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Successful Enterprise Resource Planning System Implementation: A Higher Education Managerial Perspective

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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2016

Abstract

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by

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MS, Georgian Court University, 2008

BS, Thomas Edison State College, 2006

Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The overall success rate of implementing enterprise resource planning systems is about 30%. Guided by systems theory, the purpose of this qualitative single case study was to explore the strategies used to ensure a successful implementation by information technology managers working in higher education settings. The data were derived from semistructured interviews of 6 managers and documentation from a higher education institution in the northeastern United States that successfully implemented an ERP system. Data analysis consisted of reviewing interview transcripts, from which themes and patterns were identified and coded. Three recurring factors arose throughout the analysis involved commitment, communication, and change management. The main themes included pre-implementation strategy activities, implementation strategies, post-implementation strategy activities, and continuous improvement. Managers engaged in enterprise resource planning systems implementations should frame the strategic approach with a strong commitment, effective communication, and a comprehensive change management plan throughout the process. The implications for positive social change include the potential to improve the institution's business processes, cultivate a more knowledgeable workforce, increase student academic experience, and improve the institution's performance overall.

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Dedication

To God be the glory. I dedicate this dissertation to my family, especially my children, and grandchildren. Dare to dream. Remember, you can do all things through Christ who strengthens you (Philippians 4:13 KJV). And, most of all never give up on your dreams.

Acknowledgments

I thank God for this opportunity. It has been an arduous journey filled with barriers, challenges, and lessons learned. My faith, family, and friends helped me to persevere. “But as for you, be strong and do not give up, for your work will be rewarded (2 Chronicles 15:7 NIV).”

To my doctoral study committee, thank you. To my Chair, Dr. Michael Lavelle, for your constant encouragement and support, thank you thank you. Also, to Dr. Edward Paluch, Second Committee Member; Dr. Charlene Dunfee, URR; and Dr. Freda Turner, DBA Program Director, thank you for your advice and commitment.

To my family, friends, study participants, colleagues, cohorts, and professional peers thank you. Each of you added a unique perspective to this study and value to my work and life. Your support and commitment made this journey possible.

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Section 1: Foundation of the Study

Expanding data within the infrastructure of an organization is an opportunity for organizations to compete in the global market. Enterprise resource planning (ERP) systems enabled the expansion of data access (Dey, Clegg, & Cheffi, 2013). Additionally, ERP systems integrate data throughout organizational business processes for sales, purchases, production, inventory movements, financial transactions, and human resource information (Nazemi, Tarokh, & Djavanshir, 2012; Sandhil & Gupta, 2013), and student information and academic resources (Mathias, Oludayo, & Ray, 2014). Managers engaged in the adoption of an ERP system experience changes such as (a) rethinking management strategies (Lee, Elbashir, Mahama, & Sutton, 2014), (b) redesigning business processes (Masumi, 2013), and (c) rethinking information management (Fulford, 2013; Hidding, 2012).

Traditionally, managing data has required the use of more than one software application that lacked connectivity with one another (Katerattanakul, Lee, & Hong, 2014; Sandhil & Gupta, 2013). The complexity of ERP systems requires that managers manage a variety of knowledgeable stakeholders who support an ERP implementation project (Frimpon, 2012). Higher education institutions challenged with improving academic outcomes seek access to quality data in the strategic planning process (Kerrigan, 2015). The purpose of this study was to investigate the managerial strategies used in an ERP implementation project in a higher education institution.

Background of the Problem

The evolution of data management led to challenges and opportunities for managers of organizations. Managerial decisions historically have required that managers make sense of data from a variety of fragmented sources especially in multinational companies (Nazemi et al., 2012). Globalization has propelled the integration of information and ERP systems to maintain competitive advantages in organizations (Mathias et al., 2014; Rossetti, Handfield, & Dooley, 2011). Access to accurate and meaningful data are critical components of an organization's operations (Schneiderjans & Yadav, 2013), and converging data from multiple sources to a single application facilitates improving an organization's business processes and competencies (Subramanian & Peslak, 2012; Thomas, Babb, & Spillan, 2012).

Information technology (IT) advancements have enabled organizations to develop managing and processing data more efficiently. Infusing an ERP system with the proper managerial execution provides an organization the opportunity to make strides toward implementing strategic goals (Chowdary & George, 2012; Frimpon, 2012; Madapusi & D'Souza, 2012; Markus & Tanis, 2000; Waring & Skoumpopoulou, 2013). However, a significant number of ERP system implementations did not meet the goals of the organization (Hwang & Grant, 2014; Jacobs, van Witteloostuijn, & Christe-Zeyse, 2013). Approximately 90% of ERP system implementation projects exceed budget or delivery date (Shaul & Tauber, 2013), and according to Ara and Al-Mudimigh (2011), only about 30% of ERP system implementations are successful. Although the success rate is low, there are still benefits to implementing an ERP system (Thomas et al., 2012).

Problem Statement

Inexperienced managers involved in ERP projects have suffered a 42% failure rate because they lacked an understanding of the challenges of an ERP system implementation (Shaul & Tauber, 2013). Managers have recognized that the use of consultants improved the rate of ERP system success up to 36% (Hasibuan & Dantes, 2012). The general business problem is that executives in organizations implementing an ERP system are experiencing delays due to a lack of managers experienced in the dynamics of systems implementation. The specific business problem is that some IT managers in higher education institutions lack strategies to support a successful ERP system implementation.

Purpose Statement

The purpose of this qualitative single case study was to explore what strategies IT managers in a higher education institution used to ensure a successful ERP system implementation. The three major frames of inquiry themes in the study were: (a) systems theory, (b) strategic information management, and (c) ERP strategic management. The targeted population consisted of experienced higher education ERP system IT managers in the northeastern United States. This population was appropriate because research is scarce regarding the effectiveness of management in ERP system implementations (Metrejean & Stocks, 2011). Experienced managers may provide a richer understanding of an ERP system's complexity. The implications for positive social change include the potential to provide growth for the institution and increase employment opportunities for the community.

Nature of the Study

I used a qualitative method to explore strategies used by managers in a higher education institution to implement an ERP system. Qualitative research calls for flexibility in analyzing and developing a rich understanding of a research topic (Hirschheim & Klein, 2012). A qualitative approach enables researchers to make sense of phenomena while uncovering themes and patterns (Birkinshaw, Brannen, & Tung, 2011). Quantitative research, which uses statistical procedures or mathematical measurements, was not appropriate because the intent of this study was to understand how ERP system manager's strategies contributed to ERP success. Venkatesh, Brown, and Bala (2013) have noted that quantitative researchers use statistical analysis techniques while qualitative researchers employ coding and data reduction analysis. A mixed methodology consists of using qualitative and quantitative data, and likewise was not appropriate for this study. The focus of my study was to gain a richer understanding of the research problem and not to converge qualitative and quantitative methods.

I used a single case study approach for this study because I determined that it was most appropriate for exploring managerial strategies used in a successful ERP system implementation. Interpretation of experiences adds a broader perspective to research and may demonstrate the evolution of patterns and themes (Hirschheim & Klein, 2012). Case study design provides answers to how and what questions (Yin, 2013). While ethnographic and phenomenological designs may complement this qualitative study, these were not the focus of this research. Specifically, I decided against using an ethnographic design because I did not intend to study human behaviors or cultures

(Watson, 2012). Likewise, I decided not to use a phenomenological design because researchers use them to capture the essence of lived experiences and gain a detailed understanding of a phenomenon (Marshall & Rossman, 2011). I decided that a case study design was most suited to my needs because I investigated managers' perspectives and experiences with the expectation that exploring critical successful factors may help identify dependencies related to ERP system implementations and support data analysis.

Research Question

What strategies do experienced higher education institution managers use to implement an ERP system successfully?

Interview Questions

I designed the interview questions for this study to explore the common mistakes made by managers during an ERP system implementation. Using open-ended questions in a semistructured interview process, I asked:

1. What are the reasons for your organization's implementation of an ERP system?
2. What strategies did you employ that supported your successful ERP system implementation and operation?
3. What factors did you use to select the ERP project team members?
4. How did the ERP system align with your business processes?
5. What internal and external challenges arose during the implementation of the ERP system?

6. What other information can you share about your ERP system implementation experience?

Conceptual Framework

Systems theory was the supporting theory for this study. Von Bertalanffy (1972) used the term "wholeness" when referring to systems theory to indicate that systems theory principles seek to unite parts to form a whole. Organizations, a combination of subsystems including administrative and operational functions (Rossetti et al., 2011) seek to connect all functions through the sharing of information (Dorantes, Li, Peters, & Richardson, 2013). Integrating business processes requires managing multiple stakeholders to reframe an organization's operations (Grabski, Leech, & Schmidt, 2011; Hasibuan & Dantes, 2012; Madapusi & D'Souza, 2012; McLeod, Doolin, & MacDonell, 2012). A manager with the proper managerial expertise aligns people and processes from diverse disciplines to provide beneficial outcomes and enhance the growth of an institution (Frimpon, 2012). Implementing an ERP system facilitates the alignment of the various departments to unite an organization. Systems theory is appropriate as a conceptual framework because implementing an ERP system requires managers to have a holistic understanding of current business processes and the dynamics of aligning new business processes to develop a more cohesive organization (Shaul & Tauber, 2013).

Definition of Terms

Business process reengineering (*BPR):* The reconstruction of ineffective business processes that links strategy and systems development, enabling an organization to improve its sustainability (Darmani, & Hanafizadeh, 2013).

Critical success factors (CSF): Key elements that enable an organization to implement an ERP system successfully. Some of the more common CSFs that challenge firms are: (a) management involvement, (b) change management, and (c) user training. Realizing success require key elements working together to achieve a successful outcome (Rao & Jigeesh, 2012).

Enterprise resource planning (ERP): A process that encompasses integrating the functions of an organization to facilitate efficiency in managing business needs. The emergence of ERP systems afforded organizations the opportunity to automate business and academic functions while improving access to information organization-wide (Mathias et al., 2014).

Supply chain management (SCM): Management that integrates purchasing, operations, and logistics. Supply chain management includes the conversion of raw materials to finished goods, the distribution of goods to customers, and the management of relationships with customers and suppliers throughout the process. Purchasing and sourcing are two important activities of SCM. Integrating processes are essential components of supply chain management (Janvier-James, 2012).

Systems, applications, and products (SAP): An innovative, customizable software application. Implementing SAP across an enterprise promotes information sharing, assists in improving an organization's competitive advantage, increases efficiencies, lowers operational costs, and provides uniformity (Ram, Wu, & Tagg, 2014).

Assumptions, Limitations, and Delimitations

In this section, I outlined the assumptions, limitations, and delimitations that arose when conducting research for the qualitative study. Assumptions, or preconceived ideas, may not match the reality of the participants' experience (Sinkovics & Alfoldi, 2012; Tufford & Newman, 2012). The limitations of a study are established when the researcher narrows or restricts its focus (Myers & Klein, 2011). Delimitations establish the boundaries of the research (Birkinshaw et al., 2011).

Assumptions

A researcher may have a priori understanding of a phenomenon under study. Tufford and Newman (2012) claimed that a researcher should acknowledge his or her beliefs and biases, but suspend them during the research. This qualitative case study includes several assumptions. First, I assumed that the participants had experience in ERP system implementations, and that they would be available and willing to share experiences. I also assumed that participants were knowledgeable about critical success factors associated with implementing an ERP system. Finally, I assumed that participants could articulate their experiences with honest responses.

