacy systems.

The first subsystem released was the *Finance* subsystem. This subsystem had an estimated four-year learning curve for users. It was said, by change agents (including the ERP system manufacturer's consultant) and change recipients alike, to be the most intricate and difficult of the subsystems, requiring the most training. In addition, the second subsystem, *Human Resources* (HR) subsystem, the second most complex and difficult system, had just been released three months prior to the start of the study. The third subsystem, *Financial Aid* subsystem, was released shortly after the HR subsystem, but it was omitted from examination in this study because only a handful of employees interacted with the subsystem and they did not wish to participate in the research. The fourth subsystem, *Student* subsystem, said to be the least difficult and complex of the four subsystems, came online while the study was underway, roughly seven months into the research process.

The implementation team welcomed this research project as an opportunity to learn more about the end-users of the new ERP system through an independent source. They provided access to meetings, feedback sessions, and contact information for potential interviewees. They

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also provided e-mails and other documentation concerning the new ERP system and the implementation.

By the time the HR subsystem was released, the implementation team had learned much through working with change recipients in implementing the Finance subsystem. An effort was made to improve support by having the change agents serve as more educated support and trainers. The training itself was better organized and the instructors were far more informed than during the Finance subsystem training. In addition, the change agents were still in the process of working out bugs in the Finance subsystem and customizing it to the needs of the university. The change agents began conducting feedback sessions at each of the different colleges throughout the university. (As part of the data collection for this study, several feedback sessions were attended and comments were transcribed. These transcriptions were used to help researchers understand the technical aspects of the new ERP system, the various duties for which the ERP system was used, and the overall university-wide attitude toward the change. In addition, the transcriptions informed the researchers' action research effort in working with the change agents and also informed the narrative of the change event.)

Most employees who received training in the HR subsystem reported that the training was far better than for the Finance section because the instructors were much better informed and the subsystem was less complex than the Finance subsystem.

The implementation of the Student subsystem went far more smoothly than the Finance section and the HR section. By the time it was implemented, a person was put in charge of the team implementing that particular subsystem who interacted with the old system regularly, and who was also a university instructor. He provided far more detailed instruction to his own change-agent team and communicated more content, more frequently, than previously had been

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done for the Finance and HR subsystems. In addition, the system was less complex than the two previous systems. The major issue that arose that was unlike the other two systems was the issue of access to student records. Access was drastically reduced to improve security, and it changed the job duties of employees, who had to be chosen (usually one or two individuals from each department) to have special access to records. Even access throughout the university became more compartmentalized to protect students' records. The changes in access to student records changed the power and responsibility inherent within many positions as a result.

Throughout the entire IT implementation, many informal networks emerged to provide support to one another, passing along tips, complaints, and comments on what needed to be corrected. These networks usually formed internally within each college. Certain well-respected peers in more central administrative positions (e.g., business office, etc.), who were considered experts in using the new ERP system, served as horizontal change agents. They became central hubs in many of these networks. Often, when they did not know the solution to an issue, they would know who to call, thus connecting individuals across smaller networks.

Research has found that employee relationships provide a coping mechanism for dealing with stressful situations (Martin, Jones, & Callan, 2005). Networks of relationships have also been found to influence the results of planned change in terms of implementation and use of the change content (Tenkasi & Chesmore, 2003). Research in technology adoption has found that work networks are important in that opinion leaders within work networks influence the opinions of change recipients when it comes to using the new technology (Karahanna, Straub, & Chervany, 1999). In addition, networks of this sort help facilitate coordination of activities within the organization (Gittell, 2003, 2006, 2008), which is vital for successfully making the transition to the new system as a university. The relational dimensions of peer-to-peer

relationships have been examined in research (Bechky, 2006; Vogus, 2004; Weick & Roberts, 1993). It was found that shared goals, shared knowledge, and mutual respect provide for higher levels of information processing capacity and improve the coordination of highly interdependent activities in uncertain and time constrained situations. Thus, networks were especially important within the implementation of the new ERP system, for two main reasons: one, because everyone was learning the system simultaneously and the network served as a coping mechanism and as an information source, and, two, because many of the activities involved approval processes to carry out assignments, making the work very interdependent, requiring respect and concern for the ability of others to accomplish their job duties.

The training offered also improved drastically over time. The training for the Finance subsystem was condemned while the training for the Student subsystem was highly praised. Classes continued to be offered at regular intervals through the HR department of the university. Classes were discretionary, and employees could sign up for any classes that they thought would benefit them, and could take a class multiple times. The classes were primarily classroom based and involved actual use of the system or a facsimile of it. In addition, support improved through the printing and distribution of "cheat sheets" that provided various quick instructions for a wide variety of system tasks.

The change agents also continued to provide feedback sessions that were open to all employees, but they discovered that the same employees showed up regularly and complained about the same problems, often very vociferously. Often these problems were the result of the employees' inability to comprehend how the new ERP system functioned, despite the training provided to them. In other cases, the complaints took the form of requests for expensive alterations in the software for aesthetic reasons, such as not liking how the interface looked.

According to the change agents, the number of legitimate complaints and calls for improvements dwindled over time.

Within one year after the implementation of the Student subsystem, the global change agent who headed the implementation team retired, and the manufacturer's ERP system consultant quit the manufacturer and took the global change agent's position. The implementation team continues to work, at the time of the writing of this dissertation, at improving the ERP system for the university.

Participants

The participants for Study 1 were all administrative and staff employees working in various schools, colleges, departments, and offices throughout the university, including such areas as business, building and architecture, education, engineering, forestry and agriculture, science and math, nursing, pharmacy, political science, psychology, and veterinary medicine. Additionally, administrators working in student housing, community outreach, consulting services, and other university-wide administrative functions were included. The participants all used at least one of the ERP subsystems as a major aspect of their jobs. The initial qualitative data collection efforts focused on the Finance and HR subsystems, but expanded to include the Student section, which was not released until later in the study. Additionally, members of the change implementation team were also included through interviews and discussions. All participants remain anonymous.

Employees in various levels of authority, in various colleges and departments, with varying degrees of experience with software and change initiatives, and with a wide range of tenure, (from recent hires to employees who had been at the university for over three decades), were interviewed. A wide range of demographics including age, gender, and ethnicity was

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captured. The purpose was to capture as many different perspectives as possible. A total of 37 in-person, individual interviews were conducted by the two primary investigators, each interview lasting roughly one hour.

After completing the 37 in-person interviews, change recipients who met during the feedback sessions were contacted by telephone. They were asked to participate in online open-ended questionnaires. In total, 31 Web-based, open-ended questionnaires were administered to individuals who had not participated in the in-person interviews. These questionnaires consisted of responses to the information guide, (meaning they responded to the same questions as the in-person interviews.) Both the in-person interviews and the Web-based questionnaires resulted in the collection of similar data content, no substantive differences were found in terms of emergent concepts, though the majority of the unitized data was collected through the in-person interviews (approximately 60%). The interview and Web-based questionnaire data collection took place over a 10-month period. Additionally, 7 group interviews involving the change recipients, and 4 group meetings consisting of the change implementation team, were conducted. Documents, both private and public, were also reviewed and analyzed. See Table 5 for further details.

Table 5

Qualitative Data Collected

Type of Data	Amount of Data
Individual interviews:	37 interviews
30 university staff (change recipients)	(390 double-spaced pages)
7 change implementation team members	
Group interviews:	11 group sessions
7 feedback sessions, (12-28 individuals each)	(90 double-spaced pages)
4 change implementation team feedback sessions	
Web-based open-ended questionnaires:	31 questionnaires
31 university staff (change recipients)	(155 double-spaced pages)
Observations of change recipients & informal conversations:	Various conversations
	(25 double-spaced pages)
Internal Documents:	130 double-spaced pages
From high-level administrators and the change	
implementation team members	
(e.g., planning, progress updates, feedback opportunities)	
Public Documents:	192 double-spaced pages
(e.g., Internet news releases, public reports,	
implementation plan)	
Total data collected	917 double-spaced pages

Interviewees were sought from as many different colleges and job positions as possible. The inclusion of a wide variety of perspectives as a representative sample of employees is consistent with Flanagan's concept of "sphere of competence" (Flanagan, 1954). Flanagan acknowledged that any individual member may be more aware or sensitive to some issues than will other members, as each employee holds a unique position which can influence their experiences and perceptions.

Over the course of data collection via one-on-one interviews, Web-based interviews, and group interviews, meetings with change implementation team continued for the purpose of tracking their activities and perceptions. In addition to these data collection opportunities, change recipient feedback sessions hosted by the change implementation team were attended to gather further information. The feedback sessions involved change recipients from 11 of the university's colleges. At the end of each session, attendees were invited to participate in the study as interviewees.

Research Questions

The research questions focused on specific topics of interest, but were intentionally open to future refinement. Some of the original research questions include:

Research Question 1: During the implementation of an ERP system, what are the primary concerns of change agents and change recipients?

Research Question 2: During the implementation of an ERP system, do the activities of change agents and change recipients involve both technology acceptance and organizational change processes?

Research Question 3: What linkages possibly exist between technology acceptance and organizational change processes?

Research Question 4: What types of influence and how much influence do the technological aspects have on the social aspects of an ERP system implementation?

Research Question 5: What particular constructs and relationships seem most critical and worthy of including in an empirical study?

Research Procedures

Initial impressions. Early data collection/analysis included informal conversations with several members of the change recipients, asking questions to determine various perceptions about the change. This provided a strong foundational understanding of their perspectives. E-mail announcements, website postings, project guideline documents, and other organizational artifacts provided further detail.

We repeatedly met with members of the change implementation team, both one-on-one and in group meetings, particularly the university project leader and the top consultant, in order to gather first-hand perspectives. One-on-one meetings with the change agents ranged from

informal to formal, including, at one point, asking them over 140 questions derived from initial

conversations and analysis of organizational artifacts. This early data collection/analysis

provided a basic understanding of the organizational change, and provided help in making sense

of some general perceptions among both change targets and change agents. During this early part

of the research, the information received was corroborated by other individuals. Throughout the

entire research project, logs of notes concerning conversations, answers to questions, and

interviews were kept.

Open-ended interviews. Once a good foundation for understanding the change situation

was established, guidelines were created for the interviews. Steps were taken to communicate to

interviewees the purpose of the study, the reasons why they were asked to participate, and the

types of observations requested. Additionally, they were provided information in accordance

with the Institutional Review Board for the Use of Human Subjects in Research (IRB) regarding

the steps taken to assure confidentiality and protection. The initial plan was to record the

interviews on audio tape, but after several informal conversations it became obvious that some

interviewees would speak more openly if interviews were not recorded. Therefore, copious notes

were transcribed during interviews detailing responses as close to verbatim as possible.

Perceptions of the affective states of interviewees were likewise noted.

The interviews were semi-structured and allowed for open-ended responses. Through

these interviews, information was collected pertaining to events, incidents, processes, and issues

surrounding the implementation of the new ERP system. In the interviews, participants were

encouraged to use their own terminology and discuss topics and issues which they saw as most

salient from their particular perspective. This format permitted participants in individual

interviews to engage in a stream of consciousness and relate "thick" descriptions (Gioia &

Thomas, 1996).

Questionnaire. According to Patton (2002), the open-ended interview strategy is

characterized by predetermined questions with an exact wording and sequence, so that all

interviewees are asked the same questions in the same order. This served as the interview

schedule. After conducting a few initial semi-structured interviews, the questions were refined

and other questions were added based on the responses provided. The semi-structured interviews

were guided by a set of 14 open-ended questions that served as a data collection guide. No

questions were deleted. Throughout the data collection, the research questions were re-examined.

The structured interview questions are included in Appendix D.

Content Analysis and Theme Development

The interviewee's responses were broken down into topic-specific units; (this is referred

to as "unitization"). Care was taken to preserve the original intent of each response (i.e., breaking

up compound sentences and placing statements into categories). The units were coded during

open coding. This coding was conducted concurrently with an ongoing iterative process of

analysis. The intent of this approach was to conceptualize categories which reflected the data,

converging the codes into sub-themes and themes.

Two researchers worked initially independent of one another in developing initial codes

using an inductive method, consistent with the grounded theory building approach. After the

initial conceptual work, we worked in conjunction with one another, to determine the most

logical codes and to refine those codes. As part of the theory-building process, we began

developing more selective coding by determining links between the various codes, creating

related categories (which would become sub-themes) and determining how the categories related to one another, (which would become the primary themes).

Data collection continued throughout this process to further refine the themes and sub-themes. The collection of themes and sub-themes were not only reviewed as independent parts of the whole, but also holistically. The researchers conceptualized how the themes interrelated with one another, so as to recognize relationships among various sub-processes that together represented an organizational story about the change event. Over time, this story, and the various individual themes began to produce emergent theory. Subject matter experts (SMEs) then reviewed the analysis as a means of independent verification regarding the logic and theoretical structure of the themes, sub-themes, and the organizational story constructed.

Considerable effort was exerted so as to develop and maintain rigor throughout the data collection and analysis, especially in terms of qualitative trustworthiness. Maintaining rigor was accomplished by keeping accurate accounts of the research within research journals, including observational notes taken, personal insights into the conceptualization, and notes on the methodological decisions made.

<div align="center">Findings</div>

Themes Developed

The primary themes developed through the coding process are presented in Table 6. The themes, described individually below, include: *(content themes)* – (a) finance subsystem, (b) human resources subsystem, (c) technical issues, *(process themes)* – (d) training-related issues, (e) communication and change message, (f) managing the change process, (g) fairness-related issues, (h) change agents, *(context themes)* – (i) internal and external contextual pressures, (j) social and political influences, *(individual difference themes)* – (k) change recipient

characteristics, *(beliefs themes)* – (l) efficacy and support for the change, (m) valence for the

change recipients, and (n) discrepancy and appropriateness; (see Table 6.). A total of 147 sub-

themes were developed, making the analysis quite comprehensive, and many of the sub-themes

that were deemed important during the analysis are included within Appendix A. The themes can

be divided into various categories that match up with the components of the MTC, namely,

content themes, process themes, context themes, individual difference themes, and belief themes;

(see Table 6 for the categories).

     Additional findings. Aside from the 14 primary themes that were developed, during the

content analysis, other information was gleaned. Findings included: how the themes interrelated,

various types of progress made over time within the various themes, major incidents related to

many of the themes, the influence of individual decisions, and a variety of outcomes that

believed to be directly related to actions taken.

Table 6

Themes Developed from Content of the Interviews

MTC Component	Primary Themes	% of overall responses
Content[a]	Finance Subsystem	13.55%
	Human Resources Subsystem	11.00%
	Technical Issues	6.39%
Process	Training-Related Issues	16.37%
	Communication & Change Message	12.60%
	Managing the Change Process	5.37%
	Fairness-Related Issues	4.48%
	Change Agent Effectiveness	1.15%
Context	Internal and External Contextual Pressures	[b]
	Social & Political Influences	3.26%
Individual Differences	Change Recipient Characteristics	7.10%
Beliefs[c]	Efficacy & Support for the Change	9.66%
	Valence of Change Recipients	5.31%
	Discrepancy & Appropriateness	3.77%

[a] Note that there was no theme for Student Subsystem. Even though this was the third subsystem, it had not yet been introduced so respondents did not discuss it.
[b] Theme determined through discussion with the change implementation team and through public and private documents. Other themes were discussed with the change agents as well.
[c] The beliefs, PEOU and PERUSE, were captured within comments related to the content themes (Finance Subsystem and Human Resources Subsystem).

Summary for Study 1

The content of the themes is very broad in some cases; therefore, examples of sub-themes and sample comments are included within Appendix A to add further detail to the descriptions given below. The themes are grouped together to represent the parts of the MTC model. There are three content-related, five process-related, two context-related, one individual difference-related, and three beliefs-related. They are presented below in order of highest frequency to lowest within each group.

Finance subsystem (content theme). This theme primarily concerns a wide array of perceptions regarding the Finance subsystem. Many employees had access only to this portion of the system and often utilized it throughout the day, every day. This theme includes comments

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regarding efficiency, information availability, ease of use, specific technical issues, and perceptions of the quality of the overall Finance subsystem. The Finance subsystem was considered by those change recipients that utilized the HR subsystem to be the most complex and difficult to master.

Human resources subsystem (content theme). This theme is similar to the Finance-related theme, except that it concerns the HR subsystem of the new ERP system.

(Note that there is no theme for the Student subsystem. This is because, at the time of the qualitative interviews, the Student subsystem had not been released. The Student subsystem was released in the time between Study 1 and Study 2. It was described in informal conversations with change agents and change recipients as the easiest to learn and least complex of the three subsystems.)

Technical issues (content theme). This theme focuses on the various procedural intricacies and technological problems related to the new ERP system. The theme includes specific complaints and suggestions concerning the various screens, codes, terminology, administrative forms, reports, and so forth.

Training-related issues (process theme). This theme focuses on the various aspects of training, ranging from the course content, to course availability, to the quality of instruction, to the teaching ability of specific instructors, to a variety of suggestions for improving the courses.

Communication and change message (process theme). This theme focuses on the types of communication, and the content of the communication, conducted by the change agents in implementing the change. It includes the formal announcement, the preparation, and the continued communication throughout the change process.

Managing the change process (process theme). This theme focuses on the strategies used by the change implementation team, the reasoning for those strategies, the management style utilized, the change recipients' perceptions of how well the change process was managed, and both the met and unmet expectations and needs recognized by both change agents and change targets throughout the change process. Additionally, this theme includes how success was measured during the implementation, the perceptions of success throughout the process, and how management acted and reacted to achieve success.

Fairness-related issues (process theme). This theme focuses on the procedural, distributive, interactional, and informational fairness issues that were noted by the change implementation team and the change recipients affected by the change. The theme included cites of specific incidents, as well as general perceptions of treatment and fairness.

Change agent effectiveness (process theme). This theme does not concern any strategies about the IT implementation, but rather consists of attributions about the effectiveness of the change agents in carrying out the implementation. This theme includes change recipient comments concerning the credibility of, and leadership provided by, the change agents, as well as attributions about the change agents' attitudes concerning the change. The theme includes a comparison of how the change recipients viewed the university employees who were acting as change agents as compared to the ERP system manufacturer's employees who were assisting in the change. The change recipients had a more favorable view toward many of the university employees involved and a less favorable view toward the ERP system manufacturer's consultants.

Internal and external contextual pressures (context theme). This theme focuses primarily on the reasons for the change from a management perspective. This includes cost savings,

support issues, long-term strategic planning, and cost-benefit analysis conducted by administrators concerning the expected (and other potential) risks involved in the change initiative. It includes numerous predictions by administrators in terms of how the staff would regard the new ERP system, how the change would affect the university's efficiency and effectiveness, and how long it would take to make the change successful.

Social and political influences (context theme). This theme focuses on all the various social and political networks, pressures, coalition-building efforts, and influences at work within the university. It focuses primarily on the social influence of the change recipients on one another, both in discussing expectations regarding the change before the change occurred and opinions regarding the change throughout the change process by horizontal change agents.

Change recipient characteristics (individual difference theme). This theme focuses on the individual differences among the change recipients, shared perceptions among the change recipients, perceptions of the change recipients by the change agents and their attitudes directed toward the change recipients. Individual differences, such as resistance and readiness to change, proactive behavior, and self-efficacy, are included.

Efficacy and support for the change (beliefs theme). This theme focuses on the change recipients' perceptions of change efficacy and principal support. It includes opinions on the various groups and individuals within the university who were looked to for purposes of determining if the organization was capable of reaching the change initiative goals successfully. It also focuses on those groups and individuals who were looked to for support, be it emotional support, information, rationalization for the change, or technical assistance. This included such groups and individuals as the provost, the business office, the information technologies office,

the dean of the various colleges, the heads of the individual departments, veteran organizational members, the change implementation team, and individual change agents in particular.

Valence of change recipients (beliefs theme). This theme focuses on the perceived value of the change, including expected gains, unrealized gains, gains still in development, and gains that were already perceived at the time of the study. This theme included intrinsic and extrinsic gains, for the university, the change agents, and the change recipients.

Discrepancy and appropriateness of the change (beliefs theme). This theme includes the reasoning behind making the change from the old legacy systems to the new ERP system. It primarily focuses on the perceptions of the change recipients affected by the change. It includes their beliefs about whether or not the legacy IT systems needed replacing. Additionally, it includes their opinions on whether or not the new ERP system was the best of all the options.

Development of a Contextually-Customized Survey Instrument

It is important to note that the specific themes identified through the qualitative methodology for the customized survey would likely have been difficult to identify simply through application of existing theory. Because each of the qualitative themes in the survey was associated with organizationally specific and ERP system-specific topics, it was possible to go beyond the broad theme level to the critical issues and concerns that needed to be considered when developing a subsequent quantitative survey. In this way, a customized survey not only provides a great deal of face validity to respondents, but also helped in identifying specific perceptions surrounding controversial matters once responses to the survey are analyzed.

Due to the limitation on the number of items that could be reasonably asked on a survey, collaboration with the change agents guided the decisions, to some extent, on the most critical issues on which to focus on in the quantitative data collection. In addition to the inclusion of

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psychometrically sound scales relating to variables of interest from a research standpoint, many questions were written to address other, contextually-specific issues based on change agent needs and the qualitative findings. This process is detailed in the following chapter.

Answering the Research Questions

The findings in Study 1 sufficed in answering the five research questions that were instrumental in guiding the quantitative research in Study 2. The discussion of those findings in relation to the research questions is presented below.

R1: During the implementation of an ERP system, what are the primary concerns of change agents and change recipients?

The answer to this research question was directly produced in the form of the themes and subthemes that emerged. These themes were presented previously in Table 6. In addition, a total of 147 sub-themes were created within these themes. They are presented in a list within Appendix A. The content within the themes and subthemes, as well as the narrative of the change event, answered the remaining four research questions.

R2: During the implementation of an ERP system, do the activities of change agents and change recipients involve both technology acceptance and organizational change processes?

The simple answer to this research question is "yes." The content of the comments suggested that change recipients were concerned about not only the technical aspects of the ERP system implementation, but rather by the entirety of the change initiative. This is clear within the subthemes that were produced as a result of the qualitative analysis. Based on the findings, training issues seemed the most salient issue in the minds of change recipients. At the surface level, training seems primarily concerned with the technical content of the training, but many of the comments by the interviewees revealed concerns about the availability of training, the

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training instructors and manner in which the training was conducted. The second- and third-most discussed themes concerned the two ERP subthemes (i.e., the Finance subsystem and HR subsystem) that had been released at the time of the interviews. These two themes seem to focus solely on the technical aspects of the ERP system, but, again, examination of the subthemes reveals that a large portion of the comments concerned (a) how information was distributed and who had access to it, (b) the changes in workflow, (particularly in terms of the approval process required for many activities), (c) changes in the way work was conducted (i.e., "going paperless"), and (d) loss of productivity, mostly due to the learning curve, though some was attributed to the system itself. The other themes that were developed primarily focused on the ERP system implementation process and the way that change agents handled the process. The exception to this is the theme titled technical issues, which was thoroughly focused on the technical aspects of the change.

R3: What linkages possibly exist between technology acceptance and organizational change processes?

Based on the findings, it seems that the two processes, organizational change and technology change, are viewed as a singular process within the minds of change recipients rather than as two discrete processes. The comments that were made indicate that the change recipients made few distinctions between the technical content, the process of implementing the technical process, and the related organizational changes that would result from those changes. Indeed, it was common for those who reported that the new ERP system was not technically satisfactory to also make comments that the change initiative was not being conducted satisfactorily and that the change would not succeed.

Early in the change initiative, negative impressions of the management of the change seemed to carry over into the views of the ERP system itself. More specifically, when training was handled poorly, such as with instructors who did not know the system very well and with training materials that did not adequately explain the intended course content, the inference was that the ERP system itself was unsatisfactory. Likewise, the way the communication was handled, basically with the change to the new ERP system being dictated to the change recipients as mandatory, influenced the change recipients' willingness to give the informational advantages of the ERP system a chance to succeed. Many assumed that the new ERP system was not better than the legacy systems simply because of the many technical glitches that frequently occur early during almost any implementation of such a pervasive IS and also because the change initiative support was not adequate in the beginning of the implementation.

Over time, however, change recipients seemed to begin separating the change content from the change process in their own minds as they gained experience in using the new ERP system. Their opinions about the ERP system began to be based more on the system itself and less influenced by the change process. This is because, through use, the merits of the new ERP system became apparent, with change recipients comparing the abilities of the new system with what the legacy systems had been capable of doing.

R4: What types of influence and how much influence do the technological aspects have on the social aspects of an ERP system implementation?

Certainly subjective norms played a role in shaping the views of change recipients. Based on the comments gathered in the interviews, many of the change recipients openly discussed the change initiative with other change recipients, particularly with those within their own departments and colleges, but also with opinion leaders throughout the campus administration. It

was clear that many of the interviewees' opinions were very similar to those of their co-workers and distinct from the opinions of others in different departments, indicating that co-workers opinions may have played an influencing role. However, there was still a variety of opinion in some departments, and, based on some comments, it seemed that social influence decreased over time as the change recipients had more time to examine the merits of the ERP system itself rather than relying on the opinions of others.

R5: What particular constructs and relationships seem most critical and worthy of including in a quantitative study?

There were a number of constructs that were identified based on the qualitative research. Many of the constructs were included within the quantitative research. In fact, many of the most important constructs are included in Study 2. Aside from the constructs that were included in Study 2, there were other constructs as dispositional optimism (based on the impression from the interviews that some change recipients were overwhelmingly negative while others were overwhelmingly positive), regulatory focus (based on the fact that many viewed the change as a change to achieve goals while others saw the change as something to get through without suffering any problems), organizational justice (based on the fact that many of the change recipients discussed fairness issues), and organizational support for the change (based on the frequency of comments related to the assistance the university administration, and the change agents in particular, provided.)

CHAPTER 5

STUDY 2: QUANTITATIVE RESEARCH

This chapter details Study 2. After completing Study 1, the themes, subthemes, and other

findings produced from it were utilized in determining what should be the focus of attention in

Study 2. It was in preparation for the empirical research that theory was applied and purposes for

research were developed. This dissertation and Study 2 in particular, as it is presented here,

represents one of the outcomes of an action research-oriented, mixed method approach. For the

record, the data collection included the gathering of data beyond the scope of what is presented

here within this study. Indeed, two other related studies have emerged from this data collection

(Brown et al., 2008a, 2008b).

This study is conducted at the individual level of analysis, with an instrument composed

of scales consistent with that level. In addition, the participants (namely, the ERP system users)

were chosen to be consistent with the focus of the prior qualitative study and purpose of the

research. Given that much of the extant organizational development research has focused on a

systems or "macro" orientation in studying change (Meyer & Herscovitch, 2001), researchers

have called for more research at the individual level of analysis regarding organizational change

(Judge et al., 1999).

This study utilized a Web-based survey for data collection. Survey research is a standard

and frequently used method for conducting research involving organizational behavior.

Specifically, surveys for research purposes have three objectives: (a) to produce quantitative

descriptions of some aspects of a studied population such as variables and relationships, (b) to collect information from participants in a structured manner via predefined questions, and (c) to assess a sample of the population as a means of making generalizations concerning how they apply to the population (Pinsonneault & Kraemer, 1993). The survey used in this research accomplished those three objectives.

Procedure

Three weeks before the release of the online survey, a pilot survey was conducted. Roughly 50 university employees were recruited to participate in the survey online. These individuals were selected and then contacted by phone and e-mail to help test the Web-based survey, to make sure that it was functioning correctly. Those contacted included faculty, staff, and administrators. They were chosen from among those who had participated in the in-person and Web-based qualitative research in Study 1. They were chosen primarily because they had already demonstrated a willingness to participate in the research and also because there were individuals from across campus, in different colleges and job positions. The pilot survey functioned correctly and the data were successfully collected. After the success of the pilot survey, the decision was made to open the survey to all university employees that worked with the new ERP system.

Ten days before the Web-based survey was released, an e-mail was sent out by the person in charge of the implementation team to all university administrators and staff. In total, based on the number of university employees reported as employed in 2008, on the Auburn University Office of Institutional Research Assessment Website (2009), around 2,840 e-mails were sent out; however, the exact total was not disclosed by the administrator who sent the e-mail. The body of the e-mail contained the recruitment letter information; (see Appendix B for a copy of the e-

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mail). It described the survey used in this research and requested participation. It noted that the survey was anonymous, that participation was discretionary, and that the research was being conducted independently, with no involvement (beyond the announcement) by the university administration or implementation team.