Limitations

One of the limitations in qualitative research is that it, of necessity, focused on a narrow set of circumstances (Myers & Klein, 2011). My study was limited by the scope of time available for the research, and by the number of available project manager with experience in higher education institution ERP system implementations. The participants for this study were required to have experience in implementing an ERP system in higher

education institutions located in the northeastern region of the United States. Another limitation of the study was the specific focus on the managerial perspective. The results of a narrow focus may reveal new information that is not applicable in a different context.

Delimitations

Delimitations are the boundary and scope established for conducting research (Birkinshaw et al., 2011). I delimited this study to a single higher education institution located in the northeastern region of the United States. The results of this study may not be generalizable to other higher education institutions because of its narrow focus. During the investigation, factors emerged and provided a divergent perspective of core and industry specific criterion.

Significance of the Study

This study may offer value to organizations considering an ERP system by providing managerial perspectives about developing strategies to optimize ERP system implementation success. The optimization of managerial strategies affects the success rate of an ERP system implementation. The implication for positive social change includes the potential to improve the growth of the institution and increase employment opportunities for the community.

Value to Business

Businesses considering an ERP system may find this study offers value when considering which strategies are significant in the implementation of an ERP system. Although the success rate of ERP system implementations remains at about 30% (Ara & Al-Mudimigh, 2011), successful implementations are beneficial (Thomas et al., 2012).

Numerous critical key factors influence success; however, three of the most common are: (a) management's involvement, (b) change management awareness, and (c) user involvement (Rao & Jigeesh, 2012). Managers who acquire an understanding of the dynamics of ERP systems can ascertain the right system will fit the current and future organization needs (Williams & Pollock, 2012). Emerging globalization has forced organizations to maintain a competitive advantage through continuous business process improvements.

Business Practice Improvement

The results of this qualitative case study may provide organizational managers with an understanding of the strategies required to align business practices in an ERP system implementation. Managers' descriptions of experiences may help other ERP system managers with project expectations (Birkinshaw et al., 2011). The results may help fill gaps in business practices associated with internal communications and change management initiatives (Cserháti, & Szabó, 2014). Additionally, the results could be useful in assessing current business processes, prioritizing any necessary changes, managing stakeholders, and sharing knowledge with internal and external stakeholders.

Implications for Social Change

This study's implications for positive social change include the potential to enrich the growth of higher education institutions and increase employment opportunities for the community. Change is the major challenge of an ERP system implementation. During this process, transformations occur in people, business processes, and technology. Project managers' advocacy for change involves employing an all-inclusive approach in

developing an ERP system implementation strategy (Gallagher, Worrell, & Mason, 2012). Given that organizational culture consists of multifaceted social structures, the manager's challenge involves engaging in strategically integrating innovation and change while reframing an organization's operations (Minoja, 2012). The result of this qualitative study could contribute to positive social change and create a greater understanding of the dynamics of managing an EPR system implementation in higher education environments. Successful implementation may provide the opportunity to improve student outcomes, enhance business processes, and empower decision makers with access to real-time data.

A Review of the Professional and Academic Literature

The information in this literature review provides a basis for understanding the underlying influences of successfully implementing an ERP system in organizations. My objective in this review is to offer a holistic understanding of the research topic (Hart, 1998). I used general systems theory as the conceptual framework for this study is (von Bertalanffy, 1972). A system is a complex of interactive components (Drack & Schwarz, 2010), and organizations consist of a complexity of processes and relationships (Rossetti et al., 2011). While reviewing the literature, I sought to gain a richer understanding of what constitutes success in implementing ERP systems, especially in a higher education institution. Several scholars have found that top management commitment, effective communication, and change management top the list of critical success factors (Frimpon, 2012; Grabski et al., 2011; Shaul & Tauber, 2013; Sudhakar, 2012).

I organized the literature review into three major thematic sections: (a) systems theory, (b) strategic information management, and (c) ERP strategic management. A majority of the literature I reviewed was from myriad peer-reviewed journals such as *Business Process Management*, *Information & Management*, *International Journal of Business & Management*, *Journal of Enterprise Information Management*, *Management Information Systems Quarterly*, and *Journal of Computer Information Systems*. This literature review consists of 100 references, of which 99 originated from peer-reviewed journals, and 87 published within the last five years. This study, as a whole, contains 148 references including 4 books, 2 websites, and 142 peer-reviewed journal articles, of which 95% have publication dates within the past 5 years.

Using Boolean operators helped me narrow the search and provided ERP-associated data on theory and practice, measuring success, user perception, relationship building, lessons learned, and barriers to success from both qualitative and quantitative research articles. To conduct these searches, I used the Walden University Library to access ABI/INFORM Complete, Business Source Complete, Science Direct, and Emerald Management Journals databases. In the search, I also included a review of applicable dissertations from the Walden University Library. This literature review encompasses information from peer-reviewed articles, scholarly reference books, and websites on the subject of ERP implementation. I found an extensive array of research materials that revealed many variables regarding ERP implementations and stakeholders' perceptions of success factors.

My broad literature search using keywords *enterprise resource planning, ERP implementation, ERP critical success factors, decision support systems, business process reengineering (BPR), supply chain management,* and *higher education transformation* provided me a list of subsequent keywords for more specific search opportunities. Some of these keywords were *innovative technology, strategic management, knowledge management, change management, information management, relationship management,* and *integration*. The literature contains assessments of ERP implementation dependencies that either add to or impede success. My analysis of the literature provided evidence of the dependencies associated with ERP system implementation success in organizations.

The purpose of this qualitative study was to gain a rich understanding of managerial strategies used in successful EPR system implementations. This included exploring experiences of participants to provide a diverse perspective of information to analyze (Hirschheim & Klein, 2012). For a holistic understanding of ERP implementations, a review of quantitative and qualitative research provided me a better understanding of the topic (see Andriopoulos & Slater, 2013; Basole, Seuss & Rouse, 2012), and acquiring a historical perspective provided me a rich understanding of how a phenomenon evolves (see Mitev & De Vaujany, 2012).

Systems Theory

I used systems theory as the theoretical groundwork for this qualitative study. Drack and Schwarz (2010) attributed the development of systems theory to von Bertalanffy whose worked focused on the whole organization. Systems theory was

particularly appropriate as the foundation for my study because an ERP system affords an organization the opportunity to converge disparate systems and business processes onto a single platform to view information across the whole enterprise (Hasibuan & Dantes, 2012; Madapusi & D'Souza, 2012; Zhang, 2013). An organization's complex parts coalesce with an ERP system implementation, provided managers with an opportunity to restructure various evolving relationships and behaviors, and integrate outcomes (Petter, DeLone, & McLean, 2013). Midgley (2011) posited that employing theoretical pluralism provides a researcher the chance to experience a phenomenon in a new light or through multiple lenses, and suggested using a foundational theory and then building upon it with complementary theories when making sense of a phenomenon. Fulford (2013) averred that ERP system research is scant on strategic management perspectives.

Higher education institutions are among the many organizations using information to enhance their competitive advantage (Zhang, 2013). Emerging from legacy systems and processes requires managers and stakeholders to engage in critical systemic thinking (Bednar & Welch, 2012; Zhang, 2013). Managers have the distinctive role of facilitating and collaborating with a diverse team of stakeholders as the transition to a new business solution emerges. The integration of the various disciplines into a single system represents change. As organizations engage in implementing an ERP system, new managerial strategies emerged (Fulford, 2013). Therefore, systems theory was appropriate for this qualitative study as I sought to gain a holistic understanding of the dynamics of a successful ERP system implementation.

Strategic Information Management

Higher education institutions are systems of complex processes and relationships that exchange data to develop and expand. Managers of higher education institutions seek to improve access to information, service to students, and the business process (Ibezim & Obi, 2013; Mathias et al., 2014; Soliman & Karai, 2015). Increasing an institution's business requires information that improves the decision-making process and facilitates the development of long-term strategic plans (Ibezim & Obi, 2013; Wickramasinghe & Karunasekara, 2012). Strategic plans emerge in conjunction with the emergence of leadership and technology. With higher education institutions continuing to grow, managers use data to change the future focus of the business. Managers involved in cross-functional leadership engage diverse and knowledgeable personnel in vertical integration (Schneiderjans & Yadav, 2013; Wickramasinghe & Karunasekara, 2012)**.**

Organizational change concerns the exchange of knowledge in every area of an institution involved in maximizing a firm's intellectual capital as well as enabling growth (Narayana, Pati, & Vrat, 2014). A committed attitude to change management has a positive effect on organizations' long-term sustainability strategies (Briody, Pester, & Trotter, 2012; Cserháti, & Szabó, 2014). Variables that strengthen organizational strategic goals are effective communication, stakeholder competency, and commitment. Managers of change adjust their thought process when executing business process changes or implementing new technologies (Fulford, 2013; Jacobs et al., 2013). In general, information management is an important factor in an organization's strategic plan (Sloan, Klingenberg, & Rider, 2013).

Business process reengineering. Business process reengineering (BPR) is a critical component of ERP system implementations. BPR originated in the late 1980s and early 1990s as a means to transform organizations from a manual functional base to an automated process orientation (Masumi, 2013). Management recognized the importance of understanding existing systems and business processes before embarking on technology transformation (Masumi, 2013). Not only is the technology emerging in an ERP implementation, but so are the people. Effective communication is critical during the reengineering process.

In a comparative analysis, Livermore and Rippa (2010) examined the dynamics of implementing an ERP system in Italian and American companies. The authors demonstrated how communication in two similar-size companies yielded different results. The communication style practiced in the Italian case was open and honest compared to the American case, which was less communicative. The Italian management's open and honest dialog helped develop trust between managers and employees that positively influenced the ERP implementation and showed a converging characteristic (Livermore & Rippa, 2010). In contrast, the American case showed diverging management qualities. Livermore and Rippa's anaylsis demonstrated that a firm commitment by management established the seriousness of achieving ERP success.

An organization's business processes change with time and growth (Dawson, 2014). Darmani and Hanafizadeh (2013) proposed developing multiple change scenarios that involve input from all areas of the organization. Reengineering is an opportunity to improve processes that provide optimal organizational performance (Masumi, 2013;

Schniederjans & Yadav, 2013). Knowledgeable management and staff facilitate integrating these new strategies.

The convergence of data throughout an organization creates opportunities for managers to rethink cross-functional business processes because of implementing an ERP system (Thomas, et al., 2012). No matter what industry or country is implementing innovative business solutions, managing technical knowledge and functional knowledge before, during, and after an implementation either impedes or facilitates restructuring an organization. In the transformation process, managers should possess a shared commitment and mutual understanding (Corvera Charaf, Rosenkranz, & Holten, 2013). Researchers have noted that it takes more than ERP software to improve business performance (Gallagher et al., 2012; Thomas, et al., 2012), and that ERP implementations are no longer the sole responsibility of the IT department. Business process reengineering is a characteristic of ERP systems transformation (Subramanian & Peslak, 2012; Thomas et al., 2012).

Change management. Implementing an ERP system infuses change in an organization's strategic goals associated with culture and technology (Waring & Skoumpopoulou, 2013). In their study of SAP ERP system implementations, Thomas et al. (2012) found that managers realized that more than technology changes the way businesses operates. To combat resistance to change, managers established activities to support cultural changes (Briody et al., 2012; Shao, Feng, & Liu, 2012; Waring & Skoumpopoulou, 2013). Arvidsson, Holmström, and Lyytinen (2014) asserted that an organization experiences strategy blindness when unexpected changes occur. As

institutions continue to grow, they face the challenge of managing information company-wide in a central repository (Sandhil & Gupta, 2013). Equipped with all the right tools and training, successful managers of change have the potential to add value to the organization.

The integration of quality data is critical to an evolving organization (Williams, Williams, & Morgan, 2013). Information technology has provided a means for delivering quality information at the right time to strengthen an organization's competitive advantage. However, fragmented applications make it difficult for organizations to optimize technology strategies (Thomas et al., 2012). The evolution of information technology has created the opportunity for the compilation and dissemination of data with ease company-wide.

The progression of legacy processes to an automated orientation provides accessibility to real-time data through ERP systems. Madapusi and D'Souza (2012) found that implementing an ERP system created opportunities for managers to make sound business decisions and develop best practices in a timely manner. Hence, managers of corporations have increasingly enhanced strategies to promote internal relationship building, especially between the functional stakeholders and the technical IT department (Rose & Schlichter, 2013). Opening a line of communication between departments promotes a better understanding of system applications and processes.

Researchers have revealed several universal ERP themes as critical success factors including top management support, change management, and communication (Ara & Al-Mudimigh, 2011; Gallagher et al., 2012; Williams et al., 2013), performance

enhancement (Dey et al., 2013), business process improvements (Clegg & Wan, 2013; Masumi, 2013), and lessons learned (Jugdev, 2012). Researchers have also found that assistance from knowledgeable ERP consultants enhances the success of ERP implementations (Hasibuan & Dantes, 2012; Shaul & Tauber, 2013). Contracted consultants assisting with an ERP implementation impart knowledge and support the ERP implementation (Kwak, Park, Chung, & Ghosh, 2012).

Ongoing education is critical to the continued success of corporations. Managers enhanced their skills by gaining experience in integration management, knowledge management, and relationship management (Nazemi, et al., 2012), but will also need to think differently (Fulford, 2013; Jacobs et al., 2013). Implementing and educating all stakeholders in the use of innovative tools strengthens the success of organizational operations. Furthermore, continuous education in technical and functional orientation has improved proficiency in organizational operations (Mathias et al., 2014). Emerging change management philosophies occur in every aspect of an organization implementing an ERP system. Subsequent generations of enterprise systems evolved into a more comprehensive process-oriented application as opposed to a transactional function (Cao, Nicolaou, & Bhattacharya, 2013). The outcome of change management creates a shift in an institution that requires on-going training for project team members as well as for all stakeholders, which in turn develops a more competent community of learners. As institutions continue to expand, goals and visions change and require a greater focus on cross-functional leadership, continuous education, and vertical integration **(**Grant,

Hwang, & Tu, 2013; Schneiderjans & Yadav, 2013; Wickramasinghe & Karunasekara, 2012).

Organization culture. Since the 1980s, organizational cultures evolved in response to the introduction of information technology (Waring & Skoumpopoulou, 2013). Cultural changes occurred within the organization with people, technology, and global activity. The infusion of technology has provided a new platform for storing and retrieving data in compliance with regulatory requirements (Mundy & Owen, 2013). ERP systems rearranged the footprint of organization culture.

Organizations consist of a diverse culture of people, structures, and processes. Culture plays a pivotal role in changing organizational business processes and ERP system implementation success (Shao et al., 2012; Waring & Skoumpopoulou, 2013). ERP implementations compel bridging the gap between old and new means of operations while creating an evolving new culture. A prerequisite of implementing any change or technology entails having an astute understanding of the framework of an organization before embarking on a transformational undertaking (Briody et al., 2012; Thomas et al., 2012). Understanding the dynamics of organizations, in general, requires a broad knowledge of the connectivity of all processes enterprise-wide.

Balancing technology and processes in an organization require a collaborative environment. Therefore, adding the complexity of an ERP application to a complex business process can create a disruptive work environment (Hwang & Grant, 2014; Zeng & Skibniewski, 2013). Effective communication during an ERP system implementation transitional period helps minimize disruptions. Managers employing the right

management technique value every stakeholder's voice in the implementation process (Zeng & Skibniewski, 2013). Collaborative intervention may help reduce disruption and add value in advocating adherence to achieving strategic goals. Shifting the culture of an organization may take on political connotations as well (Gallagher et al., 2012).

Knowledge management. The competitive nature of multinational businesses experienced the evolution of knowledge management (Eden, Sedera, & Tan, 2014). Managing information in competitive environments may require organizations to adopt new knowledge management strategies. Exchanging knowledge has explicit and tacit implications (Ram et al., 2014). Information technology minimized the difficulty of sharing information across multiple processes by reducing silo thinking (Ram et al., 2014). Furthermore, knowledge interaction may occur across multiple processes between groups such as human resources, executive management, information technology personnel, academic and administrative services. With the implementation of an ERP system, the acquisition of new knowledge takes place (Nazemi et al., 2012). Hence, implementing an ERP system improved the management of information and created new opportunities (Dorantes et al., 2013) as well as improved operational processes (Grabski et al., 2011).

One of the many changes organizations address in an ERP system implementation is knowledge management. Stakeholder knowledge is a critical factor in the pursuit of achieving ERP implementation success (Candra, 2012). Mathias et al. (2014) asserted understanding ERP systems requires higher cognitive skills. ERP systems challenged stakeholders to process information differently while expediting business decisions and

improving student services (Mathias et al., 2014). Developing a tool to manage and share the knowledge of business processes, ERP dynamics, technical expertise, and functional expertise may help to reduce the number of future CSFs.

ERP systems implemented in a multitude of industries use various methodologies. Myers and Klein (2011) used an interpretive methodology to ascertain that knowledge helps to transform one's understanding of a subject. Nazemi et al. (2012) analyzed the influence of divergent perspectives of accepting change within an organization. Exposing stakeholders to different perspectives during an ERP project may help the transformation. Initiating and maintaining a consistent training and education strategy provides the opportunity for employees to embrace change brought on by ERP adoption (Dezdar, 2012; Schniederjans & Yadav, 2013; Williams et al., 2013). Going against the goal of streamlining processes might hinder success (Nazemi et al., 2012; Williams et al., 2013).

Stakeholder management. Since the 1990s, enterprise resource planning projects' key success factors evolved with the evolution of ERP systems. An abundance of information exists on the critical success factors for implementing ERP systems (Frimpon, 2012; Rao & Jigeesh, 2012; Ross & Vitale, 2000; Shaul & Tauber, 2013; Sudhakar, 2012). The emergence of stakeholder management adds another layer to the complexity of changes that occur during an ERP project (Corvera Charaf et al., 2013). During the transitional period of an ERP project, organizations engaged in realigning strategic practices (Hidding, 2012; Masumi, 2013). The parameters of an ERP system may extend to the reframing of an organization's behaviors. Managers of organizations moved from legacy practices of managing silos of knowledge to a more inclusive process

of knowledge sharing (Jacobs et al., 2013).

Relationship management. Converting divergent organizational relationships into a cohesive enterprise influences the outcome of an ERP implementation. However, aligning relationships involves continuous support by senior management (Cserháti, & Szabó, 2014). Introducing changes during an ERP implementation challenges management and every stakeholder to realign thought processes. Addressing the variant of relationship management as part of the change management could reduce the resistance to change (Soja & Paliwoda-Pekosz, 2013). Change involves incorporating processes and people to set the tone for integration. To minimize resistance to change, managers who make a commitment embody the move to improving relationships and building trust (Briody et al., 2012; Cserháti, & Szabó, 2014; Dawson, 2014; Rose & Schlichter, 2013). Managers promoting relationship management enhance the integration process.

Many factors for success have emerged since the introduction of ERP prominence. Access to education furthers the success of an organization for refresher training and provides an introduction for employees who may transfer within an organization or for new employee orientation. Managers sharing the vision and goals of an organization manage with passion, flexibility, and inclusiveness and embrace systemic thinking (Bednar & Welch, 2012). The absence of strong management commitment hinders the success of an ERP implementation (Boonstra, 2013). Strong, committed leaders try to coordinate challenges and change requirements with a mix of diverse viewpoints to minimize failure.

An ERP implementation system promotes new beginnings for an organization. Assigning a knowledgeable project champion to orchestrate planning and preparation of an ERP project enhances the success rate (Sudhakar, 2012). The champion facilitates assembling a diverse group of competent project team members (Candra, 2012). Gallagher et al. (2012) asserted selecting and assembling the project team involve political skills. The project team's commitment is critical to the success of the project. A critical aspect of commitment entails communication. The social interactions among project team members require a common language to ensure dissemination of information occurs and is understood (Candra, 2012). Emerging relationships may occur as the implementation activities progress.

Organization external partners. Organizational external relationships with the ERP software provider and consultants support optimizing ERP benefits throughout the adoption process (Schniederjans & Yadav, 2013). Gaps in ERP knowledge may exist within an organization. As a result, management resolves knowledge deficiencies by acquiring consulting services (Grabski et al., 2011). Establishing a relationship with external implementation partners may provide the project with additional expertise and support. Using competent external resources assisted organizations with bridging the knowledge gap as well as provided project assistance (Hung, Ho, Jou, & Kung, 2012). Experienced consultants may possess expertise in ERP functional and technical project management areas.

Organizations might investigate a variety of consultant firms to determine one that offers experience and expertise in a particular industry. Metrejean and Stocks (2011)

argued that consultants' add value throughout the ERP adoption process. Utilizing competent consultants increased the intellectual value of an organization (Tsai, Lee, Shen, & Lin, 2012). Consultant benefits include reducing the cost of implementation, shortening the implementation timeline, and providing sufficient knowledge to the organization.

ERP Strategic Management

Managers of ERP projects find that flexible characteristics emerge during an ERP adoption project. In project leadership, new social structures and skills emerged from ERP implementations with team dynamics and project stakeholders (Cserháti & Szabó, 2014). Several new frameworks and initiatives evolved because of implementing ERP systems. For example, changes occurred in the organizational leadership structure and relationship management (Cserháti & Szabó, 2014). Additional changes advanced knowledge management (Eden et al., 2014), skills for new job opportunities (Horwitch & Stohr, 2012), and education (Hepner & Dickson, 2013). ERP systems enriched the regulatory compliance requirements for companies (Mundy & Owen, 2013). The amoebic state of ERP systems caused shifts in functional and technological areas of organizations adopting ERP innovations. In some organizations, the shifting transformation benefits were not realized (Hwang & Grant, 2014), and others have achieved success in increments over time (Madapusi & D'Souza, 2012). Prospective ERP adopters can find literature on examples and warnings of ERP expectations, successes, and failures, and lessons learned that would facilitate the decision to advance toward acquiring a system to satisfy the business needs.

ERP expectations. ERP systems came into prominence in the 1990s (Frimpon, 2012; Markus & Tanis, 2000). When some firms were seeking a solution to address program changes to comply with the year 2000 (Y2K) format, older software applications were not capable of advancing from the year 1999 to 2000 (Frimpon, 2012; Ross & Vitale, 2000; Thomas et al., 2012). Using the last two digits of the year meant representing the year 2000 as 00. Ross and Vitale (2000) asserted that SAP, one of the leading ERP applications, addressed the Y2K issue and provided a central systems platform for processing data. Y2K was one of the many concerns organizational leaders expected an ERP system to resolve. It is critical for organizational leaders to understand the dynamics of implementing an ERP system (Frimpon, 2012).