On the same day and also one day before the survey was released, information concerning the survey was placed on AU Access, a campus news webpage containing announcements and information for administrators and staff. The recruitment letter was also included in AU Daily, a campus-wide e-mail consisting of pertinent announcements.

On the day of the survey, a mass recruitment e-mail was sent out to all university staff and administrators asking for those who utilized the new ERP as part of their job subsystem to complete an online survey. Potential participants were informed that participation was completely voluntary and anonymous, that the survey was being conducted independent of the university administration, and that the study had been approved by Auburn University's institutional review board. These potential participants received a hyperlink in the e-mail that directed them to an online survey that asked for them to give their opinions concerning specific aspects of the new system, the change agents, and various aspects of the organizational change initiative.

For screening purposes, survey instructions reiterated that only employees who used the new ERP system as part of their job should complete the survey, and, for screening purposes, participants were required to state that they used the new ERP system as an integral part of their job, to give their job description (administrator, staff, or faculty), and to choose the subsystem that they utilized the most as part of their job subsystem. The choices were Finance, HR, and Student subsystems. Many employees used two or even all three of the subsystems in carrying

out their job duties. However, during the qualitative interviews, it became clear that employees typically used one of the subsystems more than the others based on their job description.

After the initial webpage, participants were directed toward one of three slightly different surveys. The survey differed based on which ERP subsystem the participants answered that they used primarily. The survey consisted of 240 items for the Finance subsystem, 184 items for the HR subsystem, and 162 items for the Student subsystem. This variation is due to change agents requesting additional items. The teams in charge of each of the three different subsystems wished to collect different information concerning their own efforts in directing the implementation and the subsystems themselves, particularly technical aspects of each subsystem. The research variables chosen for this research did not vary based on the ERP subsystem primarily used, and all the scales were placed in the same locations throughout all the surveys.

In terms of the instrument itself, an Internet-based survey consisting of both open response and closed Likert scale type items were utilized. The Internet-based survey consisted of two sections. The first section consisted solely of the scales that were developed in conjunction with the change agents in charge of the initiative. The scales were face valid and related specifically to t`he organizational change in progress (e.g., particular change-related tasks, specific types of communication taking place, support by specific change agents). The second survey section, (and labeled as such), immediately followed the first section. It consisted of other self-report scales (e.g., LMX, coworker support, regulatory focus, commitment to change).

The survey remained active for 12 days. Three times, during the window of time that the survey was open, additional announcements were made to encourage participation. After the time specified, the survey was closed and the webpage was taken down making the hyperlink inactive.

Participants

The participants in this study consisted of the administrators and staff employed at a major Southeastern university who were all end-users of the new ERP system. As noted previously, the changeover to that new system represented a massive organizational change from legacy systems to a new integrated way of handling information. The change to the new ERP system directly affected nearly 2,400 individuals, and an earlier qualitative investigation revealed that the change initiative provoked around 30 early retirements and altered the ways in which the change recipients performed most of their daily job-related tasks; the change also affected workflow and the assignment of some job duties. Those who retired early were not contacted for the survey.

Total participation in Study 2 consisted of 737 participants, of which 696 (94.4%) provided demographic information. Of these participants, 687 (93.2%) completed at least the first section and 430 (58.3%) completed the entire survey (i.e., both sections). After cleaning the data for those who completed the entire survey (n = 430), 412 cases remained for use in the analysis for Study 2. Change agents estimated the total number of end-users as being nearly 2,400, making the overall participation rate 30.7%, with those who completed the entire survey representing 17.9% of the entire population of end-users. In addition, 58.3% of those who began the survey completed both sections. A summary of the demographics for all the participants who at least responded to the demographics items is included in Table 7a and a summary of the participant demographics for the participants used in the analysis included in Table 7b.

Table 7a
Demographics for All Participants in Study 2 that Completed the Demographics Section

Generation (Age)	Total Participants	Percent		Level of Education	Total Participants	Percent
1901-1924	0	0%		High School	162	23%
1925-1942	41	6%		2 Years	135	19%
1943-1960	347	50%		Bachelor's	257	37%
1961-1981	291	42%		Master's	109	16%
after 1982	17	2%		Doctoral	33	5%
Total	696	100%		Total	696	100%

Gender	Total Participants	Percent		Organizational Tenure	
Female	527	76%		Mean	10.71
Male	168	24%		Standard Deviation	7.03
Total	696	100%		Respondents	696

Note: Mean and Standard Deviation in Years

Table 7b
Participant Demographics for the Data Used in Study 2

Generation (Age)	Total Participants	Percent		Level of Education	Total Participants	Percent
1901-1924	0	0%		High School	94	23%
1925-1942	26	6%		2 Years	80	19%
1943-1960	208	51%		Bachelor's	135	33%
1961-1981	168	41%		Master's	71	17%
after 1982	10	2%		Doctoral	32	8%
Total	412	100%		Total	412	100%

Gender	Total Participants	Percent		Organizational Tenure	
Female	290	70%		Mean	11.60
Male	122	30%		Standard Deviation	7.76
Total	412	100%		Respondents	412

Note: Mean and Standard Deviation in Years

Development of a Contextually-Customized Survey Instrument

This study took place in 2007 after the conclusion of Study 1, the qualitative phase of the research. Based on the findings from the qualitative study, several variables were identified for inclusion in the survey. The choice of which variables to include in the survey came about through a process that took into account several factors, specifically: (a) the frequency of respondent comments concerning a variable, which assumed that a higher frequency of reports meant a greater salience among respondents, (b) the amount of researcher interest in a particular variable, and (c) the potential for any findings related to the variable adding to our scholarly understanding of the organizational change phenomenon.

Aside from the variables chosen for the research focus, through meetings with the implementation team, a number of other variables were identified as being of interest to the change agents. The purpose in adding these variables was to assist the change agents through the results that would be generated and to also focus on variables that were deemed important by the change agents based on their experiences throughout the change. A number of variables that focused on specific features, activities, support, training, and use of the new ERP system were selected based on change agent interest.

A scale development procedure following Hinkin's (1995) guidelines was used to develop assessment instruments for those variables that were specific to the change. The items were initially written by the change agents. The implementation team involved various change agents who were working in specific implementation activities, and who were working in specific administrative departments (e.g. Business office, HR department, Office of Information Management), in the item creation process. The implementation team, as the global change agents, gathered the items and organized them. The researchers then took the content and

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wording of the items and compared them to pre-existing scales. Most of the scales used for comparison came from the IS literature. The content of the items were then re-written such that, if pre-existing scales, items, or wording could be used, they were. This increased the likelihood that psychometrically sound scales comprised the survey instrument.

The scale development process involved the generation of items. According to Hinkin (1998), defining the content domain is crucial. Defining the content domain did not require a great deal of work since the scales were not concerning entirely new constructs, but, rather, involved customizing existing constructs as variables that dealt specifically with the ERP system implementation. In addition, these were not, from a deductive perspective, multi-dimensional scales. They focused on very specific content domains. For instance, ERP system-related training was asked in the same manner as in existing scales for assessing training, but the items developed focused on specific areas of training (e.g., contracts and grants training, payroll training, etc.) that were occurring as part of the new ERP system implementation.

The items related to ongoing change initiative activities were created inductively (Hunt, 1991), with the aid of the change agents, based on looking to what was being done within the change effort in terms of training, support, and activities involving use of the ERP system. Within each activity, such as training or support, the various types of training and support that were being provided were grouped and classified by the change agents in charge of those activities. Once generated inductively, researchers looked at the items and used a deductive process to match pre-existing scales to the items generated by the change agents.

The items were developed based on Hinkin's (1995) advice. They were as short as possible, relied on plain and simple language familiar to the respondents, did not mix items that assessed behaviors, cognitions, and affective responses (Harrison & McLaughlin, 1993), and

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addressed only a single issue each, rather than being "double-barreled" in content. Leading

questions were avoided. Only items that should generate variance were included. With the

exception of one item, negatively worded items were left out f the scales created for the survey in

order to keep the scales simple and clear, and to avoid reverse scoring and loss of scale reliability

(Hinkin, 1995).

Measures

This section provides descriptions of the scales used to measure each of the variables

contained in the research model for Study 2. A complete listing of the scales and their associated

items is located in Appendix D.

The scales include both previously used, well-established scales and those created with

the assistance of the implementation team. Prior to performing the statistical analyses, all

negatively worded items on the prefabricated scales were reverse scored. Table 8 provides a

summary of the variables, including their sources, number of items, and coefficient alphas.

All of the measures created for the survey were rated responses using a five-cell Likert

response format (1 = strongly disagree, 5 = strongly agree) because that was what the change

agents wanted, with the exception of change initiative, which used a six-cell response format;

(see the measure for further information). All of the scales within the second section of the

survey were answered on seven-cell Likert response format (1 = strongly disagree, 7 = strongly

agree), except for coworker support (which was still a seven-cell Likert response scale, but

which had different anchors). The decision to use a seven-cell response format for the

prefabricated scales was because the scales were originally created to be used with a seven-cell

response format.

Table 8
Summary of Measures Used in the Study

Measure	Source	Number of items	Study α
Control variables (Age, Gender, Education, Organizational Tenure)	Single item	4	N/A
ERP Subsystem	Single item	1	N/A
Organizational Change Recipients' Beliefs Scale	Armenakis, Bernerth, Pitts, & Walker (2007)	26	
Discrepancy		5	.96
Appropriateness		6	.95
Efficacy		5	.94
Principal Support		5	.92
Valence		4	.94
Perceived Ease of Use	[a] Davis, Bagozzi, &Warshaw (1989)	6	.85
Perceived Usefulness	Agarwal & Prasad (1999)	5	.93
Affective Commitment to Change	Herscovitch & Meyer (2002)	12	.90
Technology Acceptance	[b] Ajzen & Fishbein (1980), Warr (1990)	4	.92
Change-Related Personal Initiative	[c]	4	.87
ERP system-related training	[c]	5	.73
Leader Member Exchange	Liden & Maslyn (1998)	12	.94
Core Self-Evaluation	Judge, Erez, Bono, & Thoresen (2003)	7	.81

[a.] These items were based on the items from Davis et al. (1989) but were adapted to fit more specifically with the technology as has been done in many other studies (e.g. Moon & Kim, 2001).
[b.] Based on recommendations provided by Ajzen and Fishbein (1980) for the creation of items for assessing attitude. This research used modified items from Warr's Depression and Anxiety scale.
[c.] Created by researchers and change agents during the analysis of qualitative data gathered during an immediately prior qualitative study.

Control variables. To account for variance in the dependent variables that might be explained by factors other than the hypothesized variables, four control variables were chosen. These four demographic variables have been used as control variables in many TAM studies, and variables as organizational tenure or job level having been found to be related to criterion variables such as organizational commitment within the organizational change literature (e.g., Loscocco, 1989; Mathieu & Zajac, 1990). Four demographic variables were chosen as controls: age, gender, education, and organizational tenure. The items and response format are included within Appendix B. Despite the anonymity of the survey, the item about age was formatted by generation (e.g., 1943-1960 for Baby Boomers, 1961-1981 for Generation X).

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Independent Variables

ERP subsystems (i.e., content variable). This is a categorical variable representing the three major subsystems of the ERP system. The question was asked as "Which ERP *(subsystem)* do you primarily use for your job?" The three possible responses were: Finance subsystem, HR subsystem, and Student subsystem. The qualitative data support the idea that the Finance subsystem was the most intricate and difficult, while the HR subsystem was somewhat less so, and the Student subsystem was considered the least complex of the subsystems. For purposes of the research, dummy variables were created for the three subsystems.

Training (i.e., process variable). This scale consists of five items that focused on the change recipient's perceptions concerning the quality of the training. Each item was narrowly focused and specifically identified one department or group of change agents responsible for providing very specific types of training for change recipients. Items included "I feel the ERP system training provided by Contracts and Grants to date has been good" and "The ERP system training provided by Human Resources to date has been good." Because this scale was created for this research, scale development procedures were conducted and are reported in the section that follows. Coefficient alpha was .73.

Moderator Variables

Leader-member exchange (LMX; i.e., context variable). Liden and Maslyn's (1998) 12-item LMX-MDM scale was used. It includes such items as: "I like my manager very much as a person" and "My supervisor would come to my defense if I were 'attacked' by others." Liden and Maslyn demonstrated that the scale's four dimensions fell under a higher order factor, making the scale suitable for measuring overall LMX (Erdogan et al., 2006). Liden and Maslyn's originally reported reliability for the 12-item composite was .89. The coefficient alpha for this study was .94

Core self-evaluation (CSE). This measure provided by Judge et al. (2003) was used for measuring CSE in this study. The measure examines the four traits of global self efficacy, locus of control, neuroticism, and self-esteem as one variable focused on individuals' perceptions of themselves. The measure consists of 12 items, such as "I complete tasks successfully," and "I am capable of coping with most of my problems." For this study, coefficient alpha was .81.

Mediator Variables (i.e., Change Recipient Beliefs and TAM Beliefs)

The five dimensions that make up the organizational change recipient's beliefs scale (OCRBS; Armenakis et al., 2007) have been used collectively as a single factor higher-order variable due to good model fit. For purposes of this study, each dimension was examined as a separate variable for purposes of determining their individual usefulness when the two technology acceptance beliefs (i.e., perceived ease of use, perceived usefulness) are included along with them.

Discrepancy. This dimension represents the change recipient's recognition of a need for a new ERP system in order to improve information processing. It consists of four items, including "[The univerisy] needed to improve its effectiveness by changing its information system," and "An information system change was needed to improve the university's information management." For this study, coefficient alpha was .96.

Appropriateness. This dimension relates to the change recipient's belief that the new ERP system was the correct choice for the organization. The scale is composed of five items, including: "I believe the new ERP system was the best alternative available for our situation," and "The change to the new ERP system is improving the university's information management." Coefficient alpha in this study was .95.

Efficacy. This dimension concerns whether or not the change recipient believes successful change is possible. It consists of five items, including "I am capable of fully transitioning to the new

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ERP system in my job," and "I believe the university can successfully transition to the new ERP system." The scale's coefficient alpha for this study was .94.

Principal support. This dimension concerns the change recipient's perceptions of the commitment of key organizational decision makers and opinion leaders to making the change successful through their effort and backing. It is composed of five items including "My immediate manager encourages me to support the new ERP system," and "The majority of my respected peers are dedicated to making the change to the new ERP system successful." Coefficient alpha for study was .92.

Valence. This dimension represents the change recipient's perceptions of whether the change will be of personal benefit. This dimension consists of four items, among them are "The change to the new ERP system is benefiting me," and "The change in my job assignments due to the new ERP system will increase my feelings of accomplishment." Coefficient alpha for the study was .94.

Perceived ease of use (PEOU). Davis (1989) described perceived ease of use as the degree to which the technology is considered easy to understand and use. For purposes of this study, existing TAM-related PEOU scales were examined to provide a framework for the items, but the items were too general to capture the details of the ERP system. Instead, items were created to specifically address the new ERP system. It consists of six items, including: "I feel comfortable working in ERP Admin," and "It is difficult to learn how to use Self Service ERP system." Scale development procedures were used for this scale, which are detailed later. Coefficient alpha was .85.

Perceived usefulness (PERUSE). Davis (1989) defined this scale as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (p.320). The scale consists of five items, including "Using the new ERP system enables me to accomplish tasks more quickly," and

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"Using the new ERP system improves my job performance." The items were adapted to the new ERP system from the Perceived Usefulness measure provided by Agarwal and Prasad (1999). Because of the modification of the items to the new ERP system, scale development procedures were performed on the scale, detailed in the following section. Coefficient alpha for the scale was .93.

Dependent Variables

   Commitment to organizational change. This dimension reflects change recipients' commitment to a particular organizational change based on their belief in the value of that change. The affective commitment to organizational change developed by Herscovitch and Meyer (2002) was used in this study. Among the items are: "I think that management is making a mistake by introducing this change," and "Things would be better without this change." Coefficient alpha was .90

   Technology acceptance. Technology acceptance, operationalized as behavioral intention to use technology has, for the most part, ignored mandatory use of a technology, focusing instead on discretionary use. It has been captured as a construct by such items as "I plan to use (IS) in the future," "I intend to continue using (IS) in the future," and "I expect my use of the (IS) to continue in the future," (Agarwal & Karahanna, 2000) or "Assuming I had access to the system, I intend to use it," "Given that I had access to the system, I predict that I would use it," and "I plan to use the system in the next <n> months," (Venkatesh & Bala, 2008). For purposes of this study, items of this sort were not useful, given the mandatory nature of the new ERP system. The change recipients did not have a choice as to whether or not they will continue to use it, since they will have to use it if they wished to keep their jobs. Therefore, the focus in this study was on technology acceptance as an attitude.

Technology acceptance as an attitude has been captured with scales such as "How do you feel about your overall experience of (IS): very dissatisfied/very satisfied, very displeased/very pleased, very frustrated/very contented, and absolutely terrible/absolutely delightful," (Bhattacherjee, 2001) and "I like using (IS)," "(IS) is fun to use," and "(IS) provides an attractive working environment (Agarwal & Prasad, 1999).

ERP system users who completed the survey had been using the system. The focus of this research was on their experience of continuous use. Were they enjoying the system or did it make them miserable? Their experiencing of the system would most likely influence the amount of discretionary effort in using the system that they put forth. Because none of the scales provided an adequate measure of the experiences users had been having in terms of mandatory continuance use, a better instrument was sought for capturing the change recipients' attitudes toward using the technology over time. For this purpose, four items were adopted from Warr's (1990, cf. Spell & Arnold, 2007) depression-enthusiasm and anxiety-contentment scales. While the original items concerned one's job, they were modified to make the new ERP system the focus of the items rather than one's job (as was the original focus of the items). Because these four items constituted a new scale, scale development procedures were used on the items to determine their construct validity. The instruction question for the items was "Thinking of the past few weeks, how much of the time has working with the new ERP system made you feel each of the following?" The four items included "optimistic" and "enthusiastic" from the depression-enthusiasm subscale and "contented" and "relaxed" from the anxiety-contentment subscale. Respondents answered on a six-cell Likert response format consisting of 1 = never, 2 = occasionally, 3 = some of the time, 4 = much of the time, 5 = most of the time, and 6 = all of the time. Coefficient alpha for the developed scale was .92.

Change-related initiative. Change-related initiative was rated using six items designed by the researchers and change agents to tap the proactive, self-initiated aspects of a change recipient's efforts in participating in the change by seeking out the information necessary to enact the change and perform their job tasks. Items were narrowly focused and were rated using a six-cell Likert response format (1= never, 2 = very rarely, … 6 = very frequently). Among the items were "I read the ERP system-related e-mail notices I receive," "I use the ERP system tip sheets," and "I use the ERP system on-line resource documents available on functional tabs within the university web portal." Coefficient alpha was .87.

Common Method Variance

Common method variance (CMV) presents an issue for this study for three reasons. As such, various means of dealing with CMV were employed.

Self-report issues. The study design has certain shortcomings. First, it had a single data collection method, relying on online survey data. Variance may have been attributable to the design rather than to the constructs of interest themselves (Podsakoff, P., MacKenzie, Lee, & Podsakoff, 2003). The data, including both predictors and criterion variables, were collected through self-report scales on the same survey. This may have led to greater potential common method variance (Spector, 2006). CMV can present a problem when it comes to detecting interactions since inflated correlations between the independent and the dependent variables can reduce the power to detect such interactions (Evans, 1985; Schmitt, 1994).

Social desirability and anonymity. Social desirability also presented an issue (Podsakoff, et al., 2003). Social desirability reflects a person's tendency to admit socially desirable traits while denying socially undesirable traits. Anonymity was stressed but participants may have believed that their identities could have been discovered and that there was an ulterior motive to the study. If participants believed that the purpose was to discover what they really thought and

report that information to university administrators, then they may have responded in a desirable fashion. As a result, there could be a loss of internal validity and greater common method bias. However, Podsakoff et al. (2003) posit that the assurance of anonymity may cause participants to have less evaluation apprehension thus making them less likely to edit their responses to be more socially desirable.

Consistency motif and survey design. Another issue is that of consistency motif. This form of bias can occur from participants attempting to maintain consistency among their reported cognitions and attitudes so that their responses might appear consistent and rational (Podsakoff, et al., 2003). Podsakoff, MacKenzie, Lee, and Podsakoff (2003) suggested using "Temporal, proximal, psychological, or methodological separation of measurement" (p. 887) as a means of reducing potential common method biases. As previously mentioned, the survey contained open-response items interspersed throughout the survey, which may have provided some proximal or methodological separation. In addition, to keep from leading the participants to socially desirable responses and to prevent them from trying to maintain consistency, no titles were included for the measures.

Confirmation of the Change Recipient's Beliefs Factor Structure

Previous research findings (Armenakis et al., 2007; Pitts, 2006) have suggested that the OCRBS may be treated as a multi-dimensional construct. The five beliefs were found to be moderately correlated within the data for this study (see Table 16 in the analysis section). However, since this study does not specifically concern the higher order factor structure, but, rather, focuses on individual change recipient beliefs, a CFA was performed to examine the structure of the data. The overall fit of the measurement model used for the CFA was assessed by following the guideline provided by Hair, Black, Babin, Anderson, and Tatham (2006). The

results of a CFA analysis suggested that treating each distinct factor as a separate belief for purposes of this study was acceptable.

The analysis involved comparing two models, one model consisting of the OCRBS as a single factor and one model consisting of the five OCRBS factors treated as separate factors. A comparison was made of the two model's fit indices, specifically, normal chi-square (CMIN/df), the confirmatory fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). For the fit indices, CMIN/df should be 3.00 or lower; CFI should achieve .95 or higher, SRMR should be .05 or lower, and RMSEA should be .06 or lower (cf. Hu & Bentler, 1999; Kline, 2005).

The model fit for treating the OCRBS as unidimensional (CMIN/df = 19.25, CFI = .45, SRMR = .19, RMSEA = .21) was much worse than the model fit for treating the OCRBS as multidimensional (CMIN/df = 5.40, CFI = .90, SRMR = .05, RMSEA = .10). Notably, the results of the fit indices suggest that neither model meets the minimum standards to be considered a well-fit model. However, the five factor model was much closer to meeting the specifications, and that model was improved by correlating six disturbance terms (CMIN/df = 3.09, CFI = .95, SRMR = .04, RMSEA = .07) within two of the factors, without the need to correlate disturbances across the factors.

Alternative models should be tested (cf. Mulaik et al., 1989), therefore a three-factor model was tested. The three-factor model tested was the same one that had been tested previously in the research (cf. Pitts, 2006). The theoretical logic is based on Rogers (2003). For this three-factor model, appropriateness, discrepancy, and valence were combined, and efficacy and principal support represented the other two factors. The goodness-of-fit was inferior to that of the five factor solution (CMIN/df = 14.95, CFI = .67, SRMR = .16, RMSEA = .18). It should be

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noted that the results produced in this study match the factor structure found previously (Pitts, 2006). The results of the CFA are included in Table 9.

Table 9
Model Fit for the OCRBS Measures

Model	CMIN/df	CFI	SRMR	RMSEA
Single factor	19.25	.45	.19	.21
Three factors	14.95	.67	.16	.18
Five factors	5.40	.90	.05	.10
Five factors with correction[a]	3.09	.95	.04	.07

[a] This version has 6 within construct disturbance correlations but is otherwise the same five-factor model.

The results of regression weights for the CFA are presented in Tables 9a and 9b. Table 10a presents the regression weights for the indicators when they are treated as five latent constructs while Table 10b presents the regression weights for the indicators when they are loaded onto one latent construct and treated as unidimensional. The results provide further support confirming the Fit Indices. Thus, treating the five variables as a single variable is not appropriate. Instead, they were treated as five separate variables.

Table 10a
Confirmatory Factor Analysis Results for the OCRBS as Five Constructs

Item	Unstandardized Weight	S.E.	Standardized Weight	Critical Ratio (z)	p
Approp1	1.016	.119	.96	8.520	<.001
Approp2	1.055	.123	.89	8.552	<.001
Approp3	1.045	.122	.82	8.592	<.001
Approp4	1.069	.124	.94	8.629	<.001
Approp5	1.029	.119	.76	8.613	<.001
Approp6	.978	.116	.84	8.401	<.001
Discrep1	1		.93		
Discrep2	1.126	.056	.94	2.086	<.001
Discrep3	.985	.068	.95	14.590	<.001
Discrep4	1.074	.063	.96	17.020	<.001
Efficacy1	.959	.107	.75	8.965	<.001
Efficacy2	1.016	.110	.78	9.210	<.001
Efficacy3	1.130	.116	.87	9.723	<.001
Efficacy4	1.202	.118	.97	1.193	<.001
Efficacy5	1.258	.123	.97	1.212	<.001
PrinSupp1	.935	.103	.72	9.051	<.001
PrinSupp2	.858	.091	.76	9.387	<.001
PrinSupp3	.859	.089	.79	9.611	<.001
PrinSupp4	.989	.100	.83	9.887	<.001
PrinSupp5	.889	.095	.76	9.342	<.001
PrinSupp6	.950	.097	.82	9.794	<.001
Valence1	.924	.113	.88	8.159	<.001
Valence2	.978	.117	.95	8.375	<.001
Valence3	.948	.117	.87	8.133	<.001
Valence4	.967	.116	.93	8.33	<.001

Table 10b
Confirmatory Factor Analysis Results for the OCRBS Scales as a Unidimensional Scale

Item	Unstandard-ized Weight	S.E.	Standard-ized Weight	Critical Ratio (z)	p
Approp1	3.03	.58	.92	5.25	<.001
Approp2	3.15	.60	.93	5.26	<.001
Approp3	3.11	.59	.94	5.27	<.001
Approp4	3.18	.60	.96	5.28	<.001
Approp5	3.07	.58	.95	5.28	<.001
Approp6	2.94	.56	.89	5.23	<.001
Discrep1	1.00		.31		
Discrep2	1.04	.27	.33	3.86	<.001
Discrep3	1.10	.29	.32	3.82	<.001
Discrep4	1.23	.30	.37	4.07	<.001
Efficacy1	.91	.26	.27	3.45	<.001
Efficacy2	.87	.26	.26	3.36	<.001
Efficacy3	1.01	.28	.30	3.66	<.001
Efficacy4	1.29	.30	.40	4.23	<.001
Efficacy5	1.26	.31	.37	4.11	<.001
PrinSupp1	1.42	.32	.45	4.45	<.001
PrinSupp2	.95	.24	.35	3.98	<.001
PrinSupp3	.93	.23	.36	4.01	<.001
PrinSupp4	1.11	.27	.39	4.17	<.001
PrinSupp5	1.03	.25	.36	4.05	<.001
PrinSupp6	1.26	.28	.45	4.43	<.001
Valence1	1.49	.33	.46	4.49	<.001
Valence2	1.30	.30	.41	4.29	<.001
Valence3	1.03	.28	.31	3.73	<.001
Valence4	1.20	.29	.38	4.14	<.001

Validation of the Measures Developed for the Study

Because new measures were created that were specific to the research setting and change event, it is necessary to determine whether the measures created were suitable for use in the research. Construct validity represents the extent to which a scale measures a theoretical construct of interest (Cronbach & Meehl, 1955). Construct validity represents the extent to which a particular scale measures the domain content it intends to measure. Various aspects of validity have been proposed in the psychometric literature (Bagozzi, Yi, & Philips, 1991). The American

Psychological Association (1995) has established certain content validity, internal consistency, and criterion-related validity standards that a quantitative survey instrument must meet. These three standards constitute construct validity. Validity at the level of overall construct is typically assessed in terms of content validity, internal consistency reliability, convergent validity, discriminant validity, and predictive validity.

Kappa. In order to determine whether the domain content described for the created scales were properly covered by the content of the items created, PhD students examined the individual items and independently classified them based on the scale to which they should belong. To begin with, *kappa* was first calculated based on the classifications provided by three Ph.D. students. *Kappa* is used as a chance-adjusted measure of agreement for any number of items, categories and raters. *Kappa* is used to determine whether the items fit theoretically with a particular category, which represents a construct. *Kappa* can range in score from -1.0 to 1.0, with a score of -1.0 indicating complete disagreement below chance by the raters, .0 indicating the agreement is equal to chance, and 1.0 indicating perfect agreement beyond chance by the raters. Generally, a *kappa* of .70 or better is considered adequate for the items representing their intended constructs (cf. Futrell, 1995). The *kappa* for this study was .88 ($p < .05$).