ERP systems. Since the 1990s, numerous ERP systems were developed. SAP, Oracle, and Microsoft Dynamics are three major ERP vendors (Shaul & Tauber, 2013). Purchasing the appropriate ERP system has an influence on the implementation's success. A fundamental principle associated with ERP implementations is no one-size-fits-all (Zhang, 2013). Benefits of successful implementations are (a) improved system performance enterprise-wide, (b) data stored in a single database, (c) minimized duplication of data, and (d) standardized business processes (Subramanian & Peslak, 2012; Thomas et al., 2012).

ERP definition. Enterprise resource planning (ERP) is an evolutionary term. ERP systems evolved from material requirements planning (MRP) and manufacturing resource-planning II (Olhager, 2013). The initial ERP applications were information technology solutions (Williams & Pollock, 2012). The motivation for ERP

implementations focused on integration, creation of enterprise standards, process improvements, and increased competitive advantage. Enterprise resource planning systems facilitate information sharing and promote business process improvements (Jacobs et al., 2013). An ERP system is a commercial application that integrates business processes associated with manufacturing, finance, sales, and supply chain into a single information software application (Chang, Wang, Jiang, & Klein, 2013; Hasibuan & Dantes, 2012; Madapusi & D'Souza, 2012; Zhang, 2013). Also, ERP applications have become an essential tool in the operation of an organization (Engelstätter, 2012; Mathias et al., 2014; Ross & Vitale, 2000; Rossetti et al., 2011; Shaul & Tauber, 2013). The definition of enterprise systems continues to evolve.

The competitive nature of organizations may require tools such as an ERP system that may provide improvements and help establish standards of operations (Zeng & Skibniewski, 2013). Additionally, ERP systems aim to create value and reduce cost when presented to decision makers with the right information at the right time (Nazemi et al., 2012). The next generation of enterprise systems, ERP II, emerged as a process base application as opposed to an ERP module foundation (Clegg & Wan, 2013). The evolution of automating information continues to expand with technology. First generation ERP systems focused on the concept of best practices, while the matured ERP has extended the concept to facilitate managing business processes (Clegg & Wan, 2013). The emergence of ERP II has increased the challenges and opportunities of data integration.

ERP benefits. The outcome of an ERP system implementation has historically

been disruptive (Grant et al., 2013; Markus & Tanis, 2000). However, ERP systems have transformed the landscape of an organization's functional and technical performance (Masumi, 2013; Wickramasinghe & Karunasekara, 2012). Likewise, unexpected outcomes associated with job descriptions (Nazemi et al., 2012; Williams et al., 2013) and job performance (Sykes, Venkatesh, & Johnson, 2014) transpired because of implementing ERP systems. Not only have individual employee changes occurred, but also ERP systems transformed department processes and relationships. Also, ERP projects changed the scope of business education that requires new skills and knowledge (Eden et al., 2014; Hepner & Dickson, 2013).

Advancements in ERP systems included integrating supply chain management (SCM), customer relationship management (CRM), and financial reporting standards (Grabski et al., 2011). Improvements in supply chain and customer relationship procedures included external enhancements with suppliers and customers (Rossetti et al., 2011). Visibility of supplier and customer information in a central system companywide is one of the many short-term benefits (Sandhil & Gupta, 2013). In comparison, long-term results achieved through building relationships and educating ERP system users benefit the company as a whole. Hence, the integration of supplier and customer information augments financial reporting (Markus & Tanis, 2000; Narayana et al., 2014; Sandhil & Gupta, 2013). Organizations riding the proverbial wave of turbulence may realize short-term and long-term benefits.

ERP fit. One major factor in implementing an ERP system is functional fit (Cao et al., 2013; Hasibuan & Dantes, 2012). ERP systems adoptions are expensive, complex,

and time-consuming to implement (Fulford, 2013; Lech, 2013). Off-the-shelf ERP solutions may require some customization along with changing business processes to ensure the system can adequately handle organizational needs (Hwang & Grant, 2014; Lech, 2013). Tailoring ERP systems to satisfy the business processes of an organization requires prerequisite analysis of current processes before defining future processes. The best-fitting ERP solution provides an organization with 80% functionality (Subramoniam, Tounsi, & Krishnankutty, 2009). Masumi (2013) asserted that incorporating business processes with information technology implementation are most effective.

Modifying an ERP system requires a holistic understanding of existing business processes and its influence on upgrading the system for future requirements (Shao et al., 2012; Williams & Pollock, 2012). The level of ERP customization may vary depending on the structure of an organization and its business practices before ERP adoption. Minimal customization is the most appropriate action to take in implementing an ERP system (Katerattanakul et al., 2014; Schniederjans & Yadav, 2013). The ideal situation calls for a thoroughly communicated project plan that includes educating stakeholders' involved with nurturing change (Fryling, 2015). A well-articulated project plan should address the benefits of aligning ERP customization within the business processes of the organization.

While ERP systems link business functions, some customization is required to enhance interaction between users and the system (Hwang & Grant, 2014). The development of a system graphical user interface (GUI) simplifies the users' ability to interact with an ERP system (Hwang & Grant, 2014). Customizing interfaces to interact

with ERP systems facilitates streamlining business processes (Mathias et al., 2014). Electronic data interchange (EDI) automates the transmission of data between two different organizations (Hwang & Grant, 2014). Customizing an ERP system to integrate student records with academic and administrative services or library information systems enables an institution to share and manage information institution-wide (Mathias et al., 2014).

ERP life cycle. A wealth of research literature exists on enterprise systems and implementation evolution (De Bernardis, 2012; Hasibuan & Dantes, 2012; Markus & Tanis, 2000; Mundy & Owen, 2013; Shaul & Tauber, 2013; Staehr, Shanks, & Seddon, 2012). Breaking down an implementation into phases or stages adds a level of assessment while influencing ERP adoption success (Hasibuan & Dantes, 2012; Markus & Tanis, 2000). Hasibuan and Dantes (2012) associated five stages with an ERP life cycle as project preparation, technology selection, project formulation, implementation development, and deployment. Also, Livermore and Rippa (2010) used two case studies to explain the complexity of ERP implementations and suggested using a four-phase project model consisting of planning, selecting, implementing, and post-implementation activities. The comparison indicated the variables that impede the success of an ERP implementation lies within the organizational culture, leadership, communication styles, and group dynamics. Involving all stakeholders from the inception of ERP system planning gave everyone a voice in the decision process and reduced the risk of disparities (Livermore & Rippa, 2010). Throughout the ERP implementation process, effective communication has emerged as an essential factor.

Integrating data in phases or stages affords an organization the ability to assess the project and evaluate the success of each phase. Markus and Tanis (2000) analyzed enterprise system adoption using four phases within a theoretical framework. Starting the project with a chartering phase set the stage for the project, shakedown, and onward and upward phases (Markus & Tanis, 2000). The chartering phase entailed selecting the appropriate software, identifying the potential improvements, developing documentation of current processes, and deciding on a methodology of deployment. Transitioning from one phase to the next is reliant on the success of the previous stage.

The chance to integrate individual applications to communicate and update a central database has brought new challenges and opportunities to organizations. In general, it is evident that ERP systems are beneficial yet problematic (Powell, Riezebos, & Strandhagen, 2013). The advantage of having a central repository of data resolved the disparity of retrieving data from multiple applications and reduced data duplication (Sandhil & Gupta, 2013). The end of old processes and legacy systems brings new life into an organization. An essential factor in an organization's decision-making process is the sustainability of the system enterprise-wide (Cao et al., 2013). New life creates new opportunities and challenges for an organization.

The lessons learned from ERP implementations are valuable guidelines for subsequent ERP adopters. Jugdev (2012) asserted managers add value to ERP projects when incorporating lessons learned from other ERP project outcomes. During the post-implementation phase, organizational benefits continue to materialize because of the commitment to change (Thomas et al., 2012). Emerging benefits such as enhanced

financial controls (Dorantes et al., 2013) and project management (Cserháti & Szabó, 2014) provide benchmarks for future projects. Advancement in the execution of ERP systems continues to evolve.

The methodology used to adopt ERP applications are as varied as the ERP selections. The options of phasing, big bang, and modeling in ERP implementations has influenced the success process (Nazemi et al., 2012). Using a case study approach, Markus and Tanis (2000) identified a four-phase model approach to implementing an enterprise system. Meanwhile, in a post-implementation phase learning emerges over time (Chou, Chang, Lin, & Chou, 2014). The evolution of ERP life cycle has promoted the opportunity for efficiency.

By comparison, global ERP implementations industry-wide inherently have similar challenges and barriers. There are core ERP impediments associated with large organizations rather than smaller firms (Grabski et al., 2011; Peslak, 2012). Large organizations, defined as those containing 500 or more employees (Demirel & Mazzucato, 2010), were the initial users of ERP systems (Shaul & Tauber, 2013). Also, EPR systems integrate a significant number of disparate processes (Shaul & Tauber, 2013).

Managers of ERP projects encounter various challenges throughout the implementation process. The initial scope of work may potentially have some process gaps. Researchers identified scope creep as a critical factor that could delay or disrupt the project as well as add significant cost (Dezdar, 2012; Williams et al., 2013). Adding new requirements may entail extensive system customization (Thomas et al., 2012). However,

establishing a communication strategy to inform stakeholders of challenges and concerns could minimize ERP system customization and cost (Williams et al., 2013). Emerging challenges during the adoption of ERP systems add to an emerging list of CSFs.

ERP challenges. The success of an ERP system implementation depends upon some dependent, independent, and interdependent variables (Petter et al., 2013). Rose and Schlichter (2013) asserted trust is a critical success factor in the ERP implementation process. Traditionally, the determination of ERP system success measurement consisted of three factors, termed the iron triangle (Cserháti & Szabó, 2014; Lech, 2013; McLeod et al., 2012). The term iron triangle meant the project did not exceed the allocated cost, met the projected timeframe, and implemented a quality product. However, the definition of project success may vary depending on the stakeholder assessing the outcome (Lech, 2013). The success of an ERP project evolves over time as some managers achieve one or two of the proposed iron triangle factors (Sudhakar, 2012). Post-implementation extends the implementation to a new phase of opportunity.

The measurement of success is a continuous process of evolution. The human factor is a key contributor to success throughout the ERP system life cycle (Cserháti & Szabó, 2014; Soja & Paliwoda-Pękosz, 2013). Other evolving factors influencing success are trust (Rose & Schlichter, 2013), user acceptance, and user satisfaction (Schniederjans & Yadav, 2013). Cserháti and Szabó (2014) posited that some success factors are relationship oriented, and others task oriented. Converging relationships reframe the landscape of an organization.

ERP critical success factors. The evolution of critical success factors (CSF) since the 1990s has consisted of multiple elements. Some of the widely cited CSFs are the lack of top management commitment, change management, poor planning, project management, and communication (Sudhakar, 2012). In general, core CSFs evolved that applied to all ERP system adoptions. The lack of internal controls affected the integrity of the financial process (Dorantes et al., 2013; Lee et al., 2014). Furthermore, an assessment of critical factors is essential before ERP deployment (Ross & Vitale, 2000; Jugdev, 2012). The extant literature on lessons learned is an indication that some CSFs continue to evolve. However, top management commitment continues to be at the forefront of ERP implementation success.

Additionally, increased in significance as a key success factor is stakeholder management (Schniederjans & Yadav, 2013; Shaul & Tauber, 2013). Furthermore, effective communication by management enhances the transformation of ERP system user's commitment to change (Cserháti, & Szabó, 2014; Peslak, 2012). The environment of trust with empowered key stakeholders has the potential to move an organization closer to success in every area of the enterprise (Gallagher et al., 2012; Rose & Schlichter, 2013). Optimistic employees may be able to help minimize issues with resisters of change.

The research on failed ERP implementations has provided insight into what did not work and where gaps may exist. Sudhakar (2012) also asserted the need to investigate CSFs to increase the implementation success rate. Managers of organizations in the assessment stage of selecting the appropriate ERP system have an opportunity to use

lessons learned from failed and successful implementations as a guiding factor (Jugdev, 2012; Williams & Pollock, 2012). During the system development stage, well-informed managers understand the significance of communication and the interaction required to integrate people, processes, and programs (Corvera Charaf, et al., 2013).

Establishing success guidelines and communicating them at the onset of an ERP project may establish the foundation for the planning stage. Using a structural approach, such as a technology acceptance model (TAM), provides a means of gauging success in increments (Sudhakar, 2012). While on time and under budget are critical, top management commitment, clearly defined project goals, effective communication, competent project team, dedication to continuous training, and knowledge sharing are a few of the core CSFs attributes (Esteves, 2014; Norton, Coulson-Thomas, Coulson-Thomas, & Ashurst, 2012; Shao et al., 2012). An expected outcome involves improvements in business processes (Shanks & Bekmamedova, 2012), system operational performance (Madapusi & D'Souza, 2012), and data quality (Otto, Hüner, & Österle, 2012). Successful ERP adoption consists of many variables that extend to new challenges and opportunities.

Risk management. Markus and Tanis (2000) suggested organizations should research enterprise systems for a comprehensive understanding of the potential benefits and risks before deciding on a specific application. Risk experiences and factors vary by organization, but some are common across all industries. Starting at the top, executive managers and project managers need to update their core competencies to include a more holistic knowledge of all internal and external business operations (Markus & Tanis,

2000; Zhang, 2013). The variety of success factors makes it difficult to attribute specific factors to any one organization or industry (Dey et al., 2013). Disseminating incorrect data using an ERP system can inflict havoc in an organization.

Competent managers need an understanding of core operations for processes such as finance, research, and development that require regulatory compliance (Butler & McGovern, 2012). ERP systems development incorporates regulatory best practices in its design to accommodate financial business processes (Mundy & Owens, 2013). The lack of integrating regulatory compliance has a potential for litigation (Butler & McGovern, 2012). Risk management starts with a strategic thinker who can integrate people, processes, and programs in such a competitive environment.

The lack of risk investigation could impede an ERP project, cause disruption, or destroy an organization. Thus, investigating risk has emerged as critical to an ERP adoption process (Aloini, Dulmin, & Mininno, 2012; Sudhakar, 2012). Some managers lack a comprehensive understanding of the risk associated with ERP projects (Aloini et al., 2012). Also, managers who incorporate risk assessment in the organization's ERP system plan enhances the rate of success. Including risk evaluation in the ERP system's project plan contributes to the implementation success rate (Dey et al., 2013; Sudhakar, 2012).

A 2004 Standish group report noted an overall ERP project success rate of about 30% (Ara & Al-Mudimigh, 2011). Additionally, there are concerns about the validity of the Standish report and the criterion used to determine ERP system success (Ara, & Al-Mudimigh, 2011). The exchange of knowledge is a critical aspect of ERP

implementations that requires an atmosphere of learning supported by top management (Hung et al., 2012; Nwankpa, 2015). Dey et al. (2013) examined the influence of incorporating risk throughout an ERP project and the associated cost. A detailed project plan that includes risk assessment may help to mitigate the risk factors associated with ERP adoption.

ERP implementation. Senior management of organizations approached ERP system implementations using a variety of methodologies (Shaul & Tauber, 2013). The phasing methodology is an ERP implementation model, which involves utilizing systems development theory (Subramanian & Peslak, 2012). Utilizing a structured implementation methodology facilitates a smooth transition from legacy applications to an integrated system (Bednar & Welch, 2012; Zhang, 2013). Including a well-defined preparation and training phase along with a transition and performance phase influences the success of an ERP implementation (Markus & Tanis, 2000; Norton et al., 2012). Also, a post-implementation phase in an ERP project plan provide organizations the opportunity to realize success is a continuous process (Esteves, 2014; Mathias et al., 2014; Shao et al., 2012).

A typical ERP implementation may not proceed according to the defined plans. An inadequate requirement definition is one of the top failure factors, according to Livermore and Rippa (2010). On the other hand, effective project leadership along with a positive organizational culture are contributing factors of success (Niederman, Alhorr, Park, & Tolmie, 2012; Shao et al., 2012). Some dependencies such as adequate stakeholder involvement, competent project members, and top management engagement

can influence ERP success (Gallagher et al., 2012). However, using an off-the-shelf ERP system application means adopting the best practices embedded in that particular system may require customization (Fryling, 2015). Organizations with complex processes may require modifications to the implementation of its ERP system (Hwang & Grant, 2014; Katerattanakul et al., 2014; Lech, 2013; Schniederjans & Yadav, 2013). Developing a succinct requirements document is a prerequisite for implementing an ERP system (Niederman et al., 2012).

Project requirements. Defining the project requirements entails having a holistic understanding of the operational functions of an organization (Williams et al., 2013). The first step to achieving success in an ERP implementation is to determine the readiness of the organization for the task (Hasibuan & Dantes, 2012; Markus & Tanis, 2000). Second, the person or persons spearheading the project should have the required knowledge, skills, abilities, and project management experience. Third, understanding the pre-implementation process may help with the analysis of legacy processes and minimize gaps in developing new processes. Moreover, Hasibuan and Dantes (2012) asserted that project management and change management readiness are two key success factors of an ERP implementation.

ERP system prerequisites. A core set of contributing factors associated with ERP system implementation success include (a) selection of the appropriate system, (b) business process reengineering (Darmani, & Hanafizadeh, 2013; Masumi, 2013), and (c) a competent team of diverse stakeholders (Tsai et al., 2012). Establishing a framework that yield success in an ERP implementation requires (a) research on ERP systems, (b) a

firm commitment from management, (c) clearly defined project plans, (d) empowered decision makers, (e) good project management skills, and (f) competent resources dedicated to the project (Fryling, 2015; Shaul & Tauber, 2013; Williams et al., 2013). Likewise, Frimpon (2012) ascribed the success of an ERP implementation relies on clearly defining (a) project management, (b) change management, (c) process management, (d) technology management, and (e) top management. Researchers argued success is a continuous process and making incremental progress has become an acceptable outcome (Hasibuan & Dantes, 2012; Thomas et al., 2012). Competent ERP project managers should have ample tools to assist with identifying critical success factors associated with achieving ERP adoption success. For example, the analytic hierarchy process (AHP) methodology consists of assigning weights to ERP system project attributes in measuring success (Frimpon, 2012).

ERP integration. Enterprise resource planning systems enable the integration of people and business processes (Hwang & Grant, 2014). An analysis of interdependent relationships may help to identify other initiatives that contribute to successful ERP integration (Grabski et al., 2011; Markus & Tanis, 2000; Shao et al., 2012). One affirmation is that no one-size system fits all contexts in ERP adoption (Al-Haddad & Kotnour, 2015). The second challenge of ERP integration initiatives is the expectation and reality of success (Blocker, 2012). A third argument involves the significance of business process reengineering (BPR) in the successful execution of change initiatives (Darmani, & Hanafizadeh, 2013; Masumi, 2013). With the assistance of innovative

technology such as ERP system initiatives, organizations have experienced growth and challenges.

Connecting all areas of business operations in ERP system adoptions allows stakeholders to see the benefits of integration. One of the benefits of an ERP system implementation is data sharing company-wide (Grant et al., 2013). High-level visibility of integrated data across an enterprise presents new opportunities and risks. Additionally, an ERP system implementation enables the integration of people and business processes (Grant et al., 2013). Effective integration enhances the sharing of information.

With the implementation of an ERP system, job descriptions changed (Hepner & Dickson, 2013; Hunt & Choi, 2015). Requirements for hiring and job performance review may present challenges and opportunities for a human resources department. Human resource management involves the process of continuous improvement that may add to the ERP success rate. Hence, organizational leaders must reconfigure the value of their human capital in every department. Therefore, investing in and maintaining human capital has become a critical factor in the success of ERP systems (Dey et al., 2013).

ERP systems seek to improve efficiencies throughout an enterprise by integrating silos of data. Organizational data challenges revolve around integrating complex processes with primary business processes. For example, manufacturing managers who integrate information from new product development through consumption enhance the supply chain business process (Narayana et al., 2014). Converging processes and systems onto a single database could also enhance IT strategies. However, costly and inefficient processes impede the integration process.

Future ERP. The results of the study may add to ERP implementation prerequisites and post-assessments for higher education institutions. Achieving success requires understanding the influential critical factors and the dynamics of ERP systems (Candra, 2012; Williams et al., 2013). Current literature consists of evolving factors associated with ERP projects and focuses on external and internal influences such as competition and regulatory compliance (Schneiderjans & Yadav, 2013). During and after an ERP implementation project, an organization depends on knowledge sharing (Eden et al., 2014; Hung et al., 2012), improved operational performance (Madapusi & D'Souza, 2012), and organizational culture changes (Schneiderjans & Yadav, 2013). Sharing knowledge facilitates closing knowledge gaps (Wang & Wang, 2012). Stakeholder interaction and collaboration drive success to a higher degree when internal and external factors are positive. Establishing a more definitive list of risk factors might improve the success rate of future ERP implementations.

Previous studies reported on the ERP system failure rate as high (Hunt & Choi, 2015). More emphasis has been placed on risk management (Dey et al., 2013), ERP readiness (Gallagher et al., 2012; Hasibuan & Dantes, 2012; Razmi & Sangari, 2013), and continuous process improvements (Chou et al., 2014) to improve the ERP implementation outcome. Establishing pre-assessment and post-assessment criteria that are more detailed could add proactive measures to future ERP and SCM integration evolution.

ERP systems served as a catalyst for transforming organizations to improve their operations. Among the numerous benefits realized from an ERP system implementation

are efficient processes, and cost reductions (Dey et al., 2013). Integrating an ERP system has created the convergence of functional and technological stakeholder dialog with new opportunities. Sharing information has provided a means of improving communication through collaborative relationships.

The existing research on CSF has increased in comparison to those success factors identified in the 1990s. The divergence of knowledge has moved training and education from an insignificant to a significant CSF (Hepner & Dickson, 2013). However, researchers continue to focus on three common key ERP project success factors: (a) top management support, (b) effective communication, and (c) change management (Shaul &Tauber, 2013; Sudhakar, 2012; Tsai et al., 2012). Emerging focus places emphasis on selecting competent consultants (Tsai et al., 2012). The evolution of CSF has developed along with ERP implementation processes and industry evolution. The focus of this study involves gaining an in-depth understanding of the managerial strategies employed in an ERP system implementation by investigating systems theory, strategic information management, and ERP strategic management.

Transition

Section 1 encompasses the foundation and background information for this qualitative single case study. The purpose of this study was to explore the managerial strategies used in a higher education institution implementing an ERP system. The overarching research question focused on strategies experienced higher education institution managers used to implement an ERP system. Section 1 also includes the nature of the study, conceptual framework, along with a literature review on the dynamics of

implementing an ERP system. The literature review is composed of ERP system and information management strategies.