Split Sample. Since only one quantitative study was conducted, it is not possible to compare multiple samples from different data sources in order to compare the results. Because of this, two subsamples were created through a random split of the data. One set was used for the exploratory factor analysis (EFA) and the "hold out" set was then used for CFA. The decision to use a split sample to perform both an EFA and a CFA on these scales was based on the recommendations of Fabrigar, Wegener, MacCallum, and Strahan (1999). The change studied was specific in terms of its population, setting, and change content. While simply cutting the

scale development down to CFA may have been enough, by randomly splitting the sample into two samples, more credibility can be given to the scales, at least in terms of attempting to follow Hinkin's (1998) procedures.

Reliability. Coefficient alphas for the scales were .85 for perceived ease of use, .93 for perceived usefulness, .92 for technology acceptance, .87 for personal initiative, and .73 for training. All were in excess of the .70 standard used in organizational research (Nunnally, 1978).

Factor Analysis

In scale creation, it may not be necessary to run an EFA when the domain content is well established and when the items are very similar to those that have been used before in the literature. However, for this study, because many items were created concerning different aspects of change recipient use or training for the new ERP system, an EFA was conducted as well as a CFA. It is considered standard procedure to use two separate data sets to run exploratory factor analysis and CFA. Replication of the factor structures with different samples can constitute evidence of their validity (Kerlinger, 1986), but the measures were created specifically for the new ERP system. Therefore, attaining a second, separate sample was not considered feasible. Because of this, the data set was split a priori into two random smaller data sets, with one set serving as the sample for an EFA and one set serving as the sample for a CFA.

Exploratory factor analysis. For those measures that were created specifically for the new ERP system, an EFA was first performed on the items, since they were all related to the use of technology. SPSS, a statistical software package, was used for the analysis, which consisted of a principal axis factor analysis using a varimax rotation with Kaiser normalization. The factor loadings that were less than .40 were suppressed (Harman, 1976). The factor results are provided in Table 11. Construct validity was evaluated by examining the factor loadings of the indicators

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for the various constructs, as well as by examining the correlation among the constructs (Anderson & Gerbing, 1988).

There was acceptable item convergence on the intended constructs, based on the factor loadings, suggesting good convergent validity. The number of factors was allowed to fluctuate, and a total of five factors were extracted after six rotations. These five factors had eigenvalues in excess of 1. They were 8.33, 3.04, 2.42, 2.13, and 1.6. The eigenvalue for a sixth factor was .87 followed by .68 for a seventh. Together the five factors represented the best factor structure, and the combined factors accounted for 66.1% of the variance. Comparatively, a four factor solution accounted for 58.1% of variance. A scree plot was used to verify the results and is presented in Figure 9.

The EFA also provided the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity. Factor analysis should yield distinctive and reliable factors (Field, 2000), and, for the KMO statistic, the closer the statistic is to 1.0, the more compact are the patterns of correlations. The KMO value for these items was .9. Values greater than .5 have been deemed acceptable in the literature (Kaiser, 1974). Therefore, the KMO value of .90 for these items was acceptable (Hutcheson & Sofroniou, 1999). Bartlett's test of Sphericity tests a null hypothesis to determine whether the original correlation matrix is an identity matrix, such that a significant result (i.e., a p-value less than .05) suggests that the correlation matrix is not an identity matrix. The results for this test were significant ($p < .001$) as well.

Table 11

EFA Factor Matrix Loadings for the Measures Developed

	Factor				
Indicator	1	2	3	4	5
PEOU1	.809				
PEOU2	.804				
PEOU3	.715				
PEOU4	.804				
PEOU5	.809				
PEOU6	.779				
PERUSE1		.846			
PERUSE2		.854			
PERUSE3		.824			
PERUSE4		.789			
PERUSE5		.843			
TechAcc1			.849		
TechAcc2			.821		
TechAcc3			.876		
TechAcc4			.851		
PI1				.736	
PI2				.780	
PI3				.658	
PI4				.818	
Train1					.603
Train2					.625
Train3					.495
Train4					.597
Train5					.617

Extraction Method: Principal Axis Factoring.
 Rotation Method: Varimax with Kaiser Normalization.
Note: Loadings lower than .40 are not shown in table.

Figure 9

Scree Plot for EFA
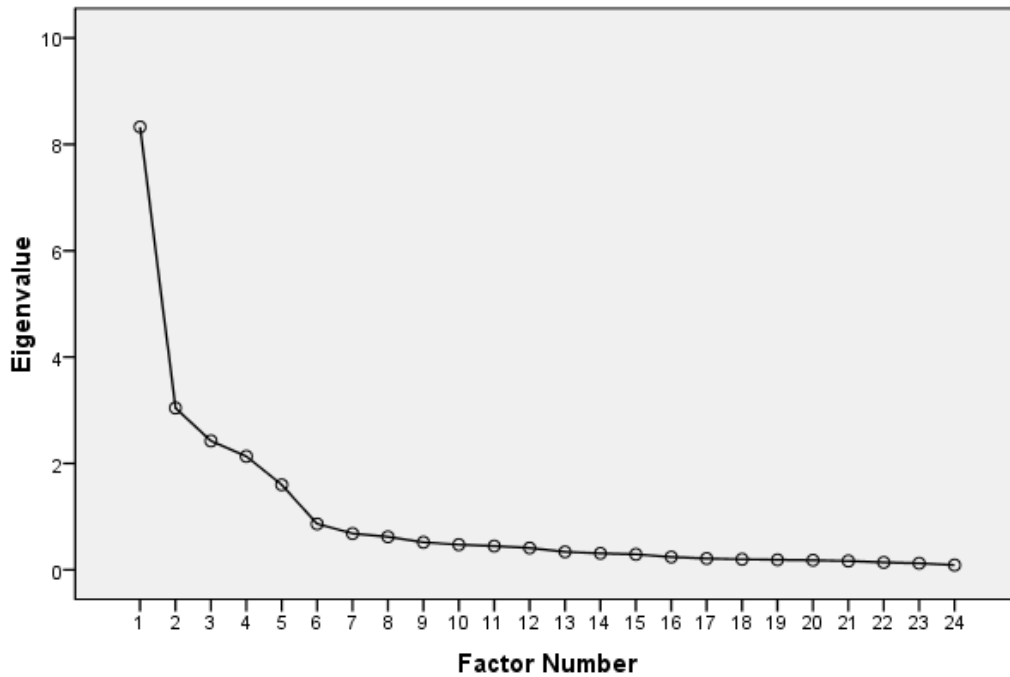
Although no definite cutoff score for adequate variability among items created for new

scales has been established, a standard deviation of 1.0 has been recommended as sufficient (cf.

Liden & Maslyn, 1998). Those items that do not show variance are not much value to the scale,

meaning that eliminating them would not be considered a loss to the content domain. Only two

items for the training variable, train1 and train5, had standard deviations below 1.0, being .96

and .95, respectively. These items were very close to 1.0 and were kept as part of the measure

because the items captured content that was not captured by the other items. No other items had

a standard deviation below 1.0.

The intercorrelation matrix among the items for each scale was examined for evidence of

internal consistency reliability, and all items were found to correlate significantly ($p < .01$). It has

been suggested that items that correlate less than .40 with other items should be dropped (Kim &

Mueller, 1978). The intercorrelations ranged from .62 to .80 for PEOU, from .71 to .89 for

PERUSE, from .82 to .87 for technology acceptance, from .55 to .71 for personal initiative, and from .25 to .50 for ERP system-related training. The reasoning behind the .40 cutoff is that a low correlation suggests that the domain content is different, and low correlations will contribute to low internal consistency (Churchill, 1979; Hinkin, 1998). However, this is clearly not the case with the training items, since all of the items are worded similarly, with only the type of training being different. It makes sense that the different types of training would vary greatly in terms of their quality, since the training sessions involved different trainers and different training content. Since, together, the items capture perceptions of the different types of ERP system-related training, and dropping any items would present a biased perspective of the overall quality of the training, all of the items were kept.

The primary criterion for discriminant validity is that each individual indicator should load more highly on its associated construct than on any other construct. Table 12 provides strong evidence of discriminant validity. No cross-loadings occurred that were above the .40 cutoff, and all indicators loaded correctly on the constructs. Conversely, there was strong convergent validity, with factor loadings in excess of .50 for each construct. The results confirm that the five theoretically derived constructs are distinct, unidimensional scales that are factorially distinct from one another.

The correlations among the overall constructs ranged from .10 to 45, with all of the related confidence intervals below unity, providing empirical support for discriminant validity among the measures.

Table 12

Item Means and Standard Deviations for the Measures Developed

Item	M	SD	Item	M	SD
PEOU1	3.67	1.29	TechAcc1	3.54	1.22
PEOU2	3.79	1.24	TechAcc2	3.62	1.20
PEOU3	3.63	1.29	TechAcc3	3.61	1.21
PEOU4	3.67	1.18	TechAcc4	3.68	1.18
PEOU5	3.65	1.22	PI1	3.74	1.41
PEOU6	3.84	1.24	PI2	3.84	1.31
PERUSE1	3.78	1.22	PI3	4.27	1.25
PERUSE2	3.92	1.26	PI4	3.86	1.29
PERUSE3	3.73	1.36	Train1	3.65	.96
PERUSE4	3.73	1.31	Train2	3.47	1.05
PERUSE5	3.67	1.29	Train3	3.51	1.06
			Train4	3.44	1.00
			Train5	3.36	.95

Note: $N = 270$, M = Mean, SD = Standard Deviation.

Confirmatory factor analysis. A common method for assessing convergent validity beyond simply examining the EFA results is to compare the EFA factor loadings to the CFA factor loadings (cf. Liden & Maslyn, 1998; Rahim & Magner, 1995). The CFA can provide further evidence of convergent validity (Anderson & Gerbing, 1988). For this study, as noted, the data were randomly divided into two sets. As previously stated, one set was used for the EFA, and one set was used for the CFA.

Structural equation modeling via AMOS 16.0 (Arbuckle, 2007) was utilized for the CFA. An examination of the statistical significance of the critical ratios associated with each loading and the standardized loadings indicated that all of the items loaded reliably on their predicted factors, with the factor structure fitting the data well within the data set. The results can be found in Table 13.

Table 13
Confirmatory Factor Analysis Results for the Measures Developed

Indicator	Unstandard-ized Weights	Standard Error	Standard-ized Weight	Critical Ratio (z)	p
PEOU1	1.00		.857		
PEOU2	.979	.055	.844	17.83	<.001
PEOU3	1.02	.051	.902	20.19	<.001
PEOU4	.942	.050	.871	18.88	<.001
PEOU5	.967	.052	.862	18.55	<.001
PEOU6	.904	.054	.816	16.82	<.001
PERUSE1	1.00		.920		
PERUSE2	.986	.038	.922	22.75	<.001
PERUSE3	.959	.043	.872	18.92	<.001
PERUSE4	.986	.051	.813	22.25	<.001
PERUSE5	1.011	.044	.880	25.90	<.001
TechAcc1	1.00		.898		
TechAcc2	.969	.042	.903	24.13	<.001
TechAcc3	1.018	.041	.935	24.97	<.001
TechAcc4	.962	.040	.922	22.86	<.001
PI1	1.00		.809		
PI2	.959	.062	.855	15.53	<.001
PI3	.651	.060	.643	10.87	<.001
PI4	.944	.059	.891	16.13	<.001
Train1	1.00		.534		
Train2	1.180	.198	.620	5.96	<.001
Train3	.787	.176	.382	4.47	<.001
Train4	1.180	.198	.625	5.97	<.001
Train5	.950	.170	.540	5.60	<.001

Even if the EFA shows that items fit correctly with the constructs for which they were designed, there is an inability to quantify the goodness of fit of the resulting factor structure (Long, 1983). Items that load onto the correct constructs in an EFA may demonstrate a lack of fit in a multiple-indicator measurement model due to a lack of external consistency (Gerbing & Anderson, 1988). AMOS (16.0) provides a means of statistically assessing the quality of the factor structure by testing the significance of the overall model as well as the item loadings on factors. Use of a CFA provides a more strict interpretation of unidimensionality than possible with an EFA. A CFA should be used to confirm that the EFA was conducted correctly (Fabrigar

et al., 1999). The goodness-of-fit indices (Kline, 2005) are provided in Table 14 below. The data

fit the scales well based on the results.

Table 14
Fit Indices for CFA

Model	CMIN/df	CFI	RMSEA	SRMR
Perceived ease of use	4.36	.98	.02	.02
Perceived usefulness	21.67	.92	.03	.05
Training	1.39	.99	.04	.03
Technology acceptance	2.75	.99	.08	.00
Personal Initiative	1.35	.98	.04	.05
All five scales together	1.77	.93	.06	.05
PEOU & PERUSE together	3.37	.95	.10	.05

Predictive validity. Predictive validity represents the extent to which a measurement scale

predicts other constructs that are expected to be related to it based on existing theory. Given that

all of these variables should be theoretically related according to extant TAM–related research

(Davis et al., 1989; Venkatesh & Bala, 2008), the five constructs should predict each other to

some extent. In particular, ERP system training would be highly likely to predict PERUSE,

though prediction of PEOU has not been found consistently in the literature (cf. Venkatesh,

2000). In turn, PEOU may or may not predict technology acceptance, as previously discussed in

the literature review. However, PERUSE should be highly predictive of technology acceptance.

It is unknown as to the relationships between personal initiative and the other variables due to a

dearth of specific research. However, in general, personal initiative should be linked to

technology acceptance given the somewhat similar findings of Frese et al. (1996). The regression

results supported the predictive validity of the measures. The results are presented in Table 15.

The results of the *kappa* computation, EFA, CFA, intercorrelation analysis, and

regression analysis suggest that the five scales created for the study demonstrate content,

convergent, discriminant, and predictive validity. Factorial validity refers to the extent to which

the factor analytic solutions are consistent with a priori theoretical expectations. Therefore, the

five measures are believed to be suitable for use within the scope of this research.

Table 15
Regression Results for the Measures Developed

IV		DV	rR^2	β	SE	t	p
PEOU	→	PERUSE	.13	.40	.06	6.34	.00
	→	TechAcc	.20	.47	.06	8.13	.00
	→	PI	.11	.35	.06	5.69	.00
	→	Training	.05	.15	.04	3.69	.00
PERUSE	→	PEOU	.13	.33	.05	6.33	.00
	→	TechAcc	.19	.42	.05	7.81	.00
	→	PI	.20	.43	.05	8.14	.00
	→	Training	.01	.06	.04	1.66	.10
TechAcc	→	PEOU	.20	.42	.05	8.13	.00
	→	PERUSE	.19	.44	.06	7.81	.00
	→	PI	.05	.22	.06	3.75	.00
	→	Training	.08	.17	.04	4.68	.00
PI	→	PEOU	.10	.31	.06	5.69	.00
	→	PERUSE	.20	.46	.06	8.14	.00
	→	TechAcc	.05	.23	.06	3.75	.00
	→	Training	.02	.08	.04	2.16	.03
Training	→	PEOU	.05	.40	.06	6.34	.00
	→	PERUSE	.01	.17	.10	1.66	.10
	→	TechAcc	.08	.45	.10	4.68	.00
	→	PI	.02	.21	.10	2.16	.03

Results

Before beginning the analysis, the data were prepared and evaluated using the guidelines

provided by Tabachnick and Fidell (2001, pp. 56 - 110). The examination revealed that the data

met the assumptions of multivariate normality and met the acceptable levels of kurtosis or

skewness.

Table 16 provides the means, standard deviations, and intercorrelations for the variables. The

maximum variance-inflation factor (VIF) was less than 1.62.

Table 16a. Means, Standard Deviations, Coefficient Alphas and Intercorrelations among Study Variables

	Variable	M	SD	1	2	3	4	5	6	7	8	9	10
	Control Variables:												
1	Age	2.39	.64	--									
2	Gender	.73	.45	.04	--								
3	Education	1.68	1.22	.08	-.25**	--							
4	Tenure	11.60	7.76	-.41**	-.08	.09	--						
	Mediator Variables:												
5	Discrepancy	4.56	1.65	.03	.00	.07	.00	(.96)					
6	Appropriateness	3.76	1.82	-.06	.07	-.02	.01	.37**	(.95)				
7	Change Efficacy	4.78	1.73	.08	-.02	.11*	-.03	.42***	.34***	(.94)			
8	Principal Support	4.21	1.42	-.06	.03	.06	.09	.40***	.47***	.41**	(.92)		
9	Personal Valence	3.86	1.76	-.07	-.02	-.13**	.11*	.29***	.35***	.30**	.33**	(.94)	
10	Perceived Ease of Use	3.56	1.10	-.03	.00	.00	.03	.39***	.36***	.38***	.44**	.28**	(.85)
11	Perceived Usefulness	3.73	1.20	.08	.01	.09	-.02	.12***	.19***	.24***	.29***	.17***	.33***
	Dependent Variables:												
12	Affective Comm. To Δ	4.31	1.55	-.02	.05	-.05	.03	.50***	.49***	.45***	.45***	.37***	.48***
13	Technology Acceptance	3.55	1.13	.06	-.05	.15***	.05	.31***	.27***	.38***	.43***	.28***	.40***
14	Personal Initiative	3.89	1.13	.11*	.02	.05	.03	.17***	.25***	.30***	.29***	.20**	.31***
	Independent Variables:												
15	ERP Subsystem (Finance)	.42	.49	.06	.00	.12*	.02	-.12*	-.13**	-.05	-.19**	-.10	-.17**
16	ERP Subsystem (HR)	.36	.48	.01	.06	-.13**	-.03	-.10*	.03	-.04	-.09	-.02	-.14**
17	ERP Subsystem (Student)	.22	.42	-.01	-.03	.16***	-.03	-.01	.01	-.01	.03	-.06	.09
18	Training	3.44	.71	-.04	.01	-.01	-.09	.24**	.25**	.26**	.21**	.16**	.16***
	Moderator Variables:												
19	Core Self Evaluation	5.09	1.38	-.01	.00	.15**	.01	.00	.09	.14**	.14**	.03	.07
20	Leader-Member Exchange	5.69	1.20	.06	.13	-.08	-.13	.32	.40	.45	.37	.39	.36

N = 412. *p <.05. **p<.01. Note: Affective Comm. To Δ = Affective Commitment to the Change. Coefficient α in par emphases.

Table 16b. Means, Standard Deviations, Coefficient Alphas and Intercorrelations among Study Variables

Variable	11	12	13	14	15	16	17	18	19
Mediator Variables:									
11 Perceived Usefulness	(.93)								
Dependent Variables:									
12 Affective Comm. To Δ	.25**	(.90)							
13 Technology Acceptance	.47**	.22**	(.92)						
14 Personal Initiative	.44**	.24**	.28**	(.87)					
Independent Variables:									
15 ERP Subsystem (Finance)	-.15**	-.18**	-.11*	-.17**	---				
16 ERP Subsystem (HR)	-.13**	-.07	-.08	-.07	.13**	---			
17 ERP Subsystem (Student)	.11*	-.02	.10	.01	-.02	-.63**	---		
18 Training	.05	.20**	.21**	.11*	-.07	.05	.03	(.73)	
Moderator Variables:									
18 Core Self Evaluation	.06	.10*	.04	.06	-.01	-.01	-.18**	.00	(.94)
20 Leader-Member Exchange	.31**	.38**	.41**	.30**	.05	.05	-.13**	.16**	.29** (.81)

N = 412. *p <.05. **p<.01. Note: Affective Comm. To Δ = Affective Commitment to the Change. Coefficient α in par emphases.

Data Analyses

The statistical analysis involved three different techniques: hierarchical regression (Hypotheses 1-3), mediation analysis with an SPSS macro (Hypotheses 4-9), and mediated moderation analysis with an SPSS macro (Hypotheses 10-15).

While structural equation modeling (SEM) can serve as an excellent means of testing relationships such as those proposed within this study, the complexity of a single model that contains all of the variables within this study would be too complex to be testable (Kline, 2005). An alternative approach would be to create multiple smaller SEM models that could be tested individually.

Along similar lines, another issue that arises from choosing SEM as an analysis technique is that moderation analysis in SEM requires splitting up a data set based on the moderator. The data can be divided into differentiated categories using a median split, or some other type of high-low classification based on the moderator. Frazier, Tix, and Barron, (2004) note, however, that using SEM techniques to test interactions among continuous variables is complex, and that there is very little agreement among researchers as to what is the best technique to use.

Certainly testing multiple smaller models and creating and testing separate data sets based on the moderator scores is feasible, however, an alternative exists that can generate the same results through a more parsimonious approach. Preacher and Hayes (2008, 2009) have provided macros for SPSS that allow for the testing of multiple moderators in a manner similar to SEM and for testing moderated mediation, but with additional analysis output. Research studies concerning these macros have been published in academic journals (Preacher & Hayes, 2008; Preacher, Rucker, & Hayes, 2007), and the macros have been utilized as tools within studies published in the *Journal of Applied Psychology* (Cole, Walter, & Bruch, 2007) and other journals (e.g., Lippke, Wiedemann, Ziegelmann, & Schwarzer, 2009).

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Belief-Related Hypotheses

Hypotheses 1, 2, and 3 focus on the examination of potential relationships between the seven beliefs, including the five change recipient beliefs and the two TAM-related beliefs, and three criterion variables related to the change. Hypotheses 1, 2, and 3 examine affective commitment to the change, technology acceptance, and personal initiative related to the ERP subsystems as criterion variables, respectively. For these hypotheses, hierarchical regression (Cohen & Cohen, 1983) was performed using SPSS 16.

For these three hypotheses, the four demographic variables (age, gender, job classification, and organizational tenure) were entered first in Block 1. This was followed by the five organizational change recipient beliefs (discrepancy, appropriateness, efficacy, principal support, valence) and TAM beliefs (perceived ease of use and perceived usefulness) being entered in Block 2. All of the beliefs were included together within the regression analysis. Three regression analyses were conducted, one for each criterion variable (affective commitment to the change, technology acceptance, and personal initiative specifically related to using the new ERP system). The hierarchical regression results are presented in Table 17 and a summary of the hypotheses tests is presented in Table 18.

Hierarchical Regression Analysis

For Hypothesis 1, the hierarchical regression analysis shows that six of the seven (1a-1g) beliefs were statistically significant predictors of affective commitment to the change. Specifically, the results within Block 2 were: (a) discrepancy ($\beta = .23$, $t = 5.24$, $p < .001$); (b) appropriateness ($\beta = .21$, $t = 4.64$, $p < .001$); (c) change efficacy ($\beta = .15$, $t = 3.33$, $p < .01$); (d) principal support ($\beta = .08$, $t = 1.97$, $p < .05$); (e) personal valence ($\beta = .08$, $t = 1.95$, $p < .05$); (f) perceived ease of use ($\beta = .18$, $t = 4.05$, $p < .001$); and (g) perceived usefulness ($\beta = .06$, $t = 1.39$,

$p = ns$). As a result of the analysis, support was found for all parts (a-f) of the hypothesis except for (g) perceived usefulness.

Hypothesis 2 consisted of a hierarchical regression with the five change recipient beliefs and the two TAM beliefs as predictors and technology acceptance as the criterion variable. The results found in Block 2 of the analysis were (a) discrepancy ($\beta = .08$, $t = 1.69$, $p = ns$); (b) appropriateness ($\beta = -.01$, $t = -.12$, $p = ns$); (c) change efficacy ($\beta = .12$, $t = 2.53$, $p < .05$); (d) principal support ($\beta = .18$, $t = 3.55$, $p < .001$); (e) personal valence ($\beta = .08$, $t = .07$, $p = ns$); (f) perceived ease of use ($\beta = .12$, $t = 2.43$, $p < .05$); and (g) perceived usefulness ($\beta = .32$, $t = 7.35$, $p < .001$). Support was found for (c) change efficacy, (d) principal support, (f) perceived ease of use, and (g) perceived usefulness, but not for (a) discrepancy, (b) appropriateness, and (e) personal valence.

The analysis for Hypothesis 3 consisted of the same beliefs as for the previous two hypotheses, but with personal initiative as the criterion variable. The analysis yielded the following results in Block 2: (a) discrepancy ($\beta = -.03$, $t = -.492$, $p = ns$); (b) appropriateness ($\beta = .07$, $t = 1.42$, $p = ns$); (c) change efficacy ($\beta = .12$, $t = 2.24$, $p < .05$); (d) principal support ($\beta = .07$, $t = 1.20$, $p = ns$); (e) personal valence ($\beta = .04$, $t = .85$, ns); (f) perceived ease of use ($\beta = .10$, $t = 1.98$, $p < .05$); and (f) perceived usefulness ($\beta = .33$, $t = 7.11$, $p < .001$). Support was found for (c) change efficacy, (f) perceived ease of use, and (g) perceived usefulness. No support was found for (a) discrepancy, (b) appropriateness, (d) principal support, and (e) personal valence.

Table 17

Hierarchical Regression for Hypothesis 1: Affective Commitment to the Change as DV

Affective Commitment to Change as Criterion Variable		
	β	
Variable	Step 1	Step 2
Age	-.01	-.01
Gender	.04	.02
Education	-.04	-.07
Tenure	.04	.02
Discrepancy		.23***
Appropriateness		.21***
Change Efficacy		.15**
Principal Support		.08†
Personal Valence		.08*
PEOU		.18***
PERUSE		.06
R^2	.01	.46
ΔR^2	.00	.45
$AdjR^2$	.00	.44

† = p <.10. *p< .05. **p<.01.

Technology Acceptance as Criterion Variable		
	β	
Variable	Step 1	Step 2
Age	.09	.06
Gender	-.01	-.03
Education	.13**	.05*
Tenure	.07	.04
Discrepancy		.08†
Appropriateness		-.01
Change Efficacy		.12*
Principal Support		.18***
Personal Valence		.09*
PEOU		.12*
PERUSE		.32***
R^2	.03	.38
ΔR^2	.03	.35
$AdjR^2$	.02	.37

† = p <.10. *p< .05. **p<.01.

Personal Initiative Related to the Change as Criterion Variable		
	β	
Variable	Step 1	Step 2
Age	.14**	.11*
Gender	.04	.02
Education	.05	.01
Tenure	.08†	.07
Discrepancy		-.03
Appropriateness		.07
Change Efficacy		.12*
Principal Support		.07
Personal Valence		.04
PEOU		.10**
PERUSE		.33***
R^2	.02	.27
ΔR^2	.02	.25
$AdjR^2$	.01	.25

† = p <.10. *p< .05. **p<.01.

Note that due to rounding, some values that are the same are significant while others are not.

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Table 18

Summary of Hypotheses 1 through 3

Hyp.	IV	DV	Support?	p-value
1a	Discrepancy	Affective Commitment	Yes	.000
1b	Appropriateness	to the Change	Yes	.000
1c	Change efficacy		Yes	.001
1d	Principal Support		Yes	.048
1e	Personal valence		Yes	.049
1f	PEOU		Yes	.000
1g	PERUSE		No	.164
2a	Discrepancy	Technology Acceptance	No	.092
2b	Appropriateness		No	.902
2c	Change efficacy		Yes	.012
2d	Principal Support		Yes	.000
2e	Personal valence		No	.071
2f	PEOU		Yes	.016
2g	PERUSE		Yes	.000
3a	Discrepancy	Personal Initiative	No	.623
3b	Appropriateness		No	.157
3c	Change efficacy		Yes	.026
3d	Principal Support		No	.233
3e	Personal valence		No	.396
3f	PEOU		Yes	.048
3g	PERUSE		Yes	.000

Comparison of the OCRBS and TAM Beliefs

Integrating the organizational change recipients' beliefs constructs with the technology acceptance beliefs constructs generates a theoretical model less parsimonious than either constitutes separately. This is the opposite of what is typically desired in organizational science research. Because of this, it is necessary to compare the predictive value of each set of beliefs independent of the other to determine which model demonstrates the greatest predictive capabilities. This also provides a comparative base to determine the merits of integrating the two sets of belief constructs.

Hypotheses 4 through 6 stated that the combined MTC beliefs would explain more variance than the OCRBS beliefs or the TAM beliefs would independently. Hierarchical

regression was used to predict the three criterion variables (Hypothesis 4) affective commitment to the change, (Hypothesis 5) technology acceptance, and (Hypothesis 6) personal initiative.

For Hypothesis 4, the R-square for the change recipients' beliefs accounted 42% of the variance explained ($R^2 = .43$, $\Delta R^2 = .42$, $AdjR^2 = .41$, $p < .001$) beyond what was explained by the four control variables (age, gender, education, and organizational tenure). The two TAM beliefs together accounted for 25% of the variance, an additional 24% of variance explained beyond the control variables ($R^2 = .25$, $\Delta R^2 = .24$, $AdjR^2 = .23$, $p < .001$). In comparing the results from the two models, the difference between the R-square and adjusted R-square for the two models is 18%, with the greater variance explained by the change recipient beliefs as one set of predictors (43% - 25%). When the two sets of beliefs are combined, the MTC beliefs accounted for, 46% of the variance, an additional 45% of variance explained beyond the control variables ($R^2 = .46$, $\Delta R^2 = .45$, $AdjR^2 = .44$, $p < .001$). The two sets of beliefs combined within the MTC account for 3% more R-square and adjusted R-square than the change beliefs alone (46% - 43%). See Table 19 for the hierarchical regression results for two separate sets of belief variables with affective commitment to the change as the criterion variable.

Table 19

Hierarchical Regressions for the Change Recipient Beliefs and TAM Beliefs Separately with Affective Commitment to the Change as the Criterion Variable

Organizational Change Recipients Beliefs on Affective Commitment to Change			TAM Beliefs on Affective Commitment to Change		
	β			β	
Variable	Step 1	Step 2	Variable	Step 1	Step 2
Age	-.01	-.01	Age	-.01	-.01
Gender	.04	.02	Gender	.04	.04
Education	-.04	-.07	Education	-.04	-.05
Tenure	.04	.02	Tenure	.04	.02
Discrepancy		.26***	PEOU		.44***
Appropriateness		.23***	PERUSE		.11*
Change Efficacy		.18***			
Principal Support		.13**			
Personal Valence		.10*			
R^2	.01	.43	R^2	.01	.25
ΔR^2	.01	.42	ΔR^2	.00	.24
$AdjR^2$	.00	.41	$AdjR^2$	.00	.23

Hypothesis 5 examined the differences between the three sets of belief variables (change recipient beliefs, technology acceptance beliefs, and combined set of beliefs) with technology acceptance as the criterion variable. The change recipient beliefs ($R^2 = .27$, $\Delta R^2 = .24$, $AdjR^2 = .26$, $p < .001$) accounted for slightly less variance, (with a difference of 4% in $AdjR^2$, 30%-26%), than the two TAM beliefs ($R^2 = .30$, $\Delta R^2 = .27$, $AdjR^2 = .30$, $p < .001$), after controlling for the four control variables (age, gender, education, and organizational tenure) in both models. Together, the two sets of beliefs combined as the MTC beliefs accounted for 38% of the variance, an additional 35% of variance explained beyond the control variables ($R^2 = .38$, $\Delta R^2 = .35$, $AdjR^2 = .37$, $p < .001$). The two sets of beliefs combined within the MTC account for 8% more R-square and 7% more adjusted R-square than the TAM beliefs, which were a better set of predictors than the change beliefs (38%-30% and 37%-30%). For the results of the hierarchical regressions for change beliefs and TAM beliefs with technology acceptance as the criterion variable, see Table 20 below.

Table 20

Hierarchical Regressions for the Change Recipient Beliefs and TAM Beliefs Separately with Technology Acceptance as the Criterion Variable

Organizational Change Recipients Beliefs on Technology Acceptance			TAM Beliefs on Technology Acceptance		
	β			β	
Variable	Step 1	Step 2	Variable	Step 1	Step 2
Age	.09	.08	Age	.09	.06
Gender	-.01	-.03	Gender	-.01	-.03
Education	.13*	.10*	Education	.13*	.10*
Tenure	.07	.04	Tenure	.07	.06
Discrepancy		.08	PEOU		.27***
Appropriateness		.02	PERUSE		.37***
Change Efficacy		.18***			
Principal Support		.27***			
Personal Valence		.11*			
R^2	.03	.27	R^2	.03	.30
ΔR^2	.03	.24	ΔR^2	.03	.27
$AdjR^2$	.02	.26	$AdjR^2$	.02	.30

Hypothesis 6 stated that the MTC beliefs combined would predict personal initiative related to using the new ERP system better than the change beliefs or TAM beliefs would predict separately. Change recipient beliefs ($R^2 = .15$, $\Delta R^2 = .13$, $AdjR^2 = .13$, $p < .001$) accounted for slightly less variance, (with a difference of 9% in adjusted R-square, 22%-13%), than the two TAM beliefs ($R^2 = .24$, $\Delta R^2 = .22$, $AdjR^2 = .23$, $p < .001$), after controlling for the four control variables (age, gender, education, and organizational tenure) in both models. When combined as the MTC beliefs, the beliefs together accounted for an additional 3% of variance explained ($R^2 = .27$, $\Delta R^2 = .25$, $AdjR^2 = .25$, $p < .001$) beyond what the TAM beliefs explained alone (27%-24%). The results of the hierarchical regressions for change beliefs and TAM beliefs with personal initiative as the outcome are included in Table 21. A more direct comparison of the explanatory power of the three models across all three dependent variables is provided in Table 22.

Table 21

Hierarchical Regressions for the Change Recipient Beliefs and TAM Beliefs Separately with Personal Initiative as the Criterion Variable

Organizational Change Recipients Beliefs on Personal Initiative			TAM Beliefs on Personal Initiative		
	β			β	
Variable	Step 1	Step 2	Variable	Step 1	Step 2
Age	.14*	.14**	Age	.14	.11
Gender	.04	.02	Gender	.04	.02
Education	.05	.03	Education	.05	.01
Tenure	.08	.06	Tenure	.08	.07
Discrepancy		-.03	PEOU		.19***
Appropriateness		.10	PERUSE		.37***
Change Efficacy		.17**			
Principal Support		.16**			
Personal Valence		.07			
R^2	.02	.15	R^2	.02	.24
ΔR^2	.02	.13	ΔR^2	.02	.22
$AdjR^2$	.01	.13	$AdjR^2$	.01	.23

Table 22

Summary of Model Comparisons

Outcome	Change Beliefs			TAM Beliefs			Model Difference			MTC Beliefs			Improvement by MTC Model		
	R^2	ΔR^2	Adj R^2	R^2	ΔR^2	Adj R^2	R^2	ΔR^2	Adj R^2	R^2	ΔR^2	Adj R^2	R^2	ΔR^2	Adj R^2
A.C.C.	.43	.42	.41	.25	.24	.23	.18	.18	.18	.46	.45	.44	+.03	+.03	+.03
T.A.	.27	.24	.26	.30	.27	.30	.03	.03	.04	.38	.35	.37	+.08	+.08	+.07
P. I.	.15	.13	.13	.24	.22	.23	.09	.09	.10	.27	.25	.25	+.03	+.03	+.02

Note. A.C.C. stands for affective commitment to the change, T.A. stands for technology acceptance, and P.I. stands for personal initiative related to the new ERP system

Content-Related and Process-Related Hypotheses

Hypotheses 7 through 9 examine the role of beliefs as mediators within the relationships between ERP subsystem as a representation of the content of the change and three criterion variables (i.e., affective commitment to the change, technology acceptance, and personal initiative specifically related to using the new ERP system). The term ERP subsystem refers to the different applications of the new ERP system. These subsystems include the Finance subsystem, which is believed to be the most complex and difficult of the subsystems, the HR subsystem, and the Student subsystem, which is believed to be the least complex and easiest of the subsystems. As previously noted, because the subsystems are categorical variables, they were dummy coded.

Training was included in this study as a process variable. Hypotheses 10 through 12 examine the role of beliefs as mediators within the relationships between training, a process variable, and three criterion variables (i.e., affective commitment to the change, technology acceptance, and personal initiative specifically related to using the new ERP system).

Discrepancy was not included as a mediator because, theoretically, and based on the qualitative results, a strong case could not be established for its inclusion based on the point in time during the change at which the data was collected. Similarly, personal valence was not included as a mediator because a similar case could not be made for it either. It seemed that those two beliefs were important to change recipients. However, it also seemed that discrepancy and appropriateness mattered more to change recipients earlier in the change initiative than they did at the time of the interviews. This interpretation is based on the change recipients' comments concerning recollections of the introduction of the new ERP system versus what they thought about the change initiative at the time of the interviews. At the time the interviews were

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conducted, it seemed that the interviewees were more focused on efficacy, principal support, and valence. This is illustrated by the frequency of comments for each of the related qualitative themes presented in Chapter 4.

Mediational analysis has long been guided by the multi-step procedure offered by Baron and Kenny (1986). In recent years, however, methodologists have identified various shortcomings inherent with this procedure (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Baron and Kenny suggested that in order to support mediation, for step 1, the direct effect from the predictor variable to the outcome variable must be significant. An issue is that, as the mediational process becomes more distal, the size of the relationship between predictor and outcome variables is likely to shrink. This is due to the relationship being "(a) transmitted through additional links in a causal chain, (b) affected by competing causes, and (c) affected by random factors" (Shrout & Bolger, 2002, p. 429). Because of these issues, methodologists have argued whether step 1 (the correlation between predictor and outcome) is necessary in order for mediation to exist (MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002). Indeed, the necessity of meeting step 1 was questioned by Kenny in an updated version of the mediation procedure (Kenny, Kashy, & Bolger, 1998).

Rather than relying on the Baron and Kenny (1986) procedure, many methodologists now suggest the analysis of formal significance tests of the indirect effect. The Sobel (1982) test is the best known test for indirect effects, and is considered a powerful procedure compared to the Baron and Kenny (1986) procedure (Preacher & Hayes, 2004). The Sobel test is based on the assumption that the indirect effect is normally distributed. However, this assumption is weak given that the distribution of the indirect effect is known to be non-normal, even when the variable related to the indirect effect is normally distributed (Edwards & Lambert, 2007).

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Because of this, the bootstrapping of confidence intervals has been suggested as a means of avoiding power issues due to asymmetrical and other non-normal sampling distributions of an indirect effect (MacKinnon, Lockwood, & Williams, 2004).

For the analyses involving both ERP subsystem and training, a macro script for SPSS, provided by Preacher and Hayes (2008), was utilized. The macro generates estimates for the indirect effects of multiple mediator models. The advantage of examining multiple mediators simultaneously is that it is possible to determine if the mediation for a specific mediator is independent of the mediation by other mediators. The macro provides (1) the total effect of predictor on criterion variable, (2) the direct effect of predictor on outcome, and (3) the specific indirect effects of predictor on outcome through mediators. The macro can handle multiple mediators simultaneously, and it provides statistical control of covariates and the pairwise comparisons of all the indirect effects. It also produces percentile-based bootstrapped confidence intervals, bias-corrected bootstrapped confidence intervals, and accelerated bias-corrected bootstrap confidence intervals.

The macro follows the product-of-coefficients strategy by using bootstrapping to test the strength and significance of the indirect effect. Bootstrapping is a non-parametric method used in assessing the indirect effects (Preacher & Hayes, 2004; Preacher et al., 2007). While an exact normal distribution can be found only in large samples, bootstrapping overcomes many of the problems with non-normally distributed data. For the analyses presented here, 3,000 bootstraps were run for each analysis with a confidence interval of 95%.

The macro performs the analysis by first regressing the mediators (ME) on the predictor variables (IV). It then regresses the criterion variable (DV) on the mediators and the independent variable. The indirect effect is then created as a mean bootstrapped sample estimate of the

regression coefficients ('ME on IV'*'DV on Me controlling for IV'). A standard deviation of the estimate of the indirect effect is obtained from the 1,000 bootstrapped resamples. It is the estimated standard error of the mean indirect effect (Preacher & Hayes, 2004).

Note too that the control variables were not included in the mediation and moderated mediation for the remaining hypotheses. The decision to remove them from further analysis was based on Becker's (2005) recommendations concerning the usefulness of control variables. Becker suggests that the inclusion of controls that are not useful in explaining variance not only reduce statistical power, but may also produce biased estimates.

ERP subsystems are a categorical variable. Because of this, dummy variables were generated to represent the three subsystems within the analysis. Given that the purpose of the hypotheses was to test mediation by each particular subsystem rather than how the three subsystems differed from one another, analysis of variance (ANOVA) was not utilized for comparison purposes.

Mediation Analyses for ERP Subsystems as Predictor and Affective Commitment to the Change as Outcome

The full results for Hypotheses 7a-e through 9a-e are reported in Table 23.

Hypotheses 7a-e. For Hypotheses 7a through 7e, the normal theory and bootstrapping results produced statistically significant mean indirect effects for the finance subsystem on affective commitment to the change through (7a) appropriateness (*Effect* = -.12, Sobel z = -2.35, p <.05), (7c) principal support (*Effect* = -.08, Sobel z = -2.09, p < .05), and (7e) perceived ease of use (*Effect* = -.15, Sobel z = -2.91, p <.01). No statistically significant results were found for (7b) change efficacy (*Effect* = -.04, Sobel z = -1.06, p < .29) or (7d) perceived usefulness (*Effect* = - .02, Sobel z = -.66, p = ns). Thus, 7a, 7c, and 7e were supported for the finance subsystem.

Finance subsystem overall did not, however, have a statistically significant direct effect on affective commitment to the change (β = -.26, t = 2-1.80, p < .07).

Hypotheses 8a-e. For Hypotheses 8a through 8e, the normal theory and bootstrapping results provided no statistically significant mean indirect effects for HR subsystem on affective commitment to the change through (8a) appropriateness (*Effect* = .05, Sobel z = 1.08, p = *ns*), (8b) change efficacy (*Effect* = .00, Sobel z = .14, p = *ns*), (8c) principal support (*Effect* = .03, Sobel z = 1.41, p = *ns*), (8d) perceived ease of use (*Effect* = .07, Sobel z = 1.70, p = *ns*), and (8e) perceived usefulness (*Effect* = .00, Sobel z = .41, p = *ns*). Thus, none of the beliefs mediated the relationship between HR subsystem and affective commitment to the change. While not hypothesized, it is notable that there was no statistically significant direct effect by HR subsystem on affective commitment to the change (β = .16, t = 1.34, p = *ns*).

Hypotheses 9a-e. In addition, for Hypotheses 9a through 9e, no statistically significant mean indirect effects were found through normal theory and bootstrapping for Student subsystem on affective commitment to the change through (9a) appropriateness (*Effect* = .05, Sobel z = 1.07, p = *ns*), (9b) change efficacy (*Effect* = .03, Sobel z = .79, p = *ns*), (9c) principal support (*Effect* = .03, Sobel z = 1.41, p = *ns*), (9d) perceived ease of use (*Effect* = .05, Sobel z = 1.16, p = *ns*), and (9e) perceived usefulness (*Effect* = .01, Sobel z = .75, p = *ns*). The results show that none of the beliefs mediated the relationship between Student subsystem and affective commitment to the change relationship. Student subsystem did not have a statistically significant direct effect on affective commitment to the change (β = .02, t = .15, p = *ns*).

Table 23a.

Mediation Analyses for Finance and HR Subsystems to Affective Commitment to the Change as Outcome

Finance Subsystem					*HR Subsystem*				
on Affective Commitment to Change					*on Affective Commitment to Change*				
IV to Mediators					IV to Mediators				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Appropriateness	-.54	.21	-2.5	.01	Appropriateness	.20	.18	1.09	.28
Efficacy	-.22	.20	-1.1	.28	Efficacy	.24	.17	.14	.89
Principal Supp	-.65	.16	-3.9	.00	Principal Supp	.20	.14	1.67	.10
PEOU	-.45	.13	-3.5	.00	PEOU	.06	.11	1.8	.07
PERUSE	-.42	.14	-3.0	.00	PERUSE		.12	.47	.64

| Direct Effect of IV on DV | | | | | Direct Effect of IV on DV | | | | |
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Fin. subsystem	-.67	.18	-3.7	.00	HR subsystem	.16	.12	1.34	.18

| Total Effect of IV on DV | | | | | Total Effect of IV on DV | | | | |
	β	*S.E.*	*t*	*P*		*β*	*S.E.*	*t*	*p*
Fin. subsystem	-.26	.15	-1.8	.07	HR subsystem	.31	.15	2.02	.04

| Normal Theory Test for Indirect Effects | | | | | Normal Theory Test for Indirect Effects | | | | |
	Effect	*S.E.*	*Z*	*p*		*Effect*	*S.E.*	*Z*	*p*
Total	-.41	.12	-3.5	.00	Total	.15	.10	1.52	.13
Appropriateness	-.14	.05	-2.3	.02	Appropriateness	.05	.04	1.08	.28
Efficacy	-.04	.04	-1.1	.29	Efficacy	.00	.03	.14	.89
Principal Support	-.08	.04	-2.1	.04	Principal Support	.03	.02	1.41	.16
PEOU	-.15	.05	-2.9	.00	PEOU	.07	.04	1.7	.09
PERUSE	-.02	.02	-.66	.51	PERUSE	.00	.01	.41	.68

| Bootstrap Results for Indirect Effects | | | | | Bootstrap Results for Indirect Effects | | | | |
	Data	*boot*	*Bias*	*S.E.*		*Data*	*boot*	*Bias*	*S.E.*
Total	-.41	-.42	-.00	.12	Total	.15	.15	.00	.10
.0Appropriateness	-.12	-.13	-.00	.06	Appropriateness	.05	.05	.00	.04
Efficacy	-.04	-.04	-.00	.04	Efficacy	.00	.01	.00	.03
Principal Support	-.09	-.08	-.00	.04	Principal Support	.03	.03	.00	.02
PEOU	-.15	-.15	.00	.05	PEOU	.07	.07	.00	.04
PERUSE	-.02	-.02	-.00	.02	PERUSE	.00	.00	.00	.01

| Bias Corrected & Accelerated C.I. | | | Bias Corrected & Accelerated C.I. | | |
	Lower	*Upper*		*Lower*	*Upper*
Total	-.66	-.17	Total	-.05	.34
Appropriateness	-.25	-.03	Appropriateness	-.03	.14
Efficacy	-.14	.03	Efficacy	-.06	.07
Principal Support	-.19	-.01	Principal Support	.00	.09
PEOU	-.28	-.07	PEOU	-.01	.14
PERUSE	-.07	.03	PERUSE	-.01	.04

Table 23b.

Mediation Analyses for the Student Subsystem to Affective Commitment to the Change as Outcome

Student Subsystem on Affective Commitment to Change			
IV to Mediators			
β	S.E.	t	p
Appropriateness	.20	.19	1.08	.28
Efficacy	.14	.18	.80	.42
Principal Supp	.24	.15	1.66	.10
PEOU	.13	.11	1.19	.24
PERUSE	.26	.12	2.08	.04

Direct Effect of IV on DV			
	β	S.E.	t	p
Stud. subsystem	.18	.16	1.13	.26

Total Effect of IV on DV			
	β	S.E.	t	p
Stud. subsystem	.02	.13	.15	.88

Normal Theory Test for Indirect Effects			
	Effect	S.E.	Z	p
Total	.16	.10	1.59	.11
Appropriateness	.05	.04	1.07	.29
Efficacy	.03	.03	.79	.43
Principal Support	.03	.02	1.41	.16
PEOU	.05	.04	1.16	.25
PERUSE	.01	.01	.75	.45

Bootstrap Results for Indirect Effects			
	Data	*boot*	*Bias*	*S.E.*
Total	.16	.17	.01	.11
Appropriateness	.05	.05	.00	.10
Efficacy	.03	.03	.00	.04
Principal Support	.03	.04	.00	.02
PEOU	.05	.05	.00	.04
PERUSE	.01	.01	.00	.02

Bias Corrected & Accelerated C.I.	
	Lower	*Upper*
Total	-.04	.37
Appropriateness	-.04	.14
Efficacy	-.03	.12
Principal Support	-.01	.11
PEOU	-.02	.15
PERUSE	-.01	.06

Mediation Analyses for ERP Subsystems as Predictor and Technology Acceptance as Outcome

Hypotheses 10a-e through 12a-e were similar to Hypotheses 7a-e through 9a-e, except that the outcome examined was technology acceptance. The full results for all of these hypotheses are presented in Table 24.

Hypotheses 10a-e. For Hypotheses 10a through 10e, with Finance subsystem as the predictor, statistically significant mean indirect effects were found through normal theory and bootstrapping for (10c) principal support (*Effect* = -.11, Sobel z = -2.88, p < .01), (10d) perceived ease of use (*Effect* = -.06, Sobel z = -2.20, p < .05), and (10e) perceived usefulness (*Effect* = -.13, Sobel z = -2.78, p < .01). The mean indirect effects were not statistically significant for (10a) appropriateness (*Effect* = -.00, Sobel z = -.19, p = ns), (10b) change efficacy (*Effect* = -.02, Sobel z = -1.04, p = ns). Though not hypothesized, Finance subsystem did not have a statistically significant direct effect on technology acceptance (β = .02, t = .19, p < .85).

Hypotheses 11a-e. The results from normal theory and bootstrapping revealed statistically significant mean indirect effects for the relationship between HR subsystem and technology acceptance through (11d) perceived ease of use (*Effect* = -.04, Sobel z = -2.00, p < .05), and (11e) perceived usefulness (*Effect* = -.10, Sobel z = -2.56, p < .05). No statistically significant indirect effects at the level of the mean were found for (11a) appropriateness (*Effect* = .00, Sobel z = .17, p = ns), (11b) change efficacy (*Effect* = -.02, Sobel z = -.77, p = ns), and (11c) principal support (*Effect* = .04, Sobel z = 1.72, p = ns). The direct effect by HR subsystem on technology acceptance was also not significant (β = .01, t = .06, *p* = ns).

Hypotheses 12a-e. The results from the normal theory and bootstrapping analyses for Student subsystem found only one significant mean indirect effect for Student subsystem on technology acceptance. Only (12e) perceived usefulness (*Effect* = .08, Sobel z = 2.15, p <.05)

was significant. Hypotheses (12a) appropriateness (*Effect* = .00, Sobel z = .09, p = *ns*), (12b) change efficacy (*Effect* = -.01, Sobel z = -.28, p = *ns*), (12c) principal support (*Effect* = .02, Sobel z = .69, p = *ns*), and (12d) perceived ease of use (*Effect* = .03, Sobel z = 1.49, p = *ns*) were not significant. Student subsystem did not have a significant direct effect on technology acceptance (β = .11, t = 1.11, p = *ns*).

Table 24

Mediation Analyses for Finance and HR Subsystems to Technology Acceptance as Outcome

Finance Subsystem on Technology Acceptance					*HR Subsystem on Technology Acceptance*				
IV to Mediators					IV to Mediators				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Appropriateness	-.55	.21	-2.6	.01	Appropriateness	.10	.18	.56	.57
Efficacy	-.22	.20	-1.1	.28	Efficacy	-.14	.17	-.79	.43
Principal Supp	-.65	.17	-3.9	.00	Principal Supp	-.26	.14	-1.9	.06
PEOU	-.46	.13	-3.5	.00	PEOU	-..32	.11	-2.9	.00
PERUSE	-.42	.14	-3.0	.00	PERUSE	-.32	.12	-2.7	.01

Direct Effect of IV on DV					Direct Effect of IV on DV				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Fin. subsystem	-.30	.13	-2.3	.02	HR subsystem	-.19	.11	-1.7	.09

Total Effect of IV on DV					Total Effect of IV on DV				
	β	*S.E.*	*t*	*P*		*β*	*S.E.*	*t*	*p*
Fin. subsystem	.02	.11	.19	.85	HR subsystem	.01	.09	.06	.95

Normal Theory Test for Indirect Effects					Normal Theory Test for Indirect Effects				
	Effect	*S.E.*	*Z*	*p*		*Effect*	*S.E.*	*Z*	*p*
Total	-.32	.08	-3.9	.00	Total	-.20	.07	-2.9	.00
Appropriateness	-.00	.02	-.18	.85	Appropriateness	.00	.00	.17	.87
Efficacy	-.02	.02	-1.0	.30	Efficacy	-.01	.02	-.77	.44
Principal Support	-.11	.04	-2.8	.00	Principal Support	-.04	.03	-1.7	.09
PEOU	-.06	.03	2.2	.03	PEOU	-.04	.02	-2.0	.05
PERUSE	-.13	.05	-2.8	.01	PERUSE	-.10	.04	-2.6	.01

Bootstrap Results for Indirect Effects					Bootstrap Results for Indirect Effects				
	Data	*boot*	*Bias*	*S.E.*		*Data*	*boot*	*Bias*	*S.E.*
Total	-.32	-.32	.00	.09	Total	-.20	-.20	.00	.07
Appropriateness	-.00	-.00	-.00	.02	Appropriateness	.00	.00	.00	.00
Efficacy	-.02	-.02	.00	.03	Efficacy	-.02	-.01	.00	.02
Principal Support	-.11	-.11	.00	.04	Principal Support	-.04	-.04	.00	.03
PEOU	-.06	-.06	-.00	.03	PEOU	-.04	-.04	.00	.03
PERUSE	-.13	-.13	-.00	.05	PERUSE	-.10	-.10	-.00	.04

Bias Corrected & Accelerated C.I.				Bias Corrected & Accelerated C.I.		
	Lower	*Upper*			*Lower*	*Upper*
Total	-.51	-.16		Total	-.35	-.07
Appropriateness	-.05	.04		Appropriateness	-.01	.02
Efficacy	-.11	.01		Efficacy	-.07	.02
Principal Support	-.22	-.04		Principal Support	-.11	-.00
PEOU	-.15	-.01		PEOU	-.11	-.00
PERUSE	-.25	-.04		PERUSE	-.19	-.02

Table 24, continued

Mediation Analyses for the Finance Subsystem to Technology Acceptance as Outcome

		Student Subsystem on Technology Acceptance		
	IV to Mediators			
	ß	S.E.	t	p
Appropriateness	.02	.19	.10	.92
Efficacy	-.05	.18	-.28	.78
Principal Supp	.10	.15	.70	.49
PEOU	.20	.11	1.8	.08
PERUSE	.28	.12	2.2	.03

	Direct Effect of IV on DV			
	ß	S.E.	t	p
Stud. subsystem	.23	.12	1.95	.05

	Total Effect of IV on DV			
	ß	S.E.	t	p
Stud. subsystem	.11	.09	1.11	.27

	Normal Theory Test for Indirect Effects			
	Effect	S.E.	Z	p
Total	.12	.07	1.71	.09
Appropriateness	.00	.00	.09	.93
Efficacy	-.01	.02	-.28	.78
Principal Support	.02	.02	.69	.49
PEOU	.03	.02	1.49	.14
PERUSE	.08	.04	2.15	.03

	Bootstrap Results for Indirect Effects			
	Data	*boot*	*Bias*	*S.E.*
Total	.12	.12	-.00	.07
Appropriateness	.00	.00	.00	.01
Efficacy	-.01	-.01	-.00	.02
Principal Support	.02	.02	-.00	.02
PEOU	.03	.03	.00	.02
PERUSE	.08	.08	-.00	.04

	Bias Corrected & Accelerated C.I.	
	Lower	*Upper*
Total	-.01	.28
Appropriateness	-.01	.02
Efficacy	-.06	.04
Principal Support	-.03	.07
PEOU	-.00	.09
PERUSE	.01	.16

Mediation Analyses for ERP Subsystems as Predictor and Personal Initiative as Outcome

Hypotheses 13a-e through 15a-e examined the mediation by beliefs of the relationship between ERP subsystems and personal initiative, which reflects behaviors related to adapting to the new ERP system.

Hypotheses 13a-e. For Hypotheses 13a through 13e, the normal theory and bootstrapping results revealed a statistically significant mean indirect effect for Finance subsystem on personal initiative only through (13e) perceived usefulness (*Effect* = -.13, Sobel *z* = -2.76, *p* < .01). No statistically significant indirect effects were found for (13a) appropriateness (*Effect* = -.02, Sobel *z* = -1.21, *p* = *ns*), (13b) change efficacy (*Effect* = -.02, Sobel *z* = -1.01, *p* = *ns*), (13c) principal support (*Effect* = -.02, Sobel *z* = -1.01, *p* = *ns*), and (13d) perceived ease of use (*Effect* = -.04, Sobel *z* = -1.57, *p* = *ns*). The results show that none of the beliefs mediated the relationship between finance subsystem and affective commitment to the change relationship. Finance subsystem also did not even have a statistically significant direct effect on personal initiative (*β* = -.20, *t* = -1.72, *p* = *ns*).