Section 2 begins with a restatement of the purpose statement. Section 2 also includes the role of the researcher, research method and design, research ethics, data collection and analysis along with research ethics. Section 3 includes my findings, implications to social change, recommendations for further study, and conclusion.

Section 2: The Project

In this section, I restate the purpose, and discuss the role of the researcher and the participants' consent and commitment to the study. I also discuss my research method and design, research ethics, and data collection and data analysis practices. After approval by the IRB, I conducted my research. Section 3 includes my findings, conclusion, and recommendations for further study.

Purpose Statement

The purpose of this qualitative single case study was to explore what strategies IT managers in higher education institution used to ensure a successful ERP system implementation. The targeted population consisted of experienced higher education ERP system IT managers in the northeastern United States. This population was appropriate because research is scarce regarding the effectiveness of management in ERP system implementations (Metrejean & Stocks, 2011). Experienced managers may provide a richer understanding of an ERP system's complexity. This study's implications for positive social change include providing data that leaders may use to promote growth in their institutions and increase employment opportunities of their communities.

Role of the Researcher

As the primary instrument (see Xu & Storr, 2012), I set aside my assumptions while exploring the experiences of the study's participants (see Tufford & Newman, 2012; Yin, 2013). To this study, I brought ERP systems implementation experience as a business process analyst, SAP materials management consultant, and adjunct instructor. However, I have not worked on the subject ERP project implementation. In this

qualitative single case study, I adhered to the published guidelines of the Belmont Report as well as those set by Walden University's Institutional Review Board (IRB). I completed the National Institutes of Health web-based training course *Protecting Human Research Participants* (Appendix F). The certificate in Appendix F is an indication of my awareness of the tenets and obligations associated with research involving human subjects.

To address concerns about human involvement with research, the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research published the Belmont Report (1979) in which it recommended adherence to the following tenets: (a) respect for persons, (b) beneficence, and (c) justice. Respect for persons involved in research involves participants consenting to participate in research by completing and signing a consent form (DuBois et al., 2012). I explained to the participants (a) the objective of the research, (b) that participation was voluntary, and (c) that they could withdraw without penalty from the process. My objective was to gain a richer understanding of the research topic and add to the body of knowledge, and I did not intend to do physical or emotional harm to the participants. I worked to insure that my selection of participants was fair and just, and that the selection process was without bias to gender, age, class, or educational status.

An interview protocol set the standards for the interview process, which consisted of an introduction, research overview, flexible questions, and participant's rights (Baškarada, 2014; Rowley, 2012). To ensure consistency, I asked each participant the

same questions in the same order. Each participant gave me permission to audio-record the interview.

Participants

I collected data from a purposive sample. Characteristics of purposive sampling involve selecting willing participants (Saunders, 2012) who are knowledgeable about the topic of the study and whose participation may enrich the study (Suri, 2011). I gained access to participants by submitting a written request to the appropriate authority for permission to conduct the study at the selected institution. The participant selection consisted of finding an appropriate and adequate number of respondents in pursuance of collecting quality data (O'Reilly & Parker, 2012). The participants possessed proficiency in ERP system implementation in the northeastern region of the United States, and each had at least five years of functional or technical system experience.

Myers and Klein (2011) asserted there is a need to expand research on information systems. Selecting participants with ERP system implementation experience as a project manager, business process manager or information technology manager enabled the collection of rich data. Having an understanding of the subject enabled me to communicate and ask the participants relevant questions. Utilizing an open dialogue approach, I expanded my body of knowledge. A working relationship included open communication, respect, and the consideration of each participant's voice as valuable (Williams et al., 2013). Participants meeting these criteria participated in this case study.

After securing participants, I informed them about the objectives of the study. Each participant received a consent form (Appendix B) indicating that their involvement

was voluntary, and that they could withdraw from the process at any time without penalty. I maintained the confidentiality of all data, and no names appear in the study. I assigned a case number to each participant to ensure his or her privacy and confidentiality.

Research Method and Design

I used a qualitative research method for this study. The flexibility of qualitative research permitted me to gain, analyze, and develop a rich understanding of the topic. Qualitative researchers seek to make sense of phenomena while identifying themes and patterns (Birkinshaw et al., 2011). An outcome of qualitative inquiry is the expansion and advancement of scholarly knowledge of the research topic (O'Reilly & Parker, 2012; Suri, 2011). In this study, I used qualitative inquiry to gain a richer understanding of ERP systems implementation from stakeholders willing to share experiences through a semistructured interview process.

Neither quantitative nor mixed methods research designs were appropriate for this study. Quantitative research was not appropriate because my intent was to collect qualitative data and not quantitative, numerically oriented survey data (Andriopoulos & Slater, 2013), statistical procedures, or mathematical measurements (Maxwell, 2010). A mixed methodology, consisting of a combination of qualitative and quantitative data, was likewise not appropriate for this qualitative single case study (Venkatesh et al., 2013).

Method

In this qualitative study, I sought to gain a richer understanding of the critical factors associated with successfully implementing an ERP system at a community college

in the northeastern region of the United States. Managing and maintaining information is critical to the operations of organizations. Hirschheim, Saunders, and Straub (2012) indicated that there is a need for expanding qualitative research in the information systems discipline. Further research on the evolution of data management may reveal new research opportunities.

A qualitative case study approach provides me an opportunity to explore and understand the complexities of implementing an ERP system. A case study approach facilitates exploring in-depth the dynamics of phenomena and contextual conditions (Yin, 2013). I determined that a case study was an appropriate method for investigating the strategies used by managers in an ERP system implementation. Characteristics of qualitative case study research include scrutinizing literature and examining diverse perspectives to enhance the validity of the research (Yin, 2013). In this study, I used a qualitative approach to determine whether continuous improvements were an outcome of this ERP system implementation.

Quantitative researchers use statistical procedures or mathematical measurements, whereas qualitative researchers focus on gaining a richer understanding of a phenomenon (Baškarada, 2014). I sought to understand the dynamic strategies employed by management in an ERP system implementation within a complex single organization. Tsang (2014) has legitimized the case study method as a valid means of understanding phenomena. As ERP systems continue to evolve, so does the research on them. The evolution of ERP system implementations and qualitative research provides new insights for gathering and analyzing data.

Given the emerging nature of its data, qualitative research enables the researcher to be flexible yet remain methodical when collecting and analyzing data (Sinkovics & Alfoldi, 2012). I asked open-ended questions in a semistructured interview format to explore the experiences and perceptions of the participants. Rowley (2012) suggested developing a cohesive narrative to articulate each participants' interview. Converging data sources may suggest the alignment of comparable perspectives.

Researchers can stay abreast of ERP adoption research by constantly reviewing current peer-reviewed literature. The most current research data provided new solutions and future success opportunities for prospective ERP adopters. A sound basis for accurate and painstaking research allows others to continue exploring a phenomenon (Myers & Klein, 2011). Myers and Klein (2011) suggested using multiple theories as core concepts when conducting research in fields such as information systems.

Research Design

There are several qualitative research designs including case, ethnographic, historical, participatory, and phenomenological studies. I decided to use a case study approach to gain a rich understanding of an ERP system implementation from the managers' perspectives. Analysis of multiple perspectives provides the researcher an opportunity to understand micro-macro interactions (Aguinis et al., 2011). ERP systems consist of multiple components such as accounting, sales, production, and purchasing. During the analysis, I gained a better understanding of the ERP system integration points. My exploration of the participants' experiences substantiated and refuted information associated with extant critical success factors in ERP system implementations.

In this study, I focused on exploring strategies participants used for an ERP system implementation. Yin (2013) has suggested that the analysis of empirical data provides a richer understanding of a subject through a practical examination. A case study approach was appropriate for exploring the variables of ERP implementation and for gaining a better understanding of the topic. An analysis of managerial strategies provided an understanding of how an ERP system has helped an organization to evolve over time (Hirschheim et al., 2012).

Qualitative researchers collect, analyze, and categorize information throughout the data collection process until no new themes or data surfaces (Billany, 2013). Data saturation occurs when no new data or themes emerge (Guest et al., 2006; Marshall, Cardon, Poddar, & Fontenot, 2013). While there is no formula for calculating saturation, it is a key factor in achieving quality research work (Marshall et al., 2013). If data saturation is unsuccessful, the interview process continues until no new information emerges. After each interview, I created a transcript and sent a copy to the interviewee to validate my interpretations. It was determined that data saturation occurred when no new information emerged from the interviewee's assessment of the transcript.

Population and Sampling

This study consisted of a purposeful sample of experienced stakeholders involved with an organization's ERP system implementation. Using purposeful sampling, I deliberately selected six key, knowledgeable participants to participate in semistructured interviews (Merriam, 2014). While Guest et al. (2006) have suggested using a sample size of 12 as a means of achieving sufficient data for studies of this nature, large sample

sizes may encounter limitations of time, money, and resource accessibility (O'Reilly & Parker, 2012).

I selected participants that had a minimum of five years of experience in ERP systems implementation. Selecting a diverse group of experienced stakeholders, in various disciplines such as project management, business process, ERP system functional or technical knowledge, is the best source for collecting quality data (O'Reilly & Parker, 2012). Myers and Klein (2011) suggested possessing a broad understanding of the study topic before embarking on an in-depth analysis. Additionally, using multiple sources facilitates making sense of a phenomenon (Birkinshaw et al., 2011; Weick, 2012). O'Reilly and Parker (2012) asserted sample size is associated with acquiring adequate quality information and not with a definitive number of participants.

The participant's expertise includes implementing an enterprise resource planning solution. The initial contact with the participants occurred through email. Subsequent contact occurred through email, face-to-face meeting, or telephone conference calls. Participants possessed at least five years' experience in either one or a combination of the following positions: (a) ERP system's project management, (b) business analyst, (c) functional consultant, and (d) technical knowledge. Functional use required business process knowledge and interaction with ERP system users. Whereas, technical knowledge includes ERP system configuration, development, and hardware concerns.

Participants participated in a semistructured interview process with an open-ended discussion. The interview process consisted of face-to-face meetings in a comfortable setting and free from distractions. Participants find comfort in sharing his or her

experience in a natural setting (Bluhm, Harman, Lee, & Mitchell, 2011). The initial semistructured interview sessions with participants encompassed a maximum of 60 minutes. With the participant's consent, I used audio recording to keep track of every interview. I transcribed the recordings within 24 hours of the interview. The participant received a copy, asked to review the transcript, and return to me with any comments or questions. Each participant received a list of background questions that identified his or her professional experience. The background questions are at the top of the list of interview questions (Appendix A).

Ethical Research

Once Institutional Review Board approved the proposal, participants received a consent form (see Appendix B) indicating their willingness to participate as a volunteer. Guidelines for participating in this study included steps acknowledging participation is on a voluntary basis along with steps to withdraw from the process. The consent form contained information on the background of the study, procedures, withdrawal steps, researcher's contact information (telephone number, and email address), risks, and benefits. The participants read and acknowledged receipt of the form via email. Each individual acknowledged his or her participation was voluntary. All data are confidential in the study. Each participant received an assigned case number to ensure anonymity and privacy. Withdrawing from the study requires the participant to send an email message stating their desire to withdraw. There are no penalties associated with withdrawing from the study. There was no compensation or incentive offered for participation in this study. I followed the Institutional Review Board guidelines by storing and securing all forms

and documents associated with this proposed study for five years. I will personally shred all forms and documents, erase any recordings, and delete saved documents on my computer and flash drive at the end of year five.