Hypotheses 14a-e. Hypotheses 10a through 10e concerned HR subsystem as the predictor and affective commitment to the change as the outcome. The results from the normal theory analysis revealed (14d) perceived ease of use (*Effect* = -10, Sobel *z* = -2.56, *p* < .01) as statistically significant. However, these results conflicted with the accelerated bias-corrected confidence intervals (*LCI 95%* = -.19 and *UCI 95%* = -.03) from the bootstrapping. The bootstrapping of confidence intervals is believed to be the more accurate of the two statistical techniques, based on previous examination by methodologists (cf. Briggs, 2006; Williams, 2004; Williams & MacKinnon, 2008). Therefore, in order to remain conservative in hypothesis testing, given the conflicting results, the bootstrapping results were chosen over the normal theory results

since doing so meant accepting the null hypothesis. The normal theory and bootstrapping results for the other four beliefs did not reveal any statistically significant indirect effects. The specific results were: (14a) appropriateness (*Effect* = .00, Sobel *z* = .52, *p* = *ns*), (14b) change efficacy (*Effect* = -.01, Sobel *z* = -.75, *p* = *ns*), (14c) principal support (*Effect* = .01, Sobel *z* = 1.03, *p* = *ns*), and (14d) perceived usefulness (*Effect* = -.03, Sobel *z* = -1.57, *p* = *ns*). As with the previous hypotheses, there was no significant direct effect by HR subsystem on personal initiative (β = -.01, *t* = -.11, *p* = *ns*).

Hypotheses 15a-e. For Student subsystem as the predictor and personal initiative as the outcome, normal theory and bootstrapping yielded statistically significant results for (9e) perceived usefulness (*Effect* = .09, Sobel *z* = 2.14, *p* <.05). As such, Hypotheses (9a-d) were not supported. The results include: (9a) appropriateness (*Effect* = .00, Sobel *z* = .10, *p* = *ns*), (9b) change efficacy (*Effect* = -.00, Sobel *z* = -.28, *p* = *ns*), (9c) principal support (*Effect* = .00, Sobel *z* = .61, *p* = *ns*), and (9d) perceived ease of use (*Effect* = .02, Sobel *z* = 1.32, *p* = *ns*). In addition, Student subsystem did not have a significant direct effect on personal initiative (*Effect* = -.09, *t* = -.95, *p* = *ns*). The full results are presented in Table 25.

Table 25

Mediation Analyses for the Finance and HR Subsystems to Personal Initiative as Outcome

Finance Subsystem on Personal Initiative					*HR Subsystem on Personal Initiative*				
IV to Mediators					**IV to Mediators**				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Appropriateness	-.54	.21	-2.6	.01	Appropriateness	.10	.18	.56	.57
Efficacy	-.22	.20	-1.1	.28	Efficacy	-.14	.17	-.79	.43
Principal Supp	-.65	.17	-3.9	.00	Principal Supp	-.27	.14	-1.9	.06
PEOU	-.45	.13	-3.5	.00	PEOU	-.31	.11	-2.9	.00
PERUSE	-.42	.14	-3.0	.00	PERUSE	-.32	.12	-2.7	.01

Direct Effect of IV on DV					**Direct Effect of IV on DV**				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Fin. subsystem	-.45	.13	-3.4	.00	HR subsystem	-.16	.11	-1.5	.14

Total Effect of IV on DV					**Total Effect of IV on DV**				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Fin. subsystem	-.20	.12	-1.7	.09	HR subsystem	-.01	.10	-.11	.92

Normal Theory Test for Indirect Effects					**Normal Theory Test for Indirect Effects**				
	Effect	*S.E.*	*Z*	*p*		*Effect*	*S.E.*	*Z*	*p*
Total	-.24	.07	-3.5	.00	Total	-.16	.06	-2.6	.00
Appropriateness	-.02	.02	-1.2	.23	Appropriateness	.00	.09	.52	.60
Efficacy	-.02	.02	-1.0	.31	Efficacy	-.01	.01	-.75	.45
Principal Support	-.03	.03	-1.0	.31	Principal Support	-.01	.01	-1.0	.30
PEOU	-.04	.03	-1.6	.12	PEOU	-.03	.02	-1.6	.12
PERUSE	-.13	.05	-2.8	.01	PERUSE	-.10	.04	-2.6	.01

Bootstrap Results for Indirect Effects					**Bootstrap Results for Indirect Effects**				
	Data	*boot*	*Bias*	*S.E.*		*Data*	*boot*	*Bias*	*S.E.*
Total	-.24	-.25	-.00	.08	Total	-.16	-.16	-.00	.06
Appropriateness	-.02	-.02	-.00	.02	Appropriateness	.00	.00	.00	.01
Efficacy	-.02	-.02	-.00	.02	Efficacy	-.01	-.01	-.00	.02
Principal Support	-.03	-.03	.00	.03	Principal Support	-.01	-.01	.00	.02
PEOU	-.04	-.04	-.00	.03	PEOU	-.03	-.03	-.00	.02
PERUSE	-.13	-.13	.00	.05	PERUSE	-.10	-.10	.00	.04

Bias Corrected & Accelerated C.I.					**Bias Corrected & Accelerated C.I.**				
	Lower	*Upper*				*Lower*	*Upper*		
Total	-.40	-.10			Total	-.27	-.04		
Appropriateness	-.09	.00			Appropriateness	-.01	.04		
Efficacy	-.08	.01			Efficacy	-.05	.01		
Principal Support	-.10	.03			Principal Support	-.06	.01		
PEOU	-.12	.00			PEOU	-.09	.01		
PERUSE	-.25	-.04			PERUSE	-.19	-.03		

Table 25, continued
Mediation Analyses for the Student Subsystem with Personal Initiative as Outcome

Student Subsystem on Personal Initiative			
IV to Mediators			
	ß	*S.E.*	*t*	*p*
Appropriateness	.02	.19	.10	.92
Efficacy	-.05	.18	-.28	.78
Principal Supp	.10	.15	.70	.49
PEOU	.20	.11	1.8	.08
PERUSE	.28	.12	2.2	.03

Direct Effect of IV on DV			
	ß	*S.E.*	*t*	*p*
Stud. subsystem	.02	.12	.14	.89

Total Effect of IV on DV			
	ß	*S.E.*	*t*	*p*
Stud. subsystem	-.10	.10	-95	.34

Normal Theory Test for Indirect Effects			
	Effect	*S.E.*	*Z*	*p*
Total	.11	.06	1.9	.06
Appropriateness	.00	.01	.10	.92
Efficacy	-.00	.01	-.28	.78
Principal Support	.01	.01	.61	.54
PEOU	.02	.02	1.3	.19
PERUSE	.09	.04	2.2	.03

Bootstrap Results for Indirect Effects			
	Data	*boot*	*Bias*	*S.E.*
Total	.11	.11	-.00	.06
Appropriateness	.00	.00	-.00	.01
Efficacy	-.00	-.00	-.00	.02
Principal Support	.01	.00	-.00	.01
PEOU	.02	.02	.00	.02
PERUSE	.09	.09	.00	.04

Bias Corrected & Accelerated C.I.	
	Lower	*Upper*
Total	-.00	.24
Appropriateness	-.02	.03
Efficacy	-.04	.02
Principal Support	-.01	.05
PEOU	-..00	.07
PERUSE	.01	.17

Mediation Analysis with Training as Mediator

For Hypotheses 16a through 16e, the results from the bootstrapping yielded significant mean indirect effects for training on affective commitment to the change through appropriateness (*Effect* = .14, Sobel *z* = 3.89, *p* < .001), change efficacy (*Effect* = .12, Sobel *z* = 3.52, *p* < .001), principal support (*Effect* = .06, Sobel *z* = 2.27, *p* < .05), and perceived ease of use (*Effect* = .08, Sobel *z* = 2.76, *p* < .01). Perceived usefulness (*Effect* = .00, Sobel *z* = .64, *p* = *ns*) was not significant as a mediator. Appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness mediated the effect of the training and affective commitment to the change relationship, thus Hypotheses 16a through 16d were supported and 16e was not. Training did not have a significant direct effect on affective commitment to the change (*β* = .03, *t* = .36, *p* = *ns*).

Hypotheses 17a through 17e concerned the indirect effects for training on technology acceptance. The results were: appropriateness (*Effect* = .00, Sobel *z* = -.14, *p* = *ns*), change efficacy (*Effect* = .06, Sobel *z* = 2.82, *p* < .001), principal support (*Effect* = .07, Sobel *z* = 3.00, *p* < .001), perceived ease of use (*Effect* = .03, Sobel *z* = 2.12, *p* < .05), and perceived usefulness (*Effect* = .03, Sobel *z* = 1.0, *p* = *ns*). The indirect effects were not significant for appropriateness and perceived usefulness, but significant indirect effects were found for change efficacy, principal support, and perceived ease of use. Thus, 17a and 17e were not supported, and 17b, 17c, and 17d were supported. In addition, training still had a significant direct effect on technology acceptance (*β* = .15, *t* = 2.29, *p* < .05).

The Hypotheses 18a through 18e concerned the indirect effects of training through beliefs on personal initiative. The results included appropriateness (*Effect* = .03, Sobel *z* = 1.31, *p* = *ns*), change efficacy (*Effect* = .05, Sobel *z* = 2.25, *p* < .05), principal support (*Effect* = .02, Sobel *z* =

1.17, $p = ns$), perceived ease of use (*Effect* = .02, Sobel $z = 1.64$, $p = ns$) and perceived

usefulness (*Effect* = .03, Sobel $z = 1.01$, $p = ns$). Hypotheses 18a, 18c, 18d, and 18e were not

supported, while 18b was supported. Training did not have a significant direct effect on personal

initiative ($\beta = .03$, $t = .37$, $p = ns$). The full results are presented in Table 26.

In addition, a summary of the results for all of the mediation hypotheses is presented in

Table 27.

Table 26

Mediation Analyses for Training and the Three Criterion Variables

Training on Affective Commitment to Change					*Training on Technology Acceptance*				

IV to Mediators					IV to Mediators				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Appropriateness	.64	.12	5.20	.00	Appropriateness	.64	.12	5.20	.00
Efficacy	.63	.12	5.47	.00	Efficacy	.63	.12	5.47	.00
Principal Supp	.43	.10	4.44	.00	Principal Supp	.43	.10	4.43	.00
PEOU	.24	.08	3.24	.00	PEOU	.24	.08	3.24	.00
PERUSE	.08	.08	1.02	.31	PERUSE	.09	.08	1.02	.31

Direct Effect of IV on DV					Direct Effect of IV on DV				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Training	.44	.11	4.12	.00	Training	.34	.08	4.01	.00

Total Effect of IV on DV					Total Effect of IV on DV				
	β	*S.E.*	*t*	*p*		*β*	*S.E.*	*t*	*p*
Training	.03	.09	.36	.72	Training	.15	.07	2.29	.02

Normal Theory Test for Indirect Effects					Normal Theory Test for Indirect Effects				
	Effect	*S.E.*	*Z*	*p*		*Effect*	*S.E.*	*Z*	*p*
Total	.41	.07	5.71	.00	Total	.19	.05	3.79	.00
Appropriateness	.14	.04	3.89	.00	Appropriateness	.00	.02	-.14	.89
Efficacy	.12	.03	3.52	.00	Efficacy	.06	.02	2.82	.00
Principal Support	.06	.03	2.27	.02	Principal Support	.07	.02	3.00	.00
PEOU	.08	.03	2.76	.01	PEOU	.03	.02	2.12	.03
PERUSE	.00	.00	.64	.52	PERUSE	.03	.03	1.00	.31

Bootstrap Results for Indirect Effects					Bootstrap Results for Indirect Effects				
	Data	*boot*	*Bias*	*S.E.*		*Data*	*boot*	*Bias*	*S.E.*
Total	.41	.41	.00	.08	Total	.19	.18	.00	.05
Appropriateness	.14	.15	.00	.04	Appropriateness	.00	.00	.00	.02
Efficacy	.12	.12	.00	.04	Efficacy	.06	.06	.00	.03
Principal Support	.06	.06	.00	.03	Principal Support	.07	.07	.00	.03
PEOU	.08	.08	.00	.00	PEOU	.03	.03	.00	.02
PERUSE	.00	.00	.00	.01	PERUSE	.03	.02	.00	.03

Bias Corrected & Accelerated C.I.					Bias Corrected & Accelerated C.I.				
	Lower	*Upper*				*Lower*	*Upper*		
Total	.23	.56			Total	.08	.29		
Appropriateness	.07	.24			Appropriateness	-.05	.05		
Efficacy	.05	.21			Efficacy	.01	.13		
Principal Support	.01	.13			Principal Support	.02	.14		
PEOU	.03	.17			PEOU	.01	.09		
PERUSE	.00	.03			PERUSE	-.03	.08		

Table 26, continued
Mediation Analyses for Training and the Three Criterion Variables

Training on Personal Initiative				

IV to Mediators				
	β	*S.E.*	*t*	*p*
Appropriateness	.64	.12	5.20	.00
Efficacy	.63	.12	5.47	.00
Principal Supp	.43	.10	4.44	.00
PEOU	.24	.08	3.24	.00
PERUSE	.09	.08	1.02	.31

Direct Effect of IV on DV				
	β	*S.E.*	*t*	*p*
Training	.18	.08	2.27	.02

Total Effect of IV on DV				
	β	*S.E.*	*t*	*p*
Training	.03	.07	.37	.72

Normal Theory Test for Indirect Effects				
	Effect	*S.E.*	*Z*	*p*
Total	.15	.04	3.36	.00
Appropriateness	.03	.02	1.31	.19
Efficacy	.05	.02	2.25	.02
Principal Support	.02	.02	1.17	.24
PEOU	.02	.01	1.64	.10
PERUSE	.03	.03	1.01	.31

Bootstrap Results for Indirect Effects				
	Data	*boot*	*Bias*	*S.E.*
Total	.15	.15	.00	.05
Appropriateness	.03	.03	.00	.02
Efficacy	.05	.05	.00	.03
Principal Support	.02	.02	.00	.02
PEOU	.02	.02	.00	.02
PERUSE	.03	.03	.00	.03

Bias Corrected & Accelerated C.I.		
	Lower	*Upper*
Total	.05	.26
Appropriateness	-.01	.08
Efficacy	.01	.11
Principal Support	-.01	.08
PEOU	.00	.06
PERUSE	-.03	.08

Table 27

Summary of Mediation Hypotheses 7a-e through 15a-e

Hyp.	IV	Mediator	DV	Support?
7a	Finance Subsystem	Appropriateness	Affective Commitment	Yes
7b		Change efficacy	to the Change	No
7c		Principal Support		Yes
7d		PEOU		Yes
7e		PERUSE		No
8a	HR Subsystem	Appropriateness	Affective Commitment	No
8b		Change efficacy	to the Change	No
8c		Principal Support		Yes
8d		PEOU		Yes
8e		PERUSE		Yes
9a	Student Subsystem	Appropriateness	Affective Commitment	No
9b		Change efficacy	to the Change	No
9c		Principal Support		No
9d		PEOU		No
9e		PERUSE		No
10a	Finance Subsystem	Appropriateness	Technology Acceptance	No
10b		Change efficacy		No
10c		Principal Support		Yes
10d		PEOU		Yes
10e		PERUSE		No
11a	HR Subsystem	Appropriateness	Technology Acceptance	No
11b		Change efficacy		No
11c		Principal Support		No
11d		PEOU		Yes
11e		PERUSE		Yes
12a	Student Subsystem	Appropriateness	Technology Acceptance	No
12b		Change efficacy		No
12c		Principal Support		No
12d		PEOU		No
12e		PERUSE		No
13a	Finance Subsystem	Appropriateness	Personal Initiative	No
13b		Change efficacy		No
13c		Principal Support		No
13d		PEOU		No
13e		PERUSE		No
14a	HR Subsystem	Appropriateness	Personal Initiative	No
14b		Change efficacy		No
14c		Principal Support		No
14d		PEOU		No
14e		PERUSE		Yes
15a	Student Subsystem	Appropriateness	Personal Initiative	No
15b		Change efficacy		No
15c		Principal Support		No
15d		PEOU		No
15e		PERUSE		Yes

Table 27, continued
Summary of Mediation Hypotheses 16a-e through 18a-e

Hyp.	IV	Mediator	DV	Support?
16a	Training	Appropriateness	Affective Commitment	Yes
16b		Change efficacy	to the Change	Yes
16c		Principal Support		Yes
16d		PEOU		Yes
16e		PERUSE		No
17a	Training	Appropriateness	Technology Acceptance	No
17b		Change efficacy		Yes
17c		Principal Support		Yes
17d		PEOU		Yes
17e		PERUSE		No
18a	Training	Appropriateness	Personal Initiative	No
18b		Change efficacy		Yes
18c		Principal Support		No
18d		PEOU		No
18e		PERUSE		No

Context-Related and Individual Difference-Related Hypotheses

The Model of Technological Change posits that the context in which the change takes

place and the individual differences among the change recipients serve as moderators. The model

structures the relationships such that context moderators and individual difference moderators

may influence the indirect effects of content and process variables on change-related criterion

variables, through beliefs as mediators. For this study, LMX has been proposed as a context

moderator and core self evaluation has been proposed as an individual difference moderator.

Both of these moderators are believed to influence some of the relationships between ERP

subsystem and the three criterion variables (i.e., affective commitment to the change, technology

acceptance, and personal initiative specifically related to using the new ERP system) through two

of the seven beliefs as mediators (i.e., change efficacy and perceived ease of use).

Prior to the analyses, the data for the continuous measures were mean-centered (Aiken &

West, 1991). While correlations are legitimately possible even when unexpected, having some or

all predictor variables highly correlate with one another raises concerns about the presence of

multicollinearity. Neter, Kutner, Nachtsheim, and Wasserman (1996) noted that multicollinearity can lead to a nonsignificant regression coefficient even when a statistical relation between a predictor variable and a criterion variable actually exists. One technique for dealing with potential multicollinearity is to center the variables (Aiken & West, 1991). Mean centering reduces multicollinearity enough to allow for the analysis.

For this study, a macro for SPSS, provided by Preacher and Hayes (2007), was utilized. This macro is different from the one utilized for the mediational analyses. This macro is described in Preacher et al. (2007), and implements the normal theory and bootstrap approaches to testing conditional indirect effects. The macro tests whether the indirect effect of the independent variable (IV) through a mediator (ME) on the dependent variable (DV) depends on the moderator (MO) (cf. Preacher et al., 2007). This is tested by first independently estimating coefficients in two regression analyses using bootstrapping. First, the mediator is regressed on the IV. Second, the DV is regressed on the IV, the ME, and the interaction between the MO and ME (MO* ME) using mean centered variables. The overall effect of the IV on the ME is a necessary precondition for there to be moderated mediation. A significant interaction effect (MO*ME) on the DV is only indicative of moderated mediation if the IV is significantly related to the ME. Given a significant interaction effect, regression analyses are then conducted on several values of the moderator for the purpose of obtaining the degree to which mediation varies depending on the level of the moderator. The variables are standardized and the indirect effects are reported at three levels (mean, +1 standard deviation, and -1 standard deviation) of the MO. Bias-corrected bootstrapping is used since it is considered to be more accurate in estimating confidence intervals (MacKinnon et al., 2004). In addition, the Johnson-Neyman technique is applied which tests the significance of the indirect effect on a range of values of MO until the

value of the MO is identified for which the conditional indirect effect meets statistical significance at the chosen α-level (here, α = .05). The values of the MO at which the mediation effect is significant constitute the region of significance of the indirect effect.

Moderated Mediation Analysis

As noted in the previous section, normal theory tests of interaction is not enough evidence to conclude interaction. As such, Hypotheses 19a-e through 42a-b were all tested using bootstrapping within the previously described SPSS macro. Because 84 separate analyses were required to test these hypotheses, and due to the abundance of output, only the statistically significant results of Hypotheses 19a-e through 42a-b will be presented in the narrative. The non-significant results, along with the significant results, can be found in Table 28. A summary of which hypotheses were supported is located in Table 29.

LMX as moderator of relationships between ERP subsystems and beliefs. Hypothesis 19a-e through 27a-e concerned moderation by LMX on the indirect effects of ERP subsystems (i.e., Finance, HR, and Student). The three subsystems were the predictor variables with affective commitment to the change, technology acceptance, and personal initiative as criterion variables. The proposed moderation by LMX was on the relationships between the ERP subsystems and five beliefs as mediators (appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness). For these Hypotheses 19a-e through 27a-e, interaction was found for LMX in 15 out of the 36 relationships.

Hypotheses 19a-e. For 19a-e, support was found for (19c) principal support (Sobel z for -1 S.D. = -.52, $p = ns$; Sobel z for Mean = -2.92, $p < .01$; Sobel z for +1 S.D. = -2.74, $p < .01$) and (19e) perceived ease of use (Sobel z for -1 S.D. = -2.02, $p < .05$; Sobel z for Mean = -2.62, $p <$

.01*; Sobel *z* for +1 S.D. = -2.70, *p* < .01). No support was found was found for 19a, 19b, and 19d.

Hypotheses 20a-e. For 20a-e, no support was found for any of the hypotheses

Hypotheses 21a-e. For 21a-e, no support was found for any of the hypotheses.

Hypotheses 22a-e. For Hypotheses 22a-e, support was found for (22c) principal support (Sobel *z* for -1 S.D. = -1.49, *p* = ns*; Sobel *z* for Mean = -2.97, *p* < .01*; Sobel *z* for +1 S.D. = -2.82, *p* < .01), (22d) perceived ease of use (Sobel *z* for -1 S.D. = -1.71, *p* = ns*; Sobel *z* for Mean = -2.43, *p* < .01*; Sobel *z* for +1 S.D. = -1.61, *p* = ns), and (22e) perceived usefulness (Sobel *z* for -1 S.D. = -1.28, *p* = ns*; Sobel *z* for Mean = -2.20, *p* < .01*; Sobel *z* for +1 S.D. = -2.06, *p* < .01). No support was found was found for 22a or 22b.

Hypotheses 23a-e. For Hypotheses 23a-e, support was found for (23c) principal support (Sobel *z* for -1 S.D. = -1.56, *p* = ns*; Sobel *z* for Mean = -1.96, *p* < .05*; Sobel *z* for +1 S.D. = -1.02, *p* = ns), (23d) perceived ease of use (Sobel *z* for -1 S.D. = -1.34, *p* = ns*; Sobel *z* for Mean = -2.40, *p* < .01*; Sobel *z* for +1 S.D. = -2.25, *p* < .01), and (23e) perceived usefulness (Sobel *z* for -1 S.D. = -1.74, *p* = ns*; Sobel *z* for Mean = -2.62, *p* < .01*; Sobel *z* for +1 S.D. = -2.06, *p* < .01).

Hypotheses 24a-e. For Hypotheses 24a-e, support was found for (24e) perceived ease of use (Sobel *z* for -1 S.D. = -.46, *p* = ns*; Sobel *z* for Mean = -1.96, *p* < .05*; Sobel *z* for +1 S.D. = -2.33, *p* < .01). No support was found for 24a-d.

Hypotheses 25a-e. For Hypotheses 25a-e, support was found for (25c) principal support (Sobel *z* for -1 S.D. = -1.44, *p* = ns*; Sobel *z* for Mean = -2.42, *p* < .01*; Sobel *z* for +1 S.D. = -2.37, *p* < .01), (25d) perceived ease of use (Sobel *z* for -1 S.D. = -1.44, *p* = ns*; Sobel *z* for Mean = -2.42, *p* < .01*; Sobel *z* for +1 S.D. = -2.37, *p* < .01), and (25e) perceived usefulness (Sobel *z*

for -1 S.D. = -1.25, *p* = *ns;* Sobel *z* for Mean = -2.18, *p* < .01; Sobel *z* for +1 S.D. = -1.89, *p* <

.05). No support was found for 25a and 25b.

Hypotheses 26a-e. For Hypotheses 26a-e, support was found for (26d) perceived ease of

use (Sobel *z* for -1 S.D. = -1.32, *p* = *ns;* Sobel *z* for Mean = -2.28, *p* < .01; Sobel *z* for +1 S.D. =

-2.31, *p* < .01), and (26e) perceived usefulness (Sobel *z* for -1 S.D. = -1.79, *p* = *ns;* Sobel *z* for

Mean = -2.70, *p* < .01; Sobel *z* for +1 S.D. = -1.98, *p* < .05). No support was found for 26a-c.

Hypotheses 27a-e. For Hypotheses 27a-e, support was found only for (27e) perceived

usefulness (Sobel *z* for -1 S.D. = .45, *p* = *ns;* Sobel *z* for Mean = -2.02, *p* < .01; Sobel *z* for +1

S.D. = -2.30, *p* < .01). No support was found for 27a-d.

LMX as moderator of relationships between training and beliefs. For Hypotheses 28a-e

through 30a-e, the focus was on training as the independent variable, with affective commitment

to the change (Hypotheses 28a-e), technology acceptance (Hypotheses 29a-e), and personal

initiative (Hypotheses 30a-e) as the criterion variables. For these hypotheses, LMX was proposed

as a moderator on the relationships between training and five beliefs (a. appropriateness, b.

change efficacy, c. principal support, d. perceived ease of use, and e. perceived usefulness).

Hypotheses 28a-e. For Hypotheses 28a-28e, significant results were found for 28a, with

appropriateness as mediator (Sobel *z* for -1 S.D. = 1.80, *p* = *ns;* Sobel *z* for Mean = 3.16, *p* <.01;

Sobel *z* for +1 S.D. = 3.16, *p* < .01), 28b, with change efficacy as a mediator (Sobel *z* for -1 S.D.

= 2.26, *p* < .05; Sobel *z* for Mean = 3.09, *p* < .01; Sobel *z* for +1 S.D. = 2.83, *p* < .01), and 28c,

with principal support as a mediator (Sobel *z* for -1 S.D. = 2.04, *p* < .05; Sobel *z* for Mean =

2.36, *p* < .05; Sobel *z* for +1 S.D. = 1.52, *p* < *ns*). No support was found for Hypotheses 28d and

28e.

For Hypotheses 29a-29e, a significant result was found only for 29b, with change efficacy as a mediator (Sobel z for -1 S.D. = 2.00, $p < .05$; Sobel z for Mean = 2.69, $p < .01$; Sobel z for +1 S.D. = 2.61, $p < .01$). No support was found for Hypotheses 29a, 29c, 29d, and 29e.

For Hypotheses 30a-30e, significant results were found for 30a, with appropriateness as mediator (Sobel z for -1 S.D. = 1.57, $p = ns$; Sobel z for Mean = 2.37, $p < .05$; Sobel z for +1 S.D. = 2.32, $p < .05$), 30b, with change efficacy as a mediator (Sobel z for -1 S.D. = 1.99, $p < .05$; Sobel z for Mean = 2.49, $p < .01$; Sobel z for +1 S.D. = 2.30, $p < .01$), and 30c, with principal support as a mediator (Sobel z for -1 S.D. = 1.88, $p = ns$; Sobel z for Mean = 2.09, $p < .05$; Sobel z for +1 S.D. = 1.42, $p < ns$). No support was found for Hypotheses 30d and 30e.

Table 28a

Results of the Moderated Mediation Analyses for LMX with Affective Commitment to the Change as Outcome

LMX as Moderator of Indirect Effects through Appropriateness on Affective Commitment to the Change							
						Bootstrap Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.15	.26	.58	.56	-1.51	-1.34	.58
HR subsystem	-.19	.18	-1.04	.30	.53	.56	.26
Student subsystem	.16	.17	-.28	.78	.93	.76	.19
Training	.09	.05	1.66	.09	1.80	3.16**	3.16**

LMX as Moderator of the Indirect Effects through Efficacy on Affective Commitment to the Change							
						Bootstrap Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.05	.23	.21	.84	-.11	.02	.16
HR subsystem	.23	.18	-1.25	.21	-.48	.31	.13
Student subsystem	.15	.17	.89	.38	.49	.32	-.15
Training	.09	.10	.94	.35	2.26*	3.09**	2.83**

LMX as Moderator of Indirect Effects through Principal Support on Affective Commitment to the Change							
						Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.18	.20	-.91	.36	-1.52	-2.92**	-2.74**
HR subsystem	-.29	.22	1.35	.18	-.62	.52	1.29
Student subsystem	.23	.22	1.02	.31	1.02	-.41	.48
Training	.13	.10	1.29	.20	2.04*	2.36*	1.52

LMX as Moderator of the Indirect Effects through PEOU on Affective Commitment to the Change							
						Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.05	.23	.21	.84	-.11	.02	.16
HR subsystem	.13	.20	.62	.53	-.95	-.91	-.22
Student subsystem	.11	.21	.55	.58	-.83	-.82	-.25
Training	.09	.10	.86	.39	.77	1.60	1.93*

LMX as Moderator of the Indirect Effects through PERUSE on Affective Commitment to the Change							
						Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.17	.19	-.93	.35	-2.02*	2.62**	-2.70**
HR subsystem	.14	.18	.82	.41	-1.59	-1.92	-1.02
Student subsystem	.17	.18	.97	.33	-.45	.26	.89
Training	.11	.11	1.03	.30	-.24	-.33	-.28

Table 28b

Results of the Moderated Mediation Analyses for LMX with Technology Acceptance as Outcome

LMX as Moderator of the Indirect Effects through Appropriateness on Technology Acceptance							
						Bootstrap Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.15	.26	.56	.56	-1.25	-1.13	-.47
HR subsystem	.29	.22	1.35	.18	.55	.50	1.07
Student subsystem	.23	.22	1.02	.31	-.91	-.38	.46
Training	-.05	.08	-.65	.52	1.28	1.70	1.72

LMX as Moderator of the Indirect Effects through Efficacy on Technology Acceptance							
						Bootstrap Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.05	.24	.21	.84	-.12	.02	. 18
HR subsystem	.13	.20	.62	.53	-.92	-.86	-.18
Student subsystem	.11	.21	.55	.58	-.80	-.80	-.24
Training	-.04	.08	-.56	.58	2.00*	2.69**	2.61**

LMX as Moderator of the Indirect Effects through Principal Support on Technology Acceptance							
						Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.18	.20	-.91	.36	-1.49	-2.97**	-2.82**
HR subsystem	.10	.17	.56	.58	-1.56	-1.96*	-1.02
Student subsystem	.17	.18	.97	.33	-.46	.24	.87
Training	-.03	.07	-.37	.71	.49	.29	-.10

LMX as Moderator of the Indirect Effects through PEOU on Technology Acceptance							
						Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.10	.16	.44	.66	-1.71	-2.43**	-1.61
HR subsystem	-.06	.13	-.48	.63	-1.34	-2.40**	-2.25**
Student subsystem	.10	.14	.73	.47	.43	1.38	1.78
Training	-.05	.08	-.65	.52	.76	1.52	1.82

LMX as Moderator of the Indirect Effects through PERUSE on Technology Acceptance							
						Sobel Z	
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.05	.15	.34	.74	-1.28	-2.20**	-1.87*
HR subsystem	.00	.14	.01	.99	-1.74	-2.62**	-2.06**
Student subsystem	.21	.15	1.37	.17	.46	1.96*	2.33**
Training	-.02	.06	-.43	.67	-.11	-.41	-.50

Table 28c
Results of the Moderated Mediation Analyses for LMX with Personal Initiative as Outcome

					Bootstrap Sobel Z		
LMX as Moderator of the Indirect Effects through Appropriateness on Personal Initiative							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.15	.26	.58	.56	-1.32	-1.19	-.48
HR subsystem	.29	.21	1.35	.18	-.52	.59	1.24
Student subsystem	.23	.22	1.02	.31	.99	-.43	.41
Training	-.16	.08	-1.98	.05	1.57	2.37*	2.32*

					Bootstrap Sobel Z		
LMX as Moderator of the Indirect Effects through Efficacy on Personal Initiative							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.05	.24	.21	.84	-.11	.03	.18
HR subsystem	.13	.20	.62	.53	.90	-.87	-.22
Student subsystem	.11	.21	.55	.58	-.76	-.75	-.22
Training	-.15	.08	-1.80	.07	1.99*	2.49**	2.30**

					Sobel Z		
LMX as Moderator of the Indirect Effects through Principal Support on Personal Initiative							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.18	.2	-.91	.36	-1.44	-2.42**	-2.37**
HR subsystem	.10	.17	.56	.58	-1.47	-1.71	-.97
Student subsystem	.17	.18	.97	.33	-.44	. 23	.86
Training	-.13	.08	-1.62	.11	1.88	2.09*	1.42

					Sobel Z		
LMX as Moderator of the Indirect Effects through PEOU on Personal Initiative							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.07	.16	.44	.66	-1.67	-2.16**	-1.47
HR subsystem	-.06	.13	-.48	.63	-1.32	-2.28**	-2.31**
Student subsystem	.10	.13	.72	.47	.40	1.36	1.79
Training	-.15	.08	-1.89	.06	.77	1.56	1.84

					Sobel Z		
LMX as Moderator of the Indirect Effects through PERUSE on Personal Initiative							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.11	.17	-.61	.54	-1.25	-2.18**	-1.89*
HR subsystem	.00	.15	-.01	.99	-1.79	-2.70**	-1.98*
Student subsystem	.21	.15	1.37	.17	.45	2.02**	2.30**
Training	-.12	.06	-2.04	.04*	.28	.93	1.18

Table 29a

Summary of Moderated Mediation for ERP Subsystem as Predictor (Hypotheses 19 through 27)

Hyp.	Predictor	Mediator	Moderator	Outcome	Support?
19a	Finance	Appropriateness	LMX	Affective Commitment	No
19b	Subsystem	Change efficacy	LMX	to the Change	No
19c		Principal support	LMX		Yes
19d		PEOU	LMX		No
19e		PERUSE	LMX		Yes
20a	HR Subsystem	Appropriateness	LMX	Affective Commitment	No
20b		Change efficacy	LMX	to the Change	No
20c		Principal support	LMX		No
20d		PEOU	LMX		Yes
20e		PERUSE	LMX		No
21a	Student	Appropriateness	LMX	Affective Commitment	No
21b	Subsystem	Change efficacy	LMX	to the Change	No
21c		Principal support	LMX		No
21d		PEOU	LMX		Yes
21e		PERUSE	LMX		No
22a	Finance	Appropriateness	LMX	Technology Acceptance	No
22b	Subsystem	Change efficacy	LMX		No
22c		Principal support	LMX		Yes
22d		PEOU	LMX		Yes
22e		PERUSE	LMX		Yes
23a	HR Subsystem	Appropriateness	LMX	Technology Acceptance	No
23b		Change efficacy	LMX		No
23c		Principal support	LMX		Yes
23d		PEOU	LMX		Yes
23e		PERUSE	LMX		Yes
24a	Student	Appropriateness	LMX	Technology Acceptance	No
24b	Subsystem	Change efficacy	LMX		No
24c		Principal support	LMX		No
24d		PEOU	LMX		No
24e		PERUSE	LMX		Yes
25a	Finance	Appropriateness	LMX	Personal Initiative	No
25b	Subsystem	Change efficacy	LMX		No
25c		Principal support	LMX		Yes
25d		PEOU	LMX		Yes
25e		PERUSE	LMX		Yes
26a	HR Subsystem	Appropriateness	LMX	Personal Initiative	No
26b		Change efficacy	LMX		No
26c		Principal support	LMX		No
26d		PEOU	LMX		Yes
26e		PERUSE	LMX		No
27a	Student	Appropriateness	LMX	Personal Initiative	No
27b	Subsystem	Change efficacy	LMX		No
27c		Principal support	LMX		No
27d		PEOU	LMX		No
27e		PERUSE	LMX		Yes

Table 29b

Summary of Moderated Mediation for Training as a Predictor (Hypotheses 28 through 30)

28a	Training	Appropriateness	LMX	Affective Commitment	Yes
28b		Change efficacy	LMX	to the Change	Yes
28c		Principal support	LMX		Yes
28d		PEOU	LMX		No
28e		PERUSE	LMX		No
28a	Training	Appropriateness	LMX	Technology Acceptance	No
29b		Change efficacy	LMX		Yes
29c		Principal support	LMX		No
29d		PEOU	LMX		No
29e		PERUSE	LMX		No
28a	Training	Appropriateness	LMX	Personal Initiative	Yes
30b		Change efficacy	LMX		Yes
30c		Principal support	LMX		No
30d		PEOU	LMX		No
30e		PERUSE	LMX		No

CSE as moderator of relationships between ERP subsystems and beliefs. Hypotheses 31a-b through 39a-b concern moderation by CSE as an individual difference variable on the relationships between ERP subsystems (Finance, HR, and Student) and two beliefs, (a) change efficacy and (b) perceived ease of use, with three outcome variables, affective commitment to the change, technology acceptance (Hypotheses 20a-b), and personal initiative. The specific results for all of the hypotheses can be found in Table 30 while a summary of the hypothesis testing is found in Table 31a.

CSE as moderator of relationships between training and beliefs. Hypotheses 40a-b through 42a-b are identical in mirroring the structure of Hypotheses 31a-b through 39a-b, except that instead of examining ERP subsystems as the predictor variable, they examine training as the predictor variable. The specific findings are provided in Table 30 and the summary of the hypothesis testing is found in Table 31b.

For every hypothesis proposed, from 31a-b through 42a-b, no statistically significant results were found. Therefore, none of the hypotheses were supported.

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Table 30a

Results of the Moderated Mediation Analyses for CSE with ERP Subsystem as Predictor

					Bootstrap Sobel Z		
CSE as Moderator of Indirect Effects through Efficacy on Affective Commitment to the Change							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.02	.14	-.15	.88	.37	.42	.44
HR subsystem	-.08	.12	-.63	.53	.23	.23	.15
Student subsystem	.12	.12	.95	.34	-.20	-.21	-.12
Training	-.01	.08	-.18	.86	.17	.17	.16

					Bootstrap Sobel Z		
CSE as Moderator of the Indirect Effects through PEOU on Affective Commitment to the Change							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.20	.10	195	.05	-1.48	-.81	.82
HR subsystem	.04	.08	.45	.65	-1.18	-1.30	-.94
Student subsystem	-.13	.09	-1.49	.14	1.57	1.45	.37
Training	.00	.10	-.95	.34	-.31	-1.06	-1.39

					Bootstrap Sobel Z		
CSE as Moderator of the Indirect Effects through Efficacy on Technology Acceptance							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.02	.14	-.15	.88	-.90	-.97	-.87
HR subsystem	-.08	.12	.63	.53	-.68	-.68	-.37
Student subsystem	.12	.12	.96	.34	.69	.61	.13
Trainin-.90g-.97	-.03	.06	-.49	.63	-.75	-.82	-.72

					Bootstrap Sobel Z		
CSE as Moderator of the Indirect Effects through PEOU on Technology Acceptance							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.20	.10	1.95	.05	-.47	-.31	.37
HR subsystem	.04	.09	.44	.65	-.39	-.45	-.43
Student subsystem	-.13	.09	-1.49	.14	.37	.37	.17
Training	-.02	.06	-.43	.67	-.11	-.41	-.50

Table 30b
Results of the Moderated Mediation Analyses for CSE with Training as Predictor

					Bootstrap Sobel Z		
CSE as Moderator of the Indirect Effects through Efficacy on Personal Initiative							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	-.02	.14	-.15	.88	-1.97	-2.21	-1.61
HR subsystem	-.08	.12	-.63	.53	-1.28	-1.31	-.71
Student subsystem	.12	.12	.95	.34	1.26	1.04	.15
Training	-.05	.05	-.97	.33	.78	.35	.24

					Bootstrap Sobel Z		
CSE as Moderator of the Indirect Effects through PEOU on Personal Initiative							
Predictor Variable	*β*	*S.E.*	*t*	*p*	*-1 SD*	*M*	*+1SD*
Finance subsystem	.20	.10	1.95	.05	1.45	.75	-.83
HR subsystem	.04	.09	.45	.65	1.04	1.14	.83
Student subsystem	-13	.09	-1.49	.14	-1.28	-1.19	-.37
Training	-.12	.06	-2.04	.04**	.28	.92	1.18

Table 31a
Summary of Moderated Mediation for ERP Subsystem as Predictor (Hypotheses 31 through 39)

Hyp.	*Predictor*	*Mediator*	*Moderator*	*Outcome*	*Support?*
31a	Finance	Change efficacy	CSE	Affective Commitment	No
31b	Subsystem	PEOU	CSE	to the Change	No
32a	HR Subsystem	Change efficacy	CSE	Affective Commitment	No
32b		PEOU	CSE	to the Change	No
33a	Student	Change efficacy	CSE	Affective Commitment	No
33b	Subsystem	PEOU	CSE	to the Change	No
34a	Finance	Change efficacy	CSE	Technology Acceptance	No
34b	Subsystem	PEOU	CSE		No
35a	HR Subsystem	Change efficacy	CSE	Technology Acceptance	No
35b		PEOU	CSE		No
36a	Student	Change efficacy	CSE	Technology Acceptance	No
36b	Subsystem	PEOU	CSE		No
37a	Finance	Change efficacy	CSE	Personal Initiative	No
37b	Subsystem	PEOU	CSE		No
38a	HR Subsystem	Change efficacy	CSE	Personal Initiative	No
38b		PEOU	CSE		No
39a	Student	Change efficacy	CSE	Personal Initiative	No
39b	Subsystem	PEOU	CSE		No

Table 31b

Summary of Moderated Mediation for Training as Predictor (Hypotheses 40 through 42)

Hyp.	Predictor	Mediator	Moderator	Outcome	Support?
40a	Training	Change efficacy	CSE	Affective Commitment	No
40b		PEOU	CSE	to the Change	No
41a	Training	Change efficacy	CSE	Technology Acceptance	No
41b		PEOU	CSE		No
42a	Training	Change efficacy	CSE	Personal Initiative	No
42b		PEOU	CSE		No

Summary for Study 2

Data were collected from change recipients who were being affected by the replacement of legacy IS with a new ERP system. There were three different ERP subsystems (i.e., Finance, HR, and Student) that were prevalent in terms of use throughout the campus. The data were analyzed using hierarchical regression, mediation analysis, and moderated mediation analysis. The results provided overall support for the MTC.

Hypotheses for beliefs as independent variables. The first group of hypotheses (1a-g through 3a-g) concerned the predictive capabilities of the seven beliefs chosen for the model. The MTC beliefs included five change recipients' beliefs from the MROC (i.e., discrepancy, appropriateness, change efficacy, principal support, and personal valence), and two beliefs from the TAM (i.e., perceived ease of use and perceived usefulness). Hierarchical regression was used, with all of the independent variables simultaneously tested.

Hypotheses 1a-g concerned whether the seven beliefs were useful predictors of affective commitment to the change. The results suggested that six out of the seven beliefs were effective. Perceived usefulness (1g) was the only belief that was not useful in explaining variance. Thus, full support was found for Hypotheses 1a-f, but no support was found for Hypothesis 1g.

For Hypotheses 2a-g, the seven beliefs were examined as predictors of technology acceptance. The results suggested that change efficacy (2c), principal support (2d), perceived

ease of use (2f), and perceived usefulness (2g) were useful as predictors, while discrepancy (2a), appropriateness (2b), and personal valence (2e) were not, though valence approached the cutoff for being useful as a predictor. In summary, support was found for four of the Hypotheses 2c, 2d, 2f, and 2g, while no support was found for Hypotheses 2a, 2b, and 2e.

Hypotheses 3a-g concerned the seven change beliefs as predictors of personal initiative related to adapting to the new ERP system. The results suggested that change efficacy (3c), perceived ease of use (3f), and perceived usefulness (3g) were all predictors of personal initiative, whereas discrepancy (3a), appropriateness (3b), principal support (3d), and personal valence (3e) were not. In sum, support was found for Hypotheses 3c, 3f, and 3g, while no support was found for Hypotheses 3a, 3b, 3d, and 3e.

Hypotheses for comparison of the MROC, TAM and MTC beliefs. The second group of hypotheses is related to the seven beliefs of the MTC, and the hypotheses suggest that, together, the seven beliefs are better predictors than either the change recipient beliefs (i.e., discrepancy, appropriateness, change efficacy, principal support, and personal valence) or the TAM beliefs (i.e., perceived ease of use, and perceived usefulness) alone. These hypotheses compare the change recipient beliefs to the TAM beliefs to determine if one of these sets of predictors is better than the other, and also compares both sets to the set of seven MTC beliefs. They do so to see if the seven are more effective in explaining affective commitment to the change, technology acceptance, and personal initiative related to the ERP system.

Hypothesis 4 compared the change recipient beliefs to the TAM beliefs, and both sets of beliefs to the set of seven MTC beliefs in the in predicting affective commitment to the change. The change recipient beliefs were more effective than the TAM beliefs, but the change beliefs

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were less effective than the seven beliefs together. So, because the MTC beliefs accounted for the most variance explained, Hypothesis 4 was fully supported.

For Hypothesis 5, the same hypothesis was presented except that the outcome examined was technology acceptance. For this hypothesis, the TAM beliefs were more effective than the change recipient beliefs, but, again, the seven MTC beliefs were the most effective. Therefore, full support was found for Hypothesis 5.

The outcome variable for Hypothesis 6 was personal initiative, but otherwise the hypothesis was the same as Hypotheses 4 and 5. In this case, the TAM was more effective than the change recipient beliefs. Again, the seven MTC beliefs together were more effective, providing support for Hypothesis 6.

Hypotheses for beliefs as mediators. The third group of hypotheses concerned the mediating role of beliefs on the relationships between change content and change process as predictors on affective commitment to the change, technology acceptance, and personal initiative as criterion variables. Change content was operationalized as ERP subsystems (i.e., Finance, HR, and Student). Change process was operationalized as training. These two variables were chosen for use in the study because the top three themes in the qualitative analysis, in terms of frequency of responses, were training and the ERP subsystems that had been implemented at the time of the interviews for Study 1.

Hypotheses 7a-e through 15a-e concerned ERP subsystem as the predictor, with the five of the seven technology change beliefs as mediators. For Hypotheses 7a-e, the predictor variable was the Finance subsystem and the outcome variable was affective commitment to the change. The relationship between Finance subsystem and affective commitment to the change was negative, implying that the content of the Finance subsystem was disliked. The results suggested

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that the relationship was partially mediated by (7a) appropriateness, (7c) principal support, and (7d) perceived ease of use, but not by (7b) change efficacy and (7e) perceived usefulness. Thus, support was found for 7a, 7c, and 7d, but not 7b and 7e.

Hypotheses 8a-e was the same as for 7a-e, except that the predictor variable was the HR subsystem and the outcome variable was affective commitment to the change. The relationship between the HR subsystem and affective commitment to the change was positive. The results suggested that the relationship was partially mediated by (8b) change efficacy, (8c) principal support, and (8d) perceived ease of use, but not by (8a) appropriateness and (8e) perceived usefulness. Support was found for 8b, 8c, and 8d, but not 8a and 8b.

Likewise, Hypotheses 9a-e was the same as for 7a-e and 8a-e, except that the predictor variable was the Student subsystem and the outcome variable was affective commitment to the change. The relationship between Student subsystem and affective commitment to the change was positive. The results did not show any mediation of the relationship by (9a-e) appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness. As such, no support was found for 9a-e.

For Hypotheses 10a-e, the predictor variable was the Finance subsystem and the outcome variable was technology acceptance. The results suggested that the negative relationship between Finance subsystem and technology acceptance was partially mediated by (10c) principal support and (10d) perceived ease of use, but not by (10a) appropriateness, (10b) change efficacy and (10e) perceived usefulness. Thus, support was found for 10c and 10d, but not 10a, 10b, or 10e.

For Hypotheses 11a-e, the predictor variable was the HR subsystem and the outcome variable was technology acceptance. The results suggested that the positive relationship was partially mediated by (11d) perceived ease of use and (11e) perceived usefulness, but not by

(11a) appropriateness, (11b) change efficacy, and (11c) principal support. So, Hypotheses 11d and 11e were supported, while 11a-c were not.

Likewise, Hypotheses 12a-e had Student subsystem as the predictor variable and technology acceptance as the outcome variable. The results did not show any mediation of the positive relationship by (12a-e) appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness, meaning no support was found for any of the hypotheses.

For Hypotheses 13a-e, the predictor variable was the Finance subsystem and the outcome variable was personal initiative. The results suggested that the negative relationship was not partially mediated by (13a-e) appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness. Thus, no support for the hypotheses was found.

For Hypotheses 14a-e, the predictor variable was the HR subsystem and the outcome variable was personal initiative. The results suggested that the positive relationship was partially mediated by (14e) perceived usefulness, but not by (14a) appropriateness, (14b) change efficacy, (14c) principal support, and (14d) perceived ease of use. So, only Hypothesis 14e was supported, while Hypotheses 14a-d were not.

Likewise, Hypotheses 15a-e had Student subsystem as the predictor variable and personal initiative as the outcome variable. The results did not show any mediation of the positive relationship between Student subsystem and technology acceptance by (15a-e) appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness, meaning no support was found for any of the hypotheses.

Hypotheses 16a-e through 18a-e concerned the mediation of the relationship between training as the predictor and affective commitment to the change, technology acceptance, and personal initiative as outcomes by five mediators. The results provided general support for

training as a useful variable in predicting the outcomes, and, as it concerns the hypotheses, it appears that the beliefs were useful mediators in 8 out of 15 cases.

For Hypotheses 16a-e, the predictor variable was training and the outcome variable was personal initiative. The results suggested that the positive relationship was partially mediated by (16a) appropriateness, (16b) change efficacy, (16c) principal support, and (16d) perceived ease of use, but not by (16e) perceived usefulness. Thus, support was found for Hypotheses 16a-d, but not for 16e.

For Hypotheses 17a-e, the predictor variable was training and the outcome variable was personal initiative. The results suggested that the positive relationship was partially mediated by (17b) change efficacy, (17c) principal support, and (17d) perceived ease of use, but not by (17a) appropriateness and (17e) perceived usefulness. So, Hypotheses 17b, 17c, 17d were supported, while Hypotheses 17a-d was not.

Likewise, Hypotheses 18a-e had training as the predictor variable and personal initiative as the outcome variable. The results revealed mediation of the positive relationship between Finance subsystem and technology acceptance by (18b) change efficacy, but not by (18a) appropriateness, (18c) principal support, (18d) perceived ease of use, and (18e) perceived usefulness. Therefore, support was found for 18b, but not for 18a and 18c-e.

Hypotheses for mediated moderation. The next group of hypotheses concerned LMX as a moderator of the mediated relationships that were previously found. Based on the structure of the MTC, as well as the MROC on which it was based, LMX, as a context variable, was believed to represent the pre-existing condition in which the change event (content, process, and beliefs) were occurring. Because of this, the moderation was believed to shape the sensemaking process involving content and process that led to the creation of beliefs. Based on LMX theory, it would

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make sense that change recipients in high LMX relationships would have a better impression of the change, developing better impressions of both the content of the change and the change process than those who are in low LMX relationships.

Based on this logic, moderation was believed to occur only within the relationship between the predictors (i.e., ERP subsystem and training) and the five beliefs (i.e., appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness) examined as mediators in the previous hypotheses. Based on the model, moderation was not predicted in terms of the relationships between the beliefs (as mediators) and the outcomes. This model of moderated mediation (model 2; cf. Preacher, Rucker, & Hayes, 2007) best fits with the relationships as theorized within the MTC.

For Hypotheses 19a-e through 27a-e the focus was on ERP subsystems (Finance, HR, and Student) as predictors, LMX as moderator, five beliefs (i.e., appropriateness, change efficacy, principal support, perceived ease of use, and perceived usefulness) as mediators, and three outcomes (i.e., affective commitment to the change, technology acceptance, and personal initiative.)

For Hypotheses 19a-e, the predictor was Finance subsystem and the outcome variable was affective commitment to the change. LMX was found to moderate the indirect effects of Finance subsystem through (19c) principal support and (19e) perceived usefulness as mediators. No moderation of indirect effects was found for (19a) appropriateness, (19b) change efficacy, and (19d) perceived ease of use. Thus, support was found for 19c and 19e, but not for 19a, 19b, and 19d.

For Hypotheses 20a-e, the predictor was HR subsystem and the outcome variable was affective commitment to the change. LMX was found to moderate the indirect effects of HR

subsystem through (20d) perceived ease of use as a mediator. No moderation of indirect effects was found for (20a) appropriateness, (20b) change efficacy, (20c) principal support, and (20e) perceived usefulness. Thus, support was found for 20d, but not for 20a-c and 20e.

For Hypotheses 21a-e, the predictor was Student subsystem and the outcome variable was affective commitment to the change. LMX was found to moderate the indirect effects of Student subsystem through (21d) perceived ease of use as a mediator. No moderation of indirect effects was found for (21a) appropriateness, (21b) change efficacy, (21c) principal support, and (21e) perceived usefulness. Thus, support was found for 21d, but not for 21a-c and 21e.

For Hypotheses 22a-e, the predictor was Finance subsystem and the outcome variable was technology acceptance. LMX was found to moderate the indirect effects of Finance subsystem through (22c) principal support, (22d) perceived ease of use, and (22e) perceived usefulness as mediators. No moderation of indirect effects was found for (22a) appropriateness and (22b) change efficacy. Thus, support was found for 22c, 22d, and 22e, but not for 22a and 22b.

For Hypotheses 23a-e, the predictor was HR subsystem and the outcome variable was technology acceptance. LMX was found to moderate the indirect effects of HR subsystem through (23c) principal support, (23d) perceived ease of use, and (23e) perceived usefulness as mediators. No moderation of indirect effects was found for (23a) appropriateness and (23b) change efficacy. Thus, support was found for 23c, 23d, and 23e, but not for 23a and 23b.

For Hypotheses 24a-e, the predictor was Student subsystem and the outcome variable was technology acceptance. LMX was found to moderate the indirect effects of Student subsystem through (24e) perceived usefulness as a mediator. No moderation of indirect effects

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was found for (24a) appropriateness, (24b) change efficacy, (24c) principal support, and (24d) perceived ease of use. Thus, support was found for 24e, but not for 24a-d.

For Hypotheses 25a-e, the predictor was Finance subsystem and the outcome variable was personal initiative. LMX was found to moderate the indirect effects of Finance subsystem through (25c) principal support, (25d) perceived ease of use, and (25e) perceived usefulness as mediators. No moderation of indirect effects was found for (25a) appropriateness and (25b) change efficacy. Thus, support was found for 25c, 25d, and 25e, but not for 25a and 25b.

For Hypotheses 26a-e, the predictor was HR subsystem and the outcome variable was personal initiative. LMX was found to moderate the indirect effects of HR subsystem through (26d) perceived ease of use as mediators. No moderation of indirect effects was found for (26a) appropriateness, (26b) change efficacy, (26c) principal support, and (26e) perceived usefulness. Thus, support was found for 26d, but not for 26a-c and 26e.

For Hypotheses 27a-e, the predictor was Student subsystem and the outcome variable was personal initiative. LMX was found to moderate the indirect effects of Student subsystem through (27e) perceived usefulness as a mediator. No moderation of indirect effects was found for (27a) appropriateness, (27b) change efficacy, (27c) principal support, and (27d) perceived ease of use. Thus, support was found for 27e, but not for 27a-d.

Training was the predictor variable for Hypotheses 28-e through 30a-e, with LMX as the context-related moderator, the five aforementioned beliefs as mediators, and the same three outcomes as included in the previous hypotheses.

For Hypotheses 28a-e, moderation took place only when LMX was at the mean and one standard deviation above for appropriateness (28a) and at the mean and one standard deviation below for principal support (28c). Thus, partial support was found for 28a and 28c. Moderation

at all levels of LMX was found for change efficacy as the mediator (28b), providing full support for the hypothesis. No moderation was found for perceived ease of use (28e) and perceived usefulness (28f), so those hypotheses were not supported.

For Hypotheses 29a-e, moderation at all levels of LMX was found for change efficacy as a mediator of the relationship between training and technology acceptance. Thus, 29b was fully supported, and no support was found for 29a, 29c, 29d, and 29e.

For Hypotheses 30a-e, LMX at the mean, and at one standard deviation above the mean, moderated the relationship between training and personal initiative as mediated by appropriateness (30a). LMX at all levels moderated the relationship for change efficacy as the mediator (30b). Thus, partial support was found for Hypothesis 30a and full support was found for 30b. No support was found for Hypotheses 30c-e (principal support, perceived ease of use, and perceived usefulness).

The last group of Hypotheses, 31a-e through 42a-e, focused on core self evaluation (CSE) as a moderator for the relationships between ERP subsystems (Finance, HR, and Student) and training as predictors, as mediated by change efficacy and perceived ease of use, and three outcomes (affective commitment to the change, technology acceptance, and personal initiative). For all of these hypotheses, no moderation was found for any of the indirect effects, meaning none of the hypotheses from 31a-e through 42a-e were supported.

CHAPTER 6

DISCUSSION AND CONCLUSIONS

This dissertation is composed of two studies as described in Chapters 4 and 5. This general discussion helps provide the broader picture of the findings and includes the interpretation of the findings, research implications, practical implications, limitations, and directions for future research.

The purpose of this dissertation was to investigate the integrative influence of the seven beliefs (i.e. discrepancy, appropriateness, change efficacy, principal support, personal valence, perceived ease of use, and perceived usefulness) on three different technological changes, both as predictors and as mediating variables for antecedents. In addition, the integrative influence of four categories of antecedents (i.e., content, process, context, and individual differences) were also examined. The results led to the acceptance of the MTC. Notably, to our knowledge, this is the first full-fledged attempt to integrate an MROC and a TAM into one model (i.e., the MTC).