Data Collection

In this study, I collected, organized, and analyzed data from semistructured interviews with experienced ERP system stakeholders. The stakeholders possessed at least five years of experience in ERP systems implementation with skills as a consultant, project manager, functional user, or technical expertise. I am the primary data collection instrument. I collected data through semistructured interviews using open-ended questions.

I conducted a field test to evaluate the interview questions. The field test consisted of four participants. Due to time constraints, one could not respond. Two of the participants recommended minor changes to strengthen the interview protocol. The interview questions included the changes. Two of the participants are IT managers. One is currently serving as an interim IT manager and is in the post-implementation stage of an ERP system implementation at a community college. The second IT manager is in manufacturing. The fourth participant has an education doctoral degree and is a college professor.

I used an audio recorder and a laptop computer to capture the participant's experience. An essential step in verifying the participant's experience is member checking (Marshall & Rossman, 2011). Harper and Cole (2012) asserted member checking is a quality control check for qualitative research. After the initial interview, I

presented a copy of the transcribed interview to the participant for review and verification of its accuracy. The participants had an opportunity to validate the essence of the interview. I requested the participants return comments within five business days. Feedback from the participants resulted in additional comments or corrections. This procedure adds the benefit of reliability and validity.

Instruments

Qualitative studies require tools for managing and analyzing data. According to Tufford and Newman (2012), I am the primary instrument in a qualitative study. In the interview process, I took notes using an audio recorder along with paper notes. Interviews facilitated gaining an in-depth understanding of phenomenon (Baškarada, 2014; Tsang, 2014). I used NVivo software to compile, manage, catalog, code, and query the information for specific words or phrases from the data collected during the interview process. NVivo (QSR International, 2015) is software used in the analysis of qualitative research data. Codes such as pre-implementation (Appendix C, PI), post-go-live activity (Appendix D, PGLA), and lessons learned (Appendix E, LL) are the initial categories chosen for this study. Subsequent categories may emerge during data analysis. Coding information collected during the interview process enables the development of a coherent narrative (Rowley, 2012). Also, I prioritized the raw data into themes as a major or emerging pattern of evidence.

The interview served as a means of presenting data from insights, perspectives, or questions for future research (Rowley, 2012). I used an audio recorder and hand written notes to enhance data collection. As the primary instrument, I employed all the

appropriate tools necessary to minimize presenting erroneous data. Applying member checking each participant in the study received a transcribed copy of his or her interview to check for accuracy. Feedback from the participant's review helped to strengthen the analysis of the research findings. Additionally, utilizing triangulation enhanced the reliability and validity of the research study (Bluhm et al., 2011). Triangulation means I collected data from multiple sources to strengthen the study and facilitate eliminating ambiguity.

Data Collection Technique

Through extensive analysis, a thorough examination of data collected from semistructured interviews facilitated identifying patterns or themes associated with a successful ERP system implementation. Collecting data from multiple participants provided background information and enabled a holistic understanding of a successful ERP system implementation.

Interviews. The objective of this qualitative case study was to explore the dynamics of a successful ERP system implementation in an organization using a semistructured interview approach. The interview served as a means of collecting information from experts of a phenomenon (Baškarada, 2014). I included participants with experience in ERP system project management, functional specialist, and technical specialist. Each participant received, read, and acknowledged receipt of a consent form after the IRB approved my doctoral study proposal. Noted on the consent form was a right to withdraw without penalty at any time. Included in the consent form is a request to record the participant responses. Recorded data helps to expedite the transcription process

(Rowley, 2012). Additionally, each participant received a transcribed copy of his or her interview to check for accuracy.

During a semistructured interview format, I asked open-ended questions (see Appendix A) to facilitate collecting data from consenting participants of different backgrounds such as business process owners, human resource management, technical, finance, student, and academic resources. Scheduled face-to-face interviews are the preferred data collection technique. One participant was available for a telephone interview and not a face-to-face meeting. The initial individual interviews did not exceed 60 minutes, but required subsequent input for clarification and additional information. When necessary, follow up questions clarified any ambiguity. Effective communication and listening skills are critical to evaluating and transcribing information gathered during this phase of the doctoral study (Yin, 2013). I complied with guidelines to keep all forms, documents, and recordings in a secured container at my residence for five years. At the end of five years, I will personally destroy all forms, documents, and recordings associated with this study.

The interview format consisted of open-ended questions using an audio recorder to capture the essence of the participants' experiences. A subsequent step involved addressing any questions, points of clarity, or new discoveries. Rechecking the groups and categories is an opportunity to rename any overlapping segments. Documenting and managing the summation of data analysis in NVivo was the final step in this process.

Data Organization Techniques

Managing and keeping track of research data required structure, cataloging, and labeling information in an accessible format. Coding supported structuring the data into rich descriptive accounts of the interviews (Bluhm et al., 2011). I used NVivo for coding and organizing the research data. NVivo features facilitated organizing data (QSR International, 2015). Using technology, I stored data on a flash drive. Maintaining a reflexive journal helped suspend bias and keep track of conflicting thoughts during the research process (Tufford & Newman, 2012). In compliance with the guidelines, I am keeping and storing all data electronically for five years in a secured fire-protected vessel.

Data Analysis Technique

Bluhm et al. (2011) recognized an interest to develop qualitative research with a focus on organizational research. Advancements in qualitative research are associated with the need to identify pragmatic solutions to problems (Billany, 2013; Bluhm et al., 2011). Birkinshaw et al. (2011) asserted a historical approach provides evidence of how events emerge over time. An interpretive analysis helps to identify emerging patterns or themes. An interpretive approach helps enhance the understanding of the phenomenon and provide a broad perspective (Birkinshaw et al., 2011; Myers & Klein, 2011). During the data analysis process, using interpretive software provided a means of identifying patterns or themes (Sinkovics & Alfoldi, 2012).

Bracketing aids in achieving a more in-depth interpretation of research data as well as facilitate minimizing preconceived notions (Tufford & Newman, 2012). My experience with ERP implementations presented an opportunity to inject personal

opinions. However, bracketing or epoche provided a means of exposing any biases, preconceived thoughts, or assumptions (Tufford & Newman, 2012). I journaled my thoughts throughout the research process in an attempt to detect and eliminate biases. Tufford and Newman (2012) suggested a reflexive journal might help a researcher hone the study and suspend any biases by recording their thoughts.

Using NVivo software in the research analysis phase facilitated classifying data into categories as well as help identify themes. Using an interpretive approach, I gathered, analyzed, and organized data during the analysis process (Bluhm et al., 2011). First, I transcribed and reviewed the raw data from the interview process. Next, I identified any emerging patterns or themes and created relevant sub categories (Sinkovics & Alfoldi, 2012). An analysis of what has changed versus what is still the same may provide evidence of causal relationships for the study (Bluhm et al., 2011). I used NVivo to facilitate coding and organizing information gathered during the semistructured interview process. I defined a directory of abbreviated codes and assigned the appropriate code to specific patterns or themes of data.

A hierarchical coding structure entailed identifying a category code and any subsequent second or third level category codes. The first letter of each word in a category, such as ERP for enterprise resource planning, served as an initial start for developing the first level of ERP theme codes. All data received an appropriate code of applicable (AP), pending (PE), or not applicable (NA). Employing open coding principles while classifying the data by themes, such as business process management, change management, finance, and student administration help initiate an extensive breakdown of

categories (Gallagher et al., 2012). Undecided classifications required analyzing the data multiple times. Using keyword searches assist with identifying sub categories.

Coding the data helped to keep the materials organized. Developing categories consisted of identifying the number of times a word or phrase appears (Maxwell, 2010). For example, the current literature consists of numerous articles on pre-implementation factors (Appendix C) with a variety of variables such as ERP selection, management support, organizational culture, and training. Coding and sorting are an iterative process of analyzing data to determine the proper category designation (Sinkovics & Alfoldi, 2012). The process took some time to complete. The features of NVivo enabled managing, sorting, coding, and searching to validate the patterns or themes of the collected data (QSR International, 2015). Using NVivo helped eliminate redundancy and helped identify any distinctive data.

Reliability and Validity

The use of reliability and validity in qualitative research is a means of assessing the quality and credibility of the research topic. Achieving reliability and validity in qualitative research require consistency in asking the right questions during the data collection process (Sinkovics & Alfoldi, 2012). Collecting data from multiple resources strengthened the research and facilitated eliminating ambiguity. Triangulation intensified reliability and validity.

Reliability

Dependable and reliable data are critical attributes that contribute to the rigor of qualitative research. Critical factors of qualitative research are data consistency and

trustworthiness (Sinkovics & Alfoldi, 2012**).** Embedding theory triangulation with systems thinking and the research trustworthiness increases research credibility (Andriopoulos & Slater, 2013). The multi-dimensions of qualitative research include rigor, thick description, and triangulation (Sinkovics & Alfoldi, 2012). Gathering and analyzing data from multiple perspectives enhanced credibility. The perspectives of ERP project stakeholders such as consultants, project managers, business process leaders, functional users, and technical users revealed divergent aspects of the project outcome. Analyzing multiple perspectives was essential to understanding the complexities of adopting an ERP system within an organization. Multiple perspectives enhance a holistic understanding of the phenomena (Yin, 2013).

A well-balanced content analysis based on a diverse base of multiple sources enhance reliability. Sinkovics and Alfoldi (2012) asserted qualitative research should be credible, transferable, dependable, and confirmable as opposed to reliable and valid. As the research progresses, themes or patterns emerge (Sinkovics & Alfoldi, 2012). Modifications to align data with the appropriate category or theme to create a coherent analysis facilitated continuity of thoughts during the information analysis.

Validity

The use of triangulation in qualitative research presents a foundation for validating research data (Denzin, 2012). Sinkovics and Alfoldi (2012) asserted validity in qualitative research is a matter of perception. Urban, Hargraves, and Trochim (2014) suggested considering viable validity at every phase of evaluation. Viable validity focuses on the relevancy of the study.

An essential component to identifying the efficacy of internal validity is in establishing a causal relationship (Urban et al., 2014). Researchers should use caution when attributing the outcome of research to observed changes, as there are some alternative factors to consider. Presenting data from multiple schools of thought demonstrated consistency or discord. Think of internal validity as not generalizable. Furthermore, external validity consists of variables that apply to a particular instance at a particular time and place. Using the same variables in another place and time may not yield the same result.

The credibility and reputation of data sources may confirm internal and external validity. Reviewing data from multiple resources across the enterprise from different disciplines are characteristic of ensuring the validity of qualitative research (Yin, 2013). Converging data from divergent resources provided a snapshot of relationships and patterns that shape the success or failure of ERP adoption. The extant research found in peer-reviewed literature from multiple industries helped to substantiate external and internal validity. The internal validity of the study included exploring the numerous variables that contributed to the success of implementing an ERP system and influence the SCM.

The objective of this study was to gain an understanding of the managerial strategies used in ERP system implementation. To ensure consistency, I acquired credible information by asking participants the same questions. I addressed dependability and accuracy of the interview findings through member checking. Harper and Cole (2012) asserted member checking serves as a quality control marker in verifying participants'

experience. The researcher uses member checking as a procedure to validate the content of the transcribed interview by engaging the participant to review and provide feedback. According to Billany (2013), member checking reduces ambiguity. Through a thorough description of data collection from semistructured interviews, I described the participants' experiences associated with a phenomenon (Baškarada, 2014), such as a successful ERP system implementation. The responses to the interview questions facilitated revealing and understanding the experience of each participant's point of view (Rowley, 2012; Tsang, 2014).