Study 1 was a qualitative study that used an action research approach to gathering as much information as possible about a change from legacy IT systems to a new ERP system at the university. The study took several months to complete and the research resulted in a thorough analysis of the change event from the perspectives of the change agents and the change recipients. Study 1 findings were used to inform Study 2. The sequential mixed method approach allowed for an investigation of the change without preconceived notions of what to expect. The content analysis and narrative of the change that emerged were instrumental in developing the survey that was used to collect the quantitative data.

Study 2 consisted of the operationalization of the findings from Study 1 into variables that could be tested. Choices were made as to what to focus on, but the decision was informed by the qualitative findings, as well as researcher interests and the potential for increasing our understanding of the change phenomenon especially as it relates to technological change. Quantitative data were collected from the end users of the ERP system through a Web-based survey.

To make sense of the empirical data collected, a theoretical model was employed. This model, the MTC, integrated two pre-existing models that are well-established in the literature, the MROC and the TAM. The common theoretical foundation of the theory of planned behavior served to guide the creation of hypotheses and the organization of potential relationships between the variables in the MTC. Previous findings from the organizational change and IS literatures involving the TAM also informed the generation of hypotheses.

The results from the quantitative study provided general overall support for the MTC. In addition, the quantitative findings also provided support that certain relationships discovered through the qualitative research in Study 1 did indeed exist.

As noted in the summary for Study 2 in Chapter 5, the seven beliefs (i.e., discrepancy, appropriateness, change efficacy, principal support, personal valence, perceived ease of use, and perceived usefulness) were all valuable as predictors of three different outcomes (affective commitment to the change, technology acceptance, and personal initiative). The five of those beliefs proposed as mediators (all except discrepancy and valence, which were left out due to the mandatory nature of the change and the content of the qualitative data) were all effective as such. These results provide evidence that organizational change recipient beliefs and TAM-related beliefs both add value in terms of understanding change recipient perceptions and reactions to

the change. The change recipient beliefs (discrepancy, change efficacy, principal support, and personal valence) relate more to the process of the change event while the TAM beliefs (perceived ease of use and perceived usefulness) and the change belief of appropriateness relate more to the content of the change.

From what was learned in Study 1, the beliefs early in the change initiative were shaped more by the process, context, and individual differences. The actions of the change agents early in the change initiative left a lot of ambiguity that led to reliance on rumor and the opinions of peers. This was especially the case for the first implementation, the Finance subsystem. The change content seemed less palatable to the change recipients in this implementation because it was more abrupt than the two that followed and because the change agents were not experienced. This led to lower quality process in terms of managing the change. By the second implementation, HR, the change agents were able to do a better job and the change recipients were somewhat more receptive to the change, though still a little reticent given the difficulties with the first implementation. As stated, coworkers and opinion leaders campus-wide influenced change recipients. In addition, the ways in which change recipients dealt with (and coped with) the change was influenced by their demographics (e.g., education), and their dispositional traits. Notably, however, the change recipients' opinions changed over time based on their own personal interactions with the new ERP system.

In terms of the value of the variables within the model, the ERP subsystems (i.e., Finance, HR, and Student) were effective as predictors in terms of how change recipients reacted to the change, as mediated by the beliefs. Comments by both the change recipients and the change agents (including those from the consultant from the company that produced the new ERP system) suggested that the Finance subsystem, which was the first one implemented, was

the most difficult in terms of the content complexity. The HR subsystem, which was the second one implemented, was considered to be slightly less complex. The Student subsystem was the last subsystem implemented and it was considered the easiest. The quantitative results matched the descriptions from the qualitative data in terms of change recipients viewing the three subsystems differently.

Training was very effective as a predictor variable. This suggested that training mattered greatly and, taking into account all of the other results, that change process overall may matter more than all of the other antecedents. Clearly, the quantitative results supported the importance placed on training found in the qualitative findings.

For the moderators, LMX was a valuable moderator in the MTC, providing support for the idea that the change environment within the organization influences the beliefs that change recipients develop concerning the change. It makes sense that supervisors can help make change events more palatable for their subordinates. Notably, training was not influenced by LMX at lower levels of the variable. This suggests that while LMX matters when relations are good, that, when relations are not good, then training does not suffer any negative impact due to low LMX.

Only the individual difference variable, core self evaluation, failed as an effective moderator in the model. It did not effectively demonstrate that change recipients' traits matter in influencing how they interpret change content and process. However, this is not a fatal flaw to the overall MTC.

CSE did not provide a strong case for the importance of individual differences. However, while CSE was not a useful moderator in this study, findings in previous research studies suggest that is not the case, since other individual differences have been found to be useful moderators of similar relationships within the MROC and TAM (cf. Brown et al., 2007a, 2007b; Chin et al.,

2003; Venkatesh, 2000). The lack of significant findings for CSE may be due to the fact that, since the vast majority of change recipients had previous experience using the legacy systems, they did not feel stress, insecurity, and uncertainty that might normally accompany adapting to a technologically superior IS, (such as replacing a manual system with an electronic system.) CSE may play a greater role during radical change than it does in incremental change. Its value during more uncertain situations has been studied (Judge et al., 1999), but its role in perhaps more predictable incremental change situations should be further explored.

Theoretical Implications

This dissertation makes at least five contributions to both the organizational change and IS literature. First, the overall qualitative findings add to the body of research on both organizational change and IS because both perspectives represent two pieces in a larger puzzle. The qualitative findings provide anecdotal evidence that perceptions of new technology, (i.e., an ERP system in this case), are tied to perceptions of the change agents' management of the implementation process, as well as the ramifications of the organizational change (i.e., the content) on the organization as a whole. The answers to the research questions from Study 1 are, perhaps, even more insightful than all of the quantitative evidence provided in Study 2 because they give the quantitative findings real meaning in terms of change recipient experiences.

Second, this dissertation provides an even stronger investigation of the basis for the MROC by tying it more directly with the TPB. It is clear, based on this investigation of the literature, that the MTC has a sound theoretical foundation in a wide variety of research that supports the overall directionality of the relationships proposed. This is due to the innumerable studies that have relied on the TPB in some form, with the use of longitudinal data, multiple studies, and meta-analyses.

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Third, the findings from many different research investigations involving organizational change and technology acceptance are presented in an organized and coherent manner within the literature review. The review intended to illustrate that the two areas of research are interconnected in many ways, and that, by viewing them as parts of a whole, in terms of conducting future research, a greater understanding of the overall phenomenon of technological change may be gained. Furthermore, this dissertation contributed to theory by providing an integrated model based on two accepted models, one from organizational change literature (the MROC) and one from IS literature (the TAM). The integrated model, the MTC, can serve as a starting point for future research. That is, given the value of the two individual models to their respective areas of research, examining the influence of both models, and comparing their influence to one another and to the integrated model within a technological change event provides benefit to both bodies of literature. In particular, IS literature may benefit the most because such a drastic exploratory extension of the TAM model is seldom seen in the literature.

Fourth, the use of sequential mixed methods contributed to research design, particularly as it relates to IT research. Very few IT research projects rely on qualitative data and analyses. Researchers have typically used either a qualitative or a quantitative approach rather than utilizing both (Tashakkori & Teddlie, 1998). Neither qualitative nor quantitative researchers have embraced the mixed methods approach, since each camp touts their own approach as superior (e.g., Guba & Lincoln, 1994). Mixed methods research is the exception rather than the norm, appearing in the literature rarely (e.g., Di Pofi, 2002; Higgs & Rowland, 2001; Paul, 1996; Shah & Corley, 2006; Vitale et al., 2008). The mixed methods approach adds value to the literature by linking theory building and explanation to empirical evidence.

Finally, the results of the quantitative study add value theoretically by opening a discussion within the research about the connections between organizational change and technology acceptance. This is especially important, given the rate at which technology advances (cf. Moore, 1965) and the rapidly changing competitive environment. Therefore, organizational change research and technological change research should both take on more of a socio-technical theoretical perspective in examining the role of human-technology interaction more closely.

Practical Implications

This dissertation is not solely concerned with the academic perspective. The way in which this research was conducted was intended to find meaningful ways of improving IT implementation. Study 1 was grounded in the everyday experiences of change recipients rather than starting from some pre-established theoretical perspective. The results describe what happened during the change initiative investigated and give insights as to reasons throughout the dissertation, particularly in Chapter 2, the literature review. Some lessons can be learned from this research and applied to everyday management of IT implementation and organizational change involving technology. Five lessons are presented below.

First, change agents should think about the technical impact of the change content and the change process as being tied together as one interrelated concept within the minds of change recipients, at least early in the change effort, before the change recipients' have had time to personally experience the change content and develop their own opinions. Instead, inferences are generated about the technology based on the management of the implementation, and the opinions of coworkers and opinion leaders fill in the gaps until personal experience can take over. Because of this, change agents should be wary of thinking that a new technology can "sell itself" to the change recipients. Indeed, even the best-suited, most advantageous technology, if

implemented poorly, may be rejected. This technology rejection may not actually be a rejection of the technology itself, but rather a rejection of the change process under the guise of being the technology since perceptions hold that the two are interrelated, (at least according to the data gathered in Study 1). This finding can be linked to the concept of the change equation (change success = process*content) which states that good content will not be accepted without good process, and vice versa, but, if both process and content are adequate, the change is likely to succeed.

Second, beliefs about the change must guide the process. As clearly noted throughout the organizational change literature (cf. Armenakis et al., 1993, 1999), change agents who do not take into account the human element in the change process are doomed to failure. This is often the case when it comes to technology, as established in Chapter 1. All too often IT implementation is guided by change content experts who direct little time and energy toward the change process. As a result, change recipients' beliefs often are ignored. Inexperienced change agents may take for granted that the change recipients will quickly buy-in to the change. Change agents need to understand the merits of managing change recipients' beliefs. While other research in the area of organizational change has investigated the merits of the five change recipient beliefs, the two technology acceptance beliefs have been left out. Likewise, IS researchers have not taken into account the five change recipient beliefs. This research suggests that all seven of these beliefs need to be managed. There is a dearth of research in the IS literature when it comes to this aspect of the phenomenon, and, as a result, change agents who handle IT implementation often go into change initiatives uninformed and unprepared for dealing with the end users of the technology.

Third, attitudes toward the change and the technology are likely to change over time due to dynamic shifts in terms of which factors are important within the sensemaking process. Early on in the change initiative, the way change agents introduce the new technology may shape the beliefs about the technology. Therefore, the focus should be on providing the best possible communication, support, and training possible. Indeed, proper overall introduction of the change process may create positive inferences about the change content. Certainly more investigation of this is necessary, but creating a positive first impression of the change content by introducing the change initiative with a strong change message may stave off rumors and initial negative reactions.

Fourth, similar to the previous point, training can serve as one of the best means of shaping beliefs. Given the relative usefulness of training as a predictor, it can be said that training is extremely important to those who are being affected by a technological change. It is through training that they can acquire the capabilities (i.e., efficacy) to deal effectively with the content of the change. It is clear that training influences their beliefs about the change in general as well. This means that attention should be given to presenting the change message effectively (Armenakis et al., 1993) within the training, in addition to providing the necessary technical knowhow.

Fifth, another practical implication (as well as future research opportunity) is that institutionalization needs to be recognized as a separate process, and change agents need to treat it as such. This dissertation does not directly deal with the issue, but it links technology acceptance to other change literature that does. Almost no research has been done in the area of technology *continuance* in the IS literature, the focus has been on *acceptance* (Venkatesh & Bala, 2008). Not surprisingly, expensive ERP systems are almost never drastically changed or

replaced immediately after being implemented (Ruta, 2005), aside from correcting bugs and glitches. Yet, there remain some issues with getting change recipients to continue using technology, or to continue mastering it to make the most of its potential. This is where organizational change research can be extremely beneficial to practitioners. The change needs to be institutionalized (cf. Armenakis et al., 1999), and only in recent times have IS researchers acknowledged the importance of this process (Venkatesh & Bala, 2008). Therefore, change agents involved in IT implementation should recognize that institutionalization (i.e., continuance) is a different process than simply introducing and implementing a new technology.

Conclusion

Low adoption and high underutilization of new technology within organizational changes have been major problems for organizations (Jasperson et al., 2005). IT implementation is becoming increasingly complex, and the implementation costs and risks are very high (Venkatesh & Bala, 2008). Given that failure can cost millions of dollars and lead to the demise of organizations, more effort needs to be undertaken to understand the relationship between organizational change and technological change. This dissertation contributed to that understanding by providing greater insight into the relationships among variables within the MTC. By studying TAM beliefs in relation to the MROC beliefs, more insight into a broader picture of change beliefs is gained. This dissertation provides the groundwork for additional research in understanding how employees deal with organizational change and technological change, simultaneously.

Limitations

This dissertation, particularly Study 2, has a number of limitations that should be acknowledged and considered when interpreting these results (cf. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Retrospective sensemaking. First to begin with, this dissertation is somewhat retrospective in that during Study 1, the participants in the interview phase talked about not only their current experiences with the change, but also their experiences throughout the entire change event up until the point in time of the actual interviews. While this captured a broader range of interview content, nevertheless, the comments by interviewees were likely influenced by retrospective sensemaking, which can sometimes distort actual occurrences. Despite the somewhat retrospective nature of the interviews, however, this is not viewed as a major issue in that the participants were not told any of the research questions or any specific propositions, thus they were *not primed* in any way as to direct the nature of any retrospective sensemaking distortions. In addition, the quantitative study assessed current perceptions of the change recipients, and was not subject to this limitation. Despite the potential biases that could be interjected, the retrospective nature of some of the interview content is actually beneficial in that it helped to explain some of the changes that occurred in terms of perceptions of the change process. In particular, the comparison of how the Finance subsystem rollout was handled to how the HR subsystem rollout was handled was very informative in terms of comparing and contrasting the differences in terms of perceptions and how the change activities were managed. It was clearly visible that change agents learned from their mistakes in the first rollout so that the second one went more smoothly. Introduction of the Student subsystem went even more smoothly.

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Somewhat similar to the retrospective sensemaking limitation, it is worth noting that Study 1 took place a year before Study 2. Despite this limitation, however, the mixed methods design, while subject to threats to internal validity, still allowed for the capture and triangulation of more in-depth findings of the change event and change recipient perceptions that many researchers would consider valid (Jick, 1979).

Directionality of relationships. Second, the study's research design precludes any inference of causality. The data were collected only once during the organizational change. Based on previous research, the directionality of some of the relationships examined remains unambiguous in terms of theoretical acceptance (e.g., change recipient beliefs lead to change-related outcomes rather than the opposite).

The cross-sectional nature cannot, however, preclude other interpretations about the direction of the relationships. A longitudinal research design would have been more capable of demonstrating the directional status of the relationships examined and would have provided greater insight into the change process (Van de Ven & Huber, 1990). Pettigrew (1990) opined that the theoretical and the practical soundness of organizational change research depends on the investigation of conditions (antecedents) and ending results (criterion variables) together through a temporal analysis of the change process. Still, research that includes a temporal design remains rare in the literature (Armenakis & Bedeian, 1999; Pettigrew et al., 2001). Nevertheless, despite the cross-sectional design of the quantitative study, this dissertation can be considered to be an acceptable step in the right direction within the research, given that it allowed for the examination of the technological change phenomenon in a field setting rather than in a laboratory setting and because Study 1, the qualitative phase, captured anecdotal evidence of the change process.

Similarly, as with the cross-sectional design, given the methodology involved in a field study rather than an experimental manipulation, it was not possible to manipulate any of the independent variables, mediators or moderators. Just as with the cross-sectional nature of the study, this too rules out any unchallengeable declarations of directionality.

Single-source, self-report data. The data for Study 2 were single-source, self-report via a Web-based survey. This was necessary because of the limited access to the university employees for data collection. Because of this, predictor, mediator, moderator, and criterion variables were all collected in one survey, raising the issue of common method bias. This issue of single-source, self-report data, as it relates to CMV has been discussed in Chapter 4 as it relates to methodological efforts taken to reduce or at least recognize CMV. It could be argued that there was potentially overlapping domain content among ERP-related training as a predictor variable, technology-related beliefs as mediators, and technology acceptance and personal initiative related to adapting to the new ERP as criterion variables. Because of this, common-method bias cannot be ruled out. In addition, as previously discussed in the Study 2 method section, the possibility of social desirability is another issue that could be related to single-source, self-report data collection.

However, many of the variables examined in Study 2 were internal, unobservable psychological phenomena, making self-report more appropriate than reliance on behavioral reports from third parties that would be making inferences about the change recipients' internal beliefs, attitudes, and perceptions. Moreover, since personal initiative as a behavioral outcome related to the new IT system would be practically unobservable by a third party (or at least indivisible from broader conceptualizations of other constructs), and since the behavior likely

occurred when there were no witnesses, reliance on third party reports would have been very inaccurate, thereby making reliance on self-report data a necessary procedure.

It seems that, if CMV had been an issue, larger correlations, even significant correlations among all variables, would have been found, regardless of the theoretical rationale and hypotheses (Spector, 2006). The non-statistical advice of Podsakoff and colleagues' (2003) for reducing CMV was followed, which included protecting participants' anonymity and assuring them that the survey items did not have right or wrong answers. Also, simply by examining the correlations table, multicollinearity was not a central concern in this research, given that correlations were not exceptionally high.

Generalizability. This research took place on one university campus and concerned a specific technological change event. Many of the items used in the survey were created or altered to reflect the specific nature of the organizational change. As a result, the findings, while supportive of the prevailing literature, should be viewed with caution in terms of generalizability. The findings may be far more idiosyncratic than universal. The type of organization in which the change takes place, the type of technology implemented, the types of employees affected, the external environment in terms of pressures, the type of change (e.g., radical versus incremental), and other differences may matter greatly, and they may influence the findings. This could render the findings from this study inapplicable within other contexts.

Low explanatory power. Compared with extant studies that have relied on the TAM and TPB in investigating technology acceptance, the relatively low R-square reported in Study 2 (30%) represents another limitation. Some studies have reported upwards of 70% of variance explained using the TAM (Mathieson, 1991). It should be noted that in field studies, the TAM

commonly demonstrates lower explanatory power, often in the 40% -50% range (Lucas & Spitler, 1999).

New instruments. The nature of the research required the creation of new measurement scales that were specific to the change initiative. The measurement scales were created through the assistance of the change agents and relied upon the qualitative study results and Hinkin's (1995, 1998) guidelines for scale development. The measures were narrowly focused and directly concerned the specific ERP system implementation that was examined. Consequently, as with the aforementioned results, the extent to which the created scales could be relevant or meaningful in other organizational change contexts is limited at best and, despite scale validation efforts, there remain questions as to the validity and reliability of the new scales even within this research.

Future Research

There are many directions that future research could take based on the research conducted in this dissertation.

No published studies thus far have examined the five change recipient beliefs in conjunction with the two primary technology acceptance beliefs. More insight is needed into whether there is any real substantive value derived by including both sets of beliefs within any model of technological change. Given the low explanatory value of the TAM beliefs within this study, more work is needed to see if the MROC beliefs add value in terms of variance explained when it comes to technology acceptance-related outcomes. Likewise, more research is needed concerning the overall structure of the MTC itself to determine if it adds any value to organizational change and IS research. While the model is based on the TPB as its foundation, alternative models could be specified. Changes to the MTC rather than alternative models might be helpful as well. For instance, as an alternative, the TAM3's classification of antecedents of

beliefs (individual differences, system characteristics, social influence, and facilitating conditions) could be applied rather than the categories used in the MROC (i.e., content, process, context, and individual differences) if it seems more logical or meaningful. This might be helpful at the theoretical level in organizing the likely types of relationships and the related processes that may be involved in change readiness and technology acceptance.

Future development could also consist of applying the MTC to new types of organizations (e.g., different industries, different organizational climates, etc.), different types of employees (e.g., professionals, teams, different levels of technology usage as part of the job subsystem, etc.), different types of organizational changes (i.e., incremental versus radical), different technologies (e.g., ERP systems versus smaller information systems, communication systems, manufacturing systems, etc.), and to other cultures (Western versus Eastern). Testing the model in this way would provide evidence as to whether or not it is helpful in terms of generalizability. Expansion of the MTC might also encompass testing additional variables that have not been tested within the framework of the model, including variables tested in organizational change research but not in IS research, and vice versa.

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APPENDIX A

QUALITATIVE STUDY THEMES AND SUBTHEMES

Themes and Subthemes for Study 1

Content	Finance Subsystem Issues	Freq.
46	Use of Finance subsystem:	28
47	ERP Finance - Evaluative comments	8
48	Advantages of ERP Finance subsystem – Ease of Use/ Efficiency	4
49	Advantages/strengths of ERP Finance subsystem – Information	32
50	Advantages/strengths of ERP Finance subsystem – Paperless	6
51	Advantages/strengths of ERP Finance subsystem – Screens	4
52	Advantages/strengths of ERP Finance subsystem – Approvals	10
53	Disadvantages/weaknesses of Finance subsystem – Ease of Use	3
54	Disadvantages of Finance Subsystem – Time and Code Inefficiencies	22
55	Disadvantages of Finance Subsystem – Screen Inefficiencies	14
56	Disadvantages/weaknesses of Finance subsystem – Approvals	11
57	Understanding ERP Finance Reports	15
58	New Account Numbering System	12
59	Disadvantages/weaknesses of Finance subsystem – Information	18
60	Disadvantages/weaknesses of Finance subsystem – Vendors	12
61	ERP Finance -- Critical Incidents	2
62	Disadvantages of ERP Finance subsystem – Paperless	4
63	ERP Finance - Respondent Suggestions for Improvements	3
64	Requests for Additional Information to be Provided by ERP Finance	5
		213

Content	Human Resources Subsystem	Freq.
26	Use of Human Resources subsystem:	28
27	ERP HR - Evaluative Comments	5
28	Advantages/strengths of ERP HR subsystem – Overall / Future	7
29	Advantages of ERP HR subsystem – Ease of Use / Efficiency	5
30	Advantages - Paperwork/Paper	6
31	Advantages/strengths of ERP HR subsystem – Information:	18
32	Advantages/strengths of ERP HR subsystem – Access & Security:	5
33	Advantages/strengths of ERP HR subsystem – Screen Efficiencies	2
34	Advantages/strengths of ERP HR subsystem – EPAF specific:	25
35	Advantages/strengths of ERP HR subsystem – Reports	2
36	Advantages/strengths of ERP HR subsystem – Approvals	2
37	Disadvantages/weaknesses of ERP HR subsystem – Approvals	5
38	Disadvantages/weaknesses of ERP HR subsystem – Reports	2
39	Disadvantages/weaknesses of ERP HR subsystem –EPAF specific	9
40	Disadvantages/weaknesses of ERP HR subsystem – Information	16
41	Disadvantages of ERP HR subsystem – Time & Related Inefficiencies	15
42	Disadvantages of ERP HR subsystem – Screen Inefficiencies	8
43	Disadvantages/weaknesses of ERP HR subsystem – Helping Faculty	4
44	HR Critical Incidents	3
45	ERP HR - Respondent Suggestions for Improvements	5
		172

Themes and Subthemes for Study 1, continued

Content	Technical Issues	Freq.
137	"Bugs" and "Glitches"	8
138	Technical– Admin vs. Self-Serve:	9
139	Technical– Screens (Non-subsystem specific):	7
140	Technical– Terminology (Non-subsystem specific):	4
141	Technical– Forms (Non-subsystem specific):	1
142	Technical– Printing (Non-subsystem specific):	6
143	Technical– Reports (Non-subsystem specific):	10
144	Technical– Help Subsystem:	8
145	Technical– Automatic Logout:	25
146	Technical– Other Problems:	15
147	Technical– Suggestions:	7
		100

Process	Training Related Issues	Freq.
82	Initial Training – Overall Assessment (Negative)	20
83	Initial Training – Overall Assessment (Positive)	8
84	Initial Training – Support for the Change Effort	5
85	Initial Training – Quality and Type of Information	6
86	Recent Training – Overall Assessment (Negative)	1
87	Recent Training – Overall Assessment (Positive)	7
88	Recent Training - Learning Outcomes (Good and Bad)	8
89	Trainers - Initial Training - Positive	4
90	Trainers - Initial Training - Negative	21
91	Trainers - Recent Training - Positive	7
92	Trainers - Recent Training - Negative	2
93	Training - Comments on Specific Courses / Subsystems	7
94	Training Method in Early Training	8
95	Comments on Training Methods (Positive)	4
96	Comments on Training Methods (Negative)	5
97	References to Hands on Training	9
98	Training - Needs Assessment	1
99	Training Class Pace, Scope, and Length	21
100	Training Interactiveness	4
101	Timing / Sequencing of Training	2
102	Training - Student Section of the New ERP System	8
103	Training Class Resources / Materials	6
104	Training Class Size	15
105	Reference Materials	12
106	Training Class Availability	13
107	Additional Training Desired	15
109	General Suggestions for Improving the Training	8
110	Trainees - Mis-enrollment	4
111	Trainees - Unawareness of Training Availability	4
112	Trainees - Motivation for attending	3
113	Trainees - Distractions in classroom	8
114	Trainees - Attendance & Participation	12
		259

Themes and Subthemes for Study 1, continued

Process	Communication and Change Message	Freq.
1	Introduction to ERP - Formal Introduction	41
3	Introduction to ERP - Informal Introduction	14
3	Introduction to ERP - Rumors	10
4	Introduction to ERP IT System - Expectations	11
5	Communication – Clarity of Reasoning / Change Message	6
6	Communication – Involvement of End-users in Change Planning	75
7	Communication –Generating Buy-in	17
8	Communication – Inclusion of End-Users / Information Channels	9
9	Communication –Informing End-Users about Updates	18
10	Communication – Access to ERP Staff & Responding to End-Users	4
11	Communication - Q&A Sessions (with Cindy Selman, et al)	3
12	Broun Q&A	3
13	Communication -- Miscommunication	1
14	Communication – Suggestions for Improvement	3
		215

Process	Managing the Change Process	Freq.
15	Change Process – Overall Impressions of the Change Effort	15
16	Change Process – Handling the Implementation Process	11
17	Change Process – Timing of the Training	15
18	Change Process – Speed & Timing of the System Transition	19
19	Change Process – Inefficiencies & Bad Outcomes	6
		66

Process	Fairness-Related Issues	Freq.
130	Perceptions of General Fairness	21
131	Perceptions of Fairness by Subsystem	4
132	Perceptions of Procedural Fairness (to various stakeholders)	6
133	Expressions of Perceived Deception	5
134	Distributive Justice - (Treatment of the individual compared to the group)	15
135	Interpersonal Justice	9
136	Informational Justice - (Fairness regarding access to information)	10
		70

Process	Change Agent Effectiveness	Freq.
20	Change Agents – AU Staff	15
21	Change Agents– Manufacturer	3
		18

Context	Social and Political Influence	Freq.
65	Experiences with Attitudes of Other Users	32
66	Coworker Influence on Own Opinion	12
67	Perceptions of How the ERP Ssytem Rollout Went at Other Schools	5
68	Influence Upon Coworkers	2
		51

Themes and Subthemes for Study 1, continued

Individual Differences	Change Recipient Characteristics	Freq.
115	Self Efficacy of ERP System Users	20
116	ERP System User Resistance to Change (Attitude)	28
117	ERP System User Proactivity – Self-Learning (Methods and Content)	23
118	Peers' Role in Learning	4
119	ERP System User – (Lack of) Time Spent Learning the System	13
120	ERP System User – System Hindrances to Learning the System	12
121	Retirements Prompted	4
122	New Employees Using the New ERP System	11
123	Temporary Services	1
		116

Beliefs	Efficacy and Support for the Change	Freq.
69	Coworkers	42
70	Supervisors	7
71	Own Department	6
72	Own College	20
73	Implementation Team	8
74	University (Outside own College)	3
75	Business Office	7
76	HR Office	5
77	PPS and Budget Office	12
78	Technical Support / OIT:	12
79	Informational Support (Manuals & Tipsheets)	9
80	Others (Non-Specific)	4
81	Getting Needed Answers (Non-specific Principal)	16
		151

Beliefs	Valence of Change Recipients	Freq.
124	Valence – Made Job More Difficult	25
125	Valence –Neither Gain nor Loss Experienced	28
126	Valence – Wait and See Attitude	4
127	Valence – Affective Gain (e.g. lack of stress, patience)	7
128	Valence – Extrinsic Gain (e.g. direct benefit to job skills, security, pay)	10
129	Valence –Information Gain	9
		83

Beliefs	Discrepancy and Appropriateness	Freq.
22	ERP System - Evaluative Comments of Overall System	12
23	Organizational Change – (Discrepancy) The Need to Make a Change	2
24	Organizational Change – (Appropriateness) Choosing the ERP System	27
25	Organizational Change – (Appropriateness) Quality of the System	18
		59

Examples of Comments from the Themes and Subthemes

Theme	% of Total	% of Theme	Sample Comments
Communication & Change Message			
Involvement of end-users in the change planning	4.8	38.1%	−*"They should have listened to end-users a whole lot more"* −*"I wish they had taken people like me and test it for a while & give our input before implementing"*
Generating buy-in	1.1	8.6%	−*"The university tends to survey at the director level, but they don't ask the end-users about what they think, creating resentment not only about the change, but about the management of it"* −*"I think the university doesn't care if people like it or not. We can't go back, so we have to make the best of it, whether people like it or not."*
Informing end-users about updates	1.1	8.6%	−*"Some of the forms out there online but get changed without them telling us the form has changed. There is nothing to indicate that forms have been changed. They need a little icon or highlighted date or some mark to let us know that a change has been made to a form."*
Q & A sessions with (a primary change agent)	0.2	1.5%	−*"It was beneficial to come around in small groups (for Q&A session), because no one wants to ask a question in a large group."*
Managing the Change Process			
Overall Impression of the Change Effort	1.0	17.9	−(Positive): *"They have managed to make the best of a not so good situation."* −(Negative): *"They are managing the change as best as they can, but they obviously did not realize a lot of the big issues that would come up, and it was too late to reverse the decision and go back to the old system or to another product."*
Handling the Implementation Process	0.7	13.1%	−(Negative): *"The staff felt that we have to pick up unnecessary pieces, only because the higher ups didn't plan effectively."* −(Negative): *"I also think it would have been a good idea to do a couple months of parallel operation using both FRS and (IT sys)."*
Timing of the Training	1.0	17.9	−(Negative): *"They should have trained by starting with a small school or department and training one department at a time."* −(Negative): *". . . since they were taught months/weeks before it was implemented much of the lesson was forgotten by the time we actually went on line."*
Speed and Timing of the System Rollout	1.2	22.6	−(Negative): *"Instead of gradual introduction of the system, there was a '(IT sys) Bang.'"* −(Negative): *"It took over a year to get the ICRE up and running (in IT sys finance)."*
Inefficiencies and bad outcomes	0.4	7.1	−(Negative): *"Problems arise from overspending because people don't realize how much they have spent because it is attached to the wrong org."* −(Negative): *"All the patching up has created needless extra work for the units."*

Examples of Comments from the Themes and Subthemes, continued

Theme	% of Total	% of Theme	Sample Comments
Change Agent Effectiveness			
University Change Team	1.0	83.3%	–(Positive): *"I think they are making the best of the situation."* –(Neutral): *"I think there is a reason they used Auburn people instead of [manufacturer]; they knew we would be nicer to the Auburn people."* –(Neutral): *"There is a reason that they are using people at the end of their careers, because they know anyone else would just walk away, given the stress and problems they are having to deal with."*
Provider of the Information Sys	0.2	16.7%	–(Negative): "*(Company) needs a bigger presence, it seems like they are not being as supportive as they need to be and are defensive about (IT sys).*
Discrepancy & Appropriateness			
Evaluative comments on overall system	0.8	20.3%	–(Positive): *"(IT sys) system can be more useful in the long run once you get used to it."* –(Positive): *"Love (IT sys) better than the old system."*
Need to Make the Change	0.1	3.4%	–(Negative): "*They could have cleaned up the old system and that would have been cheaper and better*"
Choosing the IT System	1.2	30.5	─(Negative): "*Why didn't they ask the people who were using the old system to compare some new systems to see which one would be the best?*" ─(Negative): "*Why didn't they compare other systems to see if (IT sys) was the right choice?*"
Human Resources Function			
Efficiency / Inefficiencies	0.3	2.9%	–(Positive): *"Payroll time entry is quite fast and easy to navigate (in (IT sys) HR)."* –(Negative): *"You can think you are doing it (inputting HR information) right, but not find out until later that you've done it the wrong way.*
Paperwork	0.5	5.3%	–(Positive): *"It ((IT sys) HR) has cut down tremendously on paperwork."*
Information	2.2	19.8	–(Positive): *"I like being able to search with the %wildcard for employee's names & (IT sys) #'s (in (IT sys) HR)."* –(Negative): *"not being able to add end dates, or labor distribution information when the job assignment is entered (is a disadvantage or weakness)."*
Access & Security	0.3	2.9	–(Positive): *"The system is much safer, with fewer people having access, especially to social security numbers and personal records."*
Screen Efficiencies	0.6	5.9	–(Positive): *"I enjoy the point and click (in (IT sys) HR) rather than learning screen names."* –(Negative): *"More steps to accomplish something – what took one screen before now requires back in and back out with more codes, go through several steps."*
EPAF specific	2.2	16.1	–(Positive): *"Can do EPAF quickly . . ."* –(Negative): *"EPAF overrides PBUD, resulting in a problem with the budget."*
Approvals	0.4	4.1	–(Positive): *"((IT sys) HR has cut down tremendously) in trying to get it all (paperwork) routed to the necessary people, signed, and returned to get someone hired."*

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Examples of Comments from the Themes and Subthemes, continued

Theme	% of Total	% of Theme	Sample Comments
HR Subsystem			
Evaluative Comments	0.3	2.9	−(Positive): *"(IT sys) HR has been a good change.* −(Positive): *"HR part - I like the new system as well or better than the old."*
Suggestions for improvement	0.3	2.9	−*"Salary wage transfer – still on paper too. Should go electronic."* −*"I would like to be able to choose which EPAFs I see by entering dates."*
Finance Subsystem			
Efficiency (Ease of Use) / Inefficiencies	0.5	3.3	−(Positive): *"Budget Transfers electronically is quick and easier (in (IT sys) finance)."* −(Negative): *"Not user friendly at all."*
Information	3.2	23.6	−(Positive): *"Drill down on purchase orders (is a strength)."* −(Negative): *"I cannot query on student workers to confirm they've been paid."*
Paperwork	0.4	2.8	−(Positive): *"Not having to use typewriter anymore."* −(Negative): *"((IT sys) finance) created more paperwork.*
Screens	1.2	8.5	−(Positive): *"((IT sys) Finance) gives more information on a single screen than old system when checking vendor payments."* −(Negative): *"Slower than the old system, cannot get around as quickly because of hassling with so many screens, menus, & levels."*
Approvals	0.6	4.7	−(Positive): *"I like seeing where things are in the approval stage."* −(Negative): *"You still don't know what is in the queue, you should receive some kind of automatic e-mail notice the system generates."*
Time and Code Inefficiencies	1.4	10.4	−(Negative): *"(IT sys) Admin is VERY SLOW to load and when you run an FGRODTA for example through this function the downloaded information will sometimes be the previous search and not what you are currently trying to query."* −(Negative): *"No subtotal on line items, so have to use a calculator to do it, can do a report, but that is time consuming ."*
Reports	1.0	7.1	−(Negative): *"The negatives and positives (debits and credits) of financial reports are very confusing.* −(Negative): *"E-Prints--again consistency--Labor Redistribution Reports--one for Fund--the same report for Org--but if you click on the Fund--you are asked to enter the Org--however IF you enter the Fund--it works--go figure!!"*
New Numbering System	0.8	5.7	−(Negative): *"Numbers for funds, orgs, and programs have too many digits – having to learn the pattern now."* −(Negative): *"Getting new FOAPS assigned has taken 2-8 weeks, placing time restrictions on sponsors and researchers, DECS and S/w transfers have increased."*
Vendors	0.8	5.7	−(Negative): *"Finance problems – vendors paid twice or not paid."* −(Negative): *"Trouble matching vendor names and even finding them."*
Evaluative comments	0.5	3.8	−(Positive): *"I am happy with (IT sys) (finance) overall."* −(Positive): *"It ((IT sys) gives us what we need."*
Suggestions	0.2	1.4	−*"They need to put a warning on the forms on which they use negative signs for positive balances so that people reading the form understand it."*

Examples of Comments from the Themes and Subthemes, continued

Theme	% of Total	% of Theme	Sample Comments
Social & Political Influences			
Experiences with attitudes of other users	0.2	62.7	−*"A lot of people believe that it is too complicated and that it has a huge learning curve that is too much, and this perception has generated a lot of bad attitudes."* −*"The lack of quality training negatively impacted the opinions of people and they caused people to get more irritated and defensive."*
Coworker influence on own opinion	0.8	23.5	−*"Initially negative influence did impact."* −*"There is no one else in my dep't who uses (IT sys) that much, so I only have my own perceptions since I began using it."*
Perceptions of how (IT sys) rollout went at other schools	0.3	9.8	−*"I worked at different university, which got (IT sys) in '01. It ((IT sys)) worked out so badly there (the previous university I worked at) they tried to get out of the contract, but could not."* − *"I personally, know of someone at another university who has had a full time job for the last four years correcting (IT sys) problems. That is all he does!"*
Efficacy & Support for the change			
Coworkers	2.7	27.8	−*"Everyone has had a "(IT sys) buddy" to help each other out."* −*"Having someone else share how to perform a particular task once they have mastered it has been most helpful."*
Supervisors	0.4	4.6	−*"My supervisor is great about taking my calls and questions and helping me all she can. "* −*"I keep my hands in to know how it works, so I can be their (my subordinates) backup."*
Implementation team	0.5	5.3	−(Negative): *"(IT sys) implementers did not correspond in a timely manner when (IT sys) was first introduced."* −(Positive): *"Responsiveness (from implementers) is somewhat better now."*
PPS and Budget office	0.8	7.9	−(Negative): *"Instead, at the departmental level, with hundreds of angry vendors to deal with (due to the registration problem), I felt like they (PPS) dropped the ball."* −(Negative): *"I still would like to have a list of people to contact in Procurement and Payment services for certain problems. It's like a crap shoot getting in touch with the correct person to answer your ((IT sys) finance) question."*
OIT	0.8	7.9	−(Negative): *"You get different instructions from different people (in OIT), there are contradictions."* −(Negative): *"For the most part we simply do what it takes to figure things out without contacting OIT because they are slow getting back to you."*
Manuals and tip sheets	0.6	6.0	−(Negative): *"Training manuals are not good. Not very detailed, skip steps in the instruction, especially with grants."* −(Positive): *"The tip sheets are quite helpful."*
Training			
Initial Training	1.5	9.2	−(Negative): *"(IT sys) Finance training was not training."* −(Positive): *"From my experience, the early training for (IT sys) Finance was well done and helpful."*
Recent Training	0.03	1.8	−(Positive): *"Training is much better now."* −(Positive) *"Training has gotten more specific, more refined."*
Trainers – Initial Training	1.6	9.8	−(Positive): *"At the first training, people who did the training did as good a job as they could, all considered."* −(Negative): *"The trainers did not know much more than me."*

Examples of Comments from the Themes and Subthemes, continued

Theme	% of Total	% of Theme	Sample Comments
Training			
Trainers – Recent Training	0.5	3.3	−(Positive): *"The person teaching the student portion was a faculty member – they knew how to teach it."* −(Negative): *"Not sure if the HR and Finance trainers know the system, they tell you to call some else and give you a name.*
Comments on Training Methods	0.6	3.2	−(Positive): *"Scheduling – did a great job, going step by step with a notebook, stopping and covering issues, not confusion."* −(Negative): *"There were no step by step instructions example for a specific set of circumstances."*
Training Class Pace and Scope	1.3	8.2	−(Negative): *"In training they are not going deep, but shallow."* −(Negative): *"Training takes too long and tries to cover too much. It could be shorter and a lot more specific"*
References to hands-on training	0.6	3.5	−*"No hands on practice (in HR training)."* −*"Sessions that were hands-on were the most productive for me."*
Training Class Size	1.0	5.9	−(Negative): *"Training should have smaller classes."* −(Positive): *"I learned a whole (lot) more in the small group training session."*
Training class availability	0.8	5.1	−(Negative): *"The classes fill up quick, so it's hard to get in when its short notice."* −(Negative): *"I had to make time to train myself…since I could not get into the classes I needed."*
Distractions in Classroom	0.4%	2.7	−*"Sometimes the other people there are the reason I don't get anything out of the training."* −*"Those folks (taking the class solely for promotion) ended up being a distraction in the class."*
Change Recipient Characteristics			
Self-efficacy	1.3	18.0	−(Negative): *"I have told my supervisor many times that I have never felt so STUPID--and I've been an accountant since 1986--pretty sad that a system has a lot of people on campus feeling so defeated!"* −(Positive): *"It made me realize that even though I am older, I can still learn new things. I find it exciting and challenging."*
Resistance to change	1.8	25.2	−(Neutral): *"I believe that is why keep beating a dead horse... (IT sys) was here to stay so it was to my benefit to make the best of it and try to learn it best I could."* −(Positive): *"The experience was taught me to be more open-minded about new wars of doing things, if you can get past not wanting to learn something new."*
Self-learning	1.4	19.8	−(Positive): *"Like any new system it has been difficult to work with however, if a person has time to play with it (IT sys) seems to be workable."* −(Negative): *"It's learning by trial and error."*
Peer role in learning	0.3	3.6	−*"I mostly (learn) through word of mouth."*
(Lack of) time spent learning the system	0.8	11.7	−*"There is a greater time commitment required for learning (IT sys), and so people won't commit to that, they just come in and want to do their jobs."* −*"I don't have time to play with the system."*
New employees using (IT sys)	0.7	9.9	−*"Don't know the old system to compare it to, so it doesn't seem so bad."* −*"Still too new in the job to complain."*

Examples of Comments from the Themes and Subthemes, continued

Theme	% of Total	% of Theme	Sample Comments
Valence of Change Recipients			
Made Job More Difficult	.03	30.1	–*"No gain from using (IT sys), just a lot more stress."* –*"It ((IT sys) finance) has created a larger workload.*"
Neither Gain nor Loss Experienced	.04	33.7	–*"I don't think I have lost anything but time spent learning the new system."* –*"I don't know of anything I have gained."*
Wait and See Attitude	.01	8.4	–*"I hope I will gain something, but I don't know what."* –*"It is hard to tell if (IT sys) is going to be beneficial"*
Affective Gain (e.g. lack of stress, patience)	.01	8.4	–*"Teaching me tolerance."* –*"We had to learn patience to deal with this."*
Extrinsic Gain (e.g. direct benefit to job skills, security, pay)	.01	12.0	–*"I like having a record of what's been done."* –*"You can state that you have skill."*
Information Gain	.01	10.8	–*"More information, organized the way I want it ."* –*"I have learned more about budgets and accounting and the whole process."*
Fairness-Related Issues			
Procedural fairness	0.4	8.6	–(Negative): *"The whole system was just pushed out on people because the Business Office & people in high positions wanted it."* – (Negative): *"This system has transferred much more work to the departments and their staff."*
Distributive fairness	1.0	21.4	–(Negative): *"More work without compensation to cover it."* –(Positive): *"I've been treated fairly."*
Interpersonal fairness	0.6%	12.9	–(Negative): *"They should have a job swap for a week with the (IT sys) people – we'd quit complaining and they would take us more serious when we do.*" –(Negative): *"I've been told "you should know this already" and don't want to help me one-on-one.*"
Informational fairness	0.6%	14.3	–(Negative): *"We were told we did not need information that we really do need, and we were not given access based on that."* –(Negative): *"There are things that were done easily on FRS but we as a department were told that what we more or less wanted was not a (IT sys) priority."*
Technical			
Bugs and glitches	0.5	8.0	–*"Epafs have errors sometimes (bugs)."* –*"Student portion – little bugs we need to work out."*
Administrative vs. Self-service	0.6	9.0	–*"I like Admin more than self-serve, but I use both."* –*"In Admin, must know the exact numbers and letters to query the information.*"
Screens	0.4	7.0	–(Negative): *"The oldest information is on the screen when you open it. The most current information (which is what we need) isn't on the screen when you open it. Would like that changed."* –(Negative): *"Drop down menus for fiscal year – there are too many past years, and you must scroll down to the current year every time."*

Examples of Comments from the Themes and Subthemes, continued

Theme	% of Total	% of Theme	Sample Comments
Technical			
Terminology	0.3	4.0	–(Negative): *"All the terminology in (IT sys) is more difficult than the previous system."* –*"Could have used training for the terminology."*
Printing	0.4	6.0	–(Positive): *"E-print is convenient to print off real quick"* –(Negative): *"The system is designed to print transactions with too many papers wasted, because it does not allow print screen."*
Reports	0.6	10.0	–(Negative): *"Classroom report before (IT sys) was 3-4 pages. Now it is 26 pages."* –(Negative): *"Some of the reports I use are not in e-print, and that makes it harder to get the information I want quickly."*
Help function	0.5	8.0	–*"They should provide more tips on screen for the actual page you are working on."* –*"Need more explanation for the errors."*
Automatic log-out	1.6	25.0	–(Negative): *"Pain getting logged out, because you lose the information."* –(Negative): *"The old system didn't require you to continually tell it if you want to stay on or not."*
Other problems	0.1	15.0	–(Negative): *"Easy to make a mistake because things are the same but labeled different, such as start date and entry date."* –(Negative): *"You can't copy and past (IT sys) ID numbers."*
Suggestions	0.4	7.0	–*"Not an 061 equivalent form (need total expenditures, had to go through pages one-by-one)."* –*"I would just like for mistakes to be highlighted in red or some color so you can see the mistake."*

APPENDIX B

QUALITATIVE STUDY INTERVIEW QUESTIONS

Factors Influencing Technology Acceptance Interview Questions

1. Tell us about yourself: How long have you been employed by [the university]? Tell us a little bit about what you do in your current position.

We want to talk with you about your experiences with the new ERP system. We would like to know about your experiences with both the process of implementing the new system and the content of the system. First, let's discuss the <u>process</u> of implementing the system:

2. How did you learn about the new ERP system and how long have you known about it?

3. Have you been through any type of formal training regarding the new ERP system? If so, what do you think about it? What are some good points and bad points?

4. What role, if any, have you played in design or implementation of the new ERP system?

5. How well would you say the change to the new ERP system has been managed up to this point? What has went well and what could have been (or still could be) improved?

Now we'd like to talk with you about the actual system and your use of and reactions to the HR and Finance functions of the new ERP system. Let's start with the HR Function.

6. How do you use the Human Resources function of the new ERP system as part of your job?

7. What are some advantages or strengths of the ERP Human Resources function compared to the previous system? In what ways has it directly made your job easier?

8. What are some disadvantages or weaknesses of the ERP Human Resources function compared to the previous system? In what ways has it directly made your job more difficult?

Now let's talk about the Finance function of the new ERP system.

9. How do you use the Finance function of the new ERP system as part of your job?

10. What are some advantages or strengths of the ERP Finance function compared to the previous system? In what ways has it directly made your job easier?

11. What are some disadvantages or weaknesses of the ERP Finance function compared to the previous system? In what ways has it directly made your job more difficult?

Last, we'd like with you about the opinions regarding the people you work with, and in what ways you've benefited from the use of the new ERP system.

12. Have the people you work with had any impact on your perceptions and use of the new ERP system? How have they influenced you? Who all have been most influential? (You do not have to give specific names.)

13. What have you gained or expect to gain personally from using the new ERP system?

14. How fairly have you been treated in regards to the new ERP system related information that you have been provided, the related policies in place, and the treatment you've received in comparison to others?

Demographic Information:
HR
Date started using ERP HR function____
Frequency of use of the HR component: _____ hours per week
Formal HR training: ____# of courses attended.

Finance
Date started using the ERP Finance function____
Frequency of use of the Finance component____ hours per week
Formal finance training: ___ # of courses attended

Frequency of use of the Administrator function: _____   hours per week
Frequency of use of the ERP Self Service function: _____hours per week
Age:_____ 20-29   _____ 30-39 ___ 40-49   ____ 50-59   _____ 60-69   _____ 70-79
Gender: male or female
Years worked at the university: _____
Years in current position: _____
Current College and/or Department:_____
Number of full-time employees immediately supervised _____

Today's Date: _____

APPENDIX C

ANNOUNCEMENT

Factors Influencing Technology Acceptance

You are invited to participate in a research study that aims at analyzing the Factors Influencing Technology Acceptance. Your participation is strictly VOLUNTARY. This study is being conducted by Steven Brown and Eric Gresch, Ph.D. students at the university under the supervision of Dr. Achilles Armenakis and Dr. Stan Harris. We hope to learn about end user perceptions of the recently implemented Human Resource and Finance components of the new ERP system. You were selected as a possible participant because you are an end user of the new ERP system. To participate in the project you must be 19 years of age or above.

If you decide to participate, we will need to interview you in person regarding your perceptions of the Human Resource and Finance components of the new ERP system. The interview will last between 20-25 minutes and we will take notes of your responses. These notes will be converted to electronic data later on.

Typically, a risk of breach of confidentiality is possible with interviews. In this research we will reduce this risk by keeping your responses confidential. Also, your responses will be accessible only to us, and we are bound by statutory human research requirements of [the university].

Any information obtained in connection with this study will remain confidential. Information collected through your participation may be used to fulfill a course requirement, for publication in a research journal, and/or for presentation at a professional conference in my field. We will have no identification information about you and we will not include the University's name in such publications or presentations.

You may withdraw from participation at any time (without penalty). You may also withdraw any data collected about you immediately after the interview, before it is coded and made unidentifiable. Your decision of whether to participate or not, or to withdraw later will not jeopardize your future relations with [the university] or Management Department.

If you have any questions we invite you to ask them now. If you have questions later, please
contact: Eric Gresch at 334-844-6524, gresceb@auburn.edu
                Steven Brown at 334- 844-3541, brown34@auburn.edu
                Dr. Armenakis, 334-844-6506, armenac@auburn.edu.
                Dr. Harris, 334-844-6519, harris4@auburn.edu
We will be happy to answer your questions.

For more information regarding your rights as a research participant you may contact the
[university] Office of Human Subjects Research or the Institutional Review Board by phone
(334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER TO
PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE
DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO.   THIS LETTER
IS YOURS TO KEEP

_____   _____
Investigator obtaining consent   Co-investigator obtaining consent
(Signature)   (Signature)

_____   _____
Printed Name   Printed Name

_____   _____
Date   Date

Recruitment Announcement: ERP System In Person Interviews
For the Factors Influencing Technology Acceptance Research Project

A study is being conducted to collect feedback from ERP Finance and HR users regarding their perceptions and usage of the new ERP system.

The practical benefit of this study will be to collect user perceptions so as to identify areas in which the implementation of the new ERP system can be improved.

Users are invited to express their thoughts about the new ERP system in an in-person interview which is expected to last 20-25 minutes. Interviews may be arranged to take place at the participant's office, at the researchers' offices at the Lowder Business Building, or at another location chosen by the participant, whichever is most convenient for the participant.

The research project is conducted independently of the ERP system project, although this research does have approval from the ERP Project Director. The identities of all participants will be kept anonymous and confidential. In addition, all interviews will be protected; no one other than the researchers will have access to data collected.

Please contact Steven Brown at brown34@auburn.edu or 334-844-5159, or Eric Gresch at gresceb@auburn.edu or 334-844-6524 for more information.

APPENDIX D

QUANTITATIVE SURVEY ITEMS

Quantitative Survey Items

Control variables (Age, Gender, Education, and Organizational Tenure)

1. Birth Year
    0 = 1901-1924
    1 = 1925-1942
    2 = 1943-1960
    3 = 1961-1981
    4 = after 1982

2. Gender
    1 = female
    2 = male

3. What is the highest level of education that you completed?
    0 = High School
    1 = 2Years of college
    2 = Bachelors Degree
    3 = Masters Degree
    4 = Doctoral Degree

4. How many years have you worked at the university (open-ended question)

ERP Subsystem

5. Which Banner Function do you primarily use for your job? (1 = Finance, 2 = HR, 3 = Student)

Organizational Change Recipients' Beliefs Scale

Discrepancy
6. Auburn University (AU) needed to change the way it did some things regarding information management.
7. AU needed to improve the way it managed information.
8. AU needed to improve its effectiveness by changing its information system.
9. An information system change was needed to improve AU's information management.

Appropriateness
10. I believe the change from the previous information system to Banner is having a favorable effect on AU's information management.
11. The change to Banner is improving AU's information management.
12. The change to Banner was correct for AU's situation.
13. When I think about the change to Banner, I realize it was appropriate for AU.
14. The change to Banner will prove to be best for AU's situation.
15. I believe Banner was the best alternative available for our situation.

Efficacy
16. I have the capability to fully transition from the previous information system to Banner.
17. I am capable of fully transitioning to Banner in my job.
18. I am comfortable in my ability to perform my job duties since the change to Banner.
19. I believe AU can successfully transition to Banner.
20. AU has the capability to successfully transition to Banner.

Principal Support
21. Most of my respected peers have embraced the change to Banner.
22. The top leaders at AU are "walking the talk" regarding Banner.
23. The top leaders support the change from the previous information system to Banner.
24. The majority of my respected peers are dedicated to making the change to Banner successful.
25. My immediate manager encourages me to support the change to Banner.
26. My immediate manager is in favor of the change to Banner.

Valence
27. The change to Banner is benefiting me.
28. With the change of using Banner in my job, I will experience more self-fulfillment.
29. I am earning higher pay from my job due to the change to Banner.
30. The change in my job assignments due to Banner will increase my feelings of accomplishment.

Perceived Ease of Use
31. It is difficult to learn how to use Self Service ERP system.
32. I feel comfortable working in Banner Admin.
33. I feel comfortable working in Self Service Banner.
34. My interaction with the new ERP system is clear and understandable.
35. I believe it is easy to get the new ERP system to do what I want it to do.
36. Overall I believe the new ERP system is easy to use.

Perceived Usefulness
37. Using the new ERP system enables me to accomplish tasks more quickly.
38. Using the new ERP system improves my job performance.
39. Using the new ERP system improves my productivity.
40. Overall, I find the new ERP system useful in my job.

Affective Commitment to Change
41. I believe in the value of this change.
42. This change is a good strategy for this organization.
43. I think that management is making a mistake by introducing this change.
44. This change serves an important purpose.
45. Things would be better without this change.
46. This change is not necessary.

Technology Acceptance

How has working with Banner made you feel over the past few weeks?

 1= never   2= occasionally   3= some of the time
 4= much of the time   5= most of the time   6=all the time

47. Miserable (score = 1) to Enthusiastic (score = 7)
48. Depressed (score = 1) to Optimistic (score = 7)
49. Uneasy (score = 1) to Contented (score = 7)
50. Worried (score = 1) to Relaxed (score = 7)

Change-Related Personal Initiative
51. Read the notices posted to AU Access in the "Personal Announcements" box/ channel?
52. Use the Banner Tip Sheets.
53. Read the AU Access e-mail notices I receive.
54. Use Banner On-Line Resource documents available on functional tabs within AU Access.

ERP system-related training
55. I feel the Banner training provided by the Controller's office to date has been good.
56. The Salary Planner training I've received has been good.
57. The STRIPES training I've received has been good.
58. I feel the Banner training provided by Budget Services to date has been good.
59. I feel the Banner training provided by Contracts and Grants to date has been good.
60. The Banner training provided by Human Resources to date has been good.
61. What type of Human Resources related training needs to be added? (open response)
62. I feel the Banner training provided by Payroll to date has been good.

Leader Member Exchange
63. I like my supervisor very much as a person.
64. My supervisor is the kind of person one would like to have as a friend.
65. My supervisor is a lot of fun to work with.
66. My supervisor defends my work actions to a superior, even without complete knowledge of the issue in question.
67. My supervisor would come to my defense if I were "attacked" by others.
68. My supervisor would defend me to others in the organization if I made an honest mistake.
69. I do work for my supervisor that goes beyond what is specified in my job description.
70. I am willing to apply extra efforts, beyond those normally required, to further the interests of my work group.
71. I do not mind working my hardest for my supervisor.
72. I am impressed with my supervisor's knowledge of his / her job.
73. I respect my supervisor's knowledge of and competence on the job.
74. I admire my supervisor's professional skills.

Core Self-Evaluation
75. I am confident I get the success I deserve in life.
76. When I try, I generally succeed.
77. Sometimes, I do not feel in control of my work

78. Overall, I am satisfied with myself.
79. I am filled with doubts about my competence.
80. I determine what will happen in my life.
81. I do not feel in control of my success in my career.