I addressed transferability by analyzing if the same success factors of this study are transferable to future ERP system implementations. Each participant received a transcribed copy of his or her interview to confirm the accuracy of the interpreted account (Harper & Cole, 2012). The quality of information is as important as the quantity of information. The results of this study could enlighten potential candidates of ERP system implementations or become the foundation for further research.

Assessing validity in qualitative research includes confirmability and data saturation. According to Sinkovics and Alfoldi (2012**),** confirmability strategies include creating an audit process and using data analysis software such as NVivo to facilitate checking and rechecking the information. Confirmability refers to other research participants confirming or corroborating the accuracy of data. To ensure consistency, I gathered credible information by asking each participant the same questions. According to Billany (2013), member checking reduces ambiguity. Also, uncovering inconsistencies

provide an opportunity to strengthen the study (Bluhm et al., 2011). I used NVivo for coding and organizing data.

I ensured saturation by first adhering to the doctoral procedures. Using Suri's (2011) purposeful sampling approach, the sample participants consisted of stakeholders with experience in ERP systems implementation. Marshall et al. (2013) identified six sources for case study research. The point at which saturation occurs means no new themes or data emerges (Guest et al., 2006; O'Reilly & Parker, 2012; Suri, 2011). Conducting additional interviews may be necessary if saturation occurs or new themes emerge (Marshall et al., 2013). Adopting a contingency step in the interview process requires an iterative process if data saturation does not transpire or new information arises. Subsequently, additional contact time with existing participants or additional participants may be appropriate.

Transition and Summary

The key points discussed in Section 2 were a restatement of the purpose of the study as stated in Section 1. Topics in this section focused on the role of the researcher; participants; research method and design; population and sampling; ethical research; and data collection. Subsections of Section 2 included the instrument, data collection technique, data organization techniques; and data analysis with emphasis on reliability and validity. Topics such as ethical research outlined the consent process for participant engagement in this study.

Section 3 is the final chapter of the study. This section will include a restatement of the purpose statement, presentation of the findings, application of professional

practice, implications for social change, recommendation for action, recommendations for further research, reflections, and conclusion. Additionally, the final pages include references and appendices.

Section 3: Application to Professional Practice and Implications for Change

Introduction

In Section 3, I present the findings of this research study. I collected interview data from five full-time managerial participants, one retired participant, and archival documents. This section includes (a) an introduction with a restatement of the purpose statement, (b) the presentation of findings, (c) a discussion of this study's application to professional practice, (d) a discussion of its implications for social change, (e) recommendations for action, (f) recommendations for further research, (g) reflections, and (h) a conclusion.

The purpose of this qualitative single case study was to explore the strategies managers in a higher education institution used to ensure a successful ERP system implementation. I collected data from semistructured interviews with six managerial participants and documentation. I derived the findings from the managers' responses regarding the strategies they used to implement an ERP system to improve the operations of the institution and student experiences. The four major themes that emerged from the data collection were (a) pre-implementation strategy activities, (b) implementation strategies, (c) post-implementation strategy activities, and (d) continuous improvement. Some common attributes throughout the major themes were (a) management support, (b) consultant competency, (c) team building, (d) resource dedication, (e) communication, (f) training, (g) infrastructure, and (h) lessons learned.

Presentation of the Findings

The purpose of this qualitative case study was to explore the strategies managers used to implement an ERP system and to answer the overarching research question, "What strategies do experienced higher education institution managers use to implement an ERP system successfully?" I conducted semistructured interviews with managers in a higher education institution to ascertain the strategies they employed during the implementation of an ERP system. The participants' responses to six interview questions provided evidence of strategies critical to the success ERP system implementation. During data analysis, I identified the following four main themes: (a) pre-implementation strategy activities, (b) implementation strategies, (c) post-implementation strategies, and (d) continuous improvement strategies. These themes coincide with the ERP system implementation process of phasing.

Strategies associated with the pre-implementation phase of an ERP system project entail investigating which system is the appropriate fit for the requirements of the institution. During the process of identifying the appropriate system, an institution may establish stakeholder buy-in and expectations, and management's involvement. The implementation phase involves (a) commitment, (b) communication, and (c) change management strategies. Engaging all stakeholders to commit and communicate throughout the implementation phase is critical to the success of the project. Through the success of the implementation phase, the emergence of post-implementation strategies evolve. During post-implementation, the success transition presents new challenges and opportunities. Incremental changes in the implementation may require continuous design

support. Throughout the four main themes, three standard components resonated. The three components of (a) commitment, (b) communication, and (c) change management are critical elements of each strategy.

Theme 1: Pre-implementation Strategy Activities

In each stage of an ERP system implementation, managers may face challenges that require a strategic plan of action (Qian, Schmidt, & Scott, 2015). During the pre-implementation phase of the ERP system project, managers develop multiple strategies (Zeng & Skibniewski, 2013). The findings of this study confirm that the structure of an ERP system implementation requires a definition that includes (a) project mission, (b) scope, (c) goals and objectives, (d) benchmarks, (e) communication method, and (f) management support. Selecting the appropriate system that will satisfy the current and future needs of an institution is a significant factor (Zouine & Fenies, 2014). Three recurring themes of this phase of the project were (a) buy-in, (b) expectation, and (c) management involvement, as shown in Table 1.

Table 1

Pre-implementation Strategies

Themes	*n*	% of frequency of occurrence
Buy-in	5	35.71%
Expectation	3	21.43%
Management involvement	6	42.86%

Note: n=frequency.

Buy-in. All stakeholders of the institution received an invitation to presentations and demonstrations from three viable software providers. After the presentations, each

one completed a survey rating likes and dislikes of the respective ERP system demonstrations. The participants of this study attended the ERP software providers' presentations. In the interviews, 50% of the participants asserted that it was important to receive feedback and buy-in for the anticipated ERP system.

Expectation. After selecting a system, the next step involves acquiring an implementation partner. Such a partner may provide consultants without any input from the implementing institution. The expectation is that the consultant is knowledgeable about the ERP system and possess an understanding of the institution's business processes (Noaman & Ahmed, 2015). The participants in this study found consultant assignments chaotic and lacking in consistency. For example, Participant 2 shared "the consultant competencies were questionable and sometimes conflicting." Participant 1 noted a desire to participate in the selection of consultants because some had limited knowledge and experience.

Management involvement. Higher education institutions are evolving and constantly developing services to responde to changes in a changing global economy. The selection and composition of a competent and knowledgeable team are a strategic imperative in the evolution of an ERP system implementation project (Zouine & Fenies, 2014). At my study site, an executive committee established the project team and assigned individuals to specific business functions. The project manager maintained and coordinated consultant schedules throughout the implementation. Team assignments were based on business functions linked to the various ERP system modules such as admissions, finance, human resources, and recruitment. During the implementation

process, team members faced internal and external challenges. As Participant 6 noted, "External challenges involved working with knowledgeable ERP consultants that fit the role."

The process of implementing an ERP system requires implementing the appropriate system coalesced with external competent consultants and internal knowledgeable project team members. The project team worked together sharing knowledge in order to develop a usable ERP system. An ERP system implementation process adheres to the tenets of system theory. The findings of this study show that engaging in an ERP system project integrates people and processes. Transitioning from the pre-implementation theme to the implementation theme involved collaborative strategies with internal and external stakeholders. The approach management used in establishing, engaging, and communicating with the project team continued throughout the implementation phase of the project.

Theme 2: Implementation Strategies

After the selection of the appropriate ERP system, the next steps involve implementation strategizing. Participants in this study agreed that having a dedicated project manager and team significantly contributed to the success of the project. Implementation execution requires technical and managerial skills (De Toni, Fornasier, & Nonino, 2015). Whittington (2014) indicated that strategic thinking is an essential attribute for the chief information officer. However, managing the implementation phase requires a manager with technical and managerial skills (De Toni et al., 2015). The quality of the implementation phase influences the success of the post-implementation

phase (De Toni et al., 2015). Three subthemes emerged from the data I collected about implementation strategies: (a) commitment, (b) communication, and (c) change management (see Table 2). Shaul and Tauber (2013) asserted that the three subthemes are in the top list of critical success factors. Every participant recognized the importance of incorporating the subthemes throughout the project.

Table 2

Implementation Strategies

Subtheme	*n*	% of frequency of occurrence
Commitment	6	16.33%
Communication	29	48.33%
Change management	37	45.60%

Note: n=frequency.

Commitment. Implementing an ERP system is costly, risky, and requires institution-wide commitment. Top management commitment is a critical factor in the success of an ERP system implementation (Gallagher et al., 2012). The goal of achieving success relies on committing, articulating, and sharing the vision with all stakeholders (Qian et al., 2015). All participants in my study embraced the commitment to the project while motivated to achieve success. Creating a dedicated space for the project is a testament to management's commitment. By isolating the ERP project team, the project team was able to focus on designing and aligning the new system to meet the needs of the institution. However, the participants felt the consultants' commitment was sporadic and

inconsistent. Implementing an ERP system requires competent and dedicated resources (Plaza, 2016).

The ERP system project team consisted of a combination of individuals employed by the institution and external consultants. The institution members possessed functional and technical expertise. The external members were consultants from the software provider. Team members faced several challenges during the project life cycle. The institution teams' dedication stretched beyond time in the project training room. Due to the staff size of the institution, performing day-to-day responsibilities meant working extended hours. The daily operations of the institution continued with the staff left in the offices. Projects suffer from high turnover, stress, and workload (Noaman & Ahmed, 2015). As Participant 5 noted, project team members experienced ERP exhaustion. Aware of the challenges and demands of the project, managers acknowledged and rewarded members for their commitment.

External challenges with the software provider involved consultant assignments. The consistency and competency of the consultants were disappointing to participants. According to Participant 1, the consultant selection process should include members of the institution's project team. The effective alignment of team members is a critical factor in the success of an ERP implementation (De Toni et al., 2015). Insufficient commitment hinders the implementation phase (Noaman & Ahmed, 2015). The findings in this study confirm that an ERP system project advances because of strong commitment and effective communication.

Communication. An effective communication strategy includes multiple ways of keeping the project team and the rest of the institution informed of developments related to the ERP implementation project. The participants received continuous communication via various mediums throughout the project lifecycle. Communication was not an issue. At the teams' disposal were iPhones, iPads, email, conference calls, and online presentation abilities. Additionally, project status updates occurred in the institution's professional development and workshop sessions. Effective communication is a common and critical thread in an ERP system implementation.

The lack of communication can impede the progress (Livermore & Rippa, 2010), and strong communication is a critical factor in the implementation process (Qian et al., 2015). Managers with an open dialog approach exemplify trust and a commitment to the process. Evolving relationships during the implementation phase required varied lines of communication that require listening as well as open dialog. Respecting stakeholder voices is characteristic of an open communication strategy (Williams et al., 2013). Participants reported that communication was a key factor throughout the entire ERP system implementation.

Change management. The complexity of implementing an ERP system forced managers to address change management. Embedded within an ERP system are best business practices that may not match an institution's legacy practices (Noaman & Ahmed, 2015). ERP systems are not a one-size fit all business solution (Al-Haddad & Kotnour, 2015). Participants of the study realized the transition from multiple manual transactions to automated processes required addressing change. Altering business

processes required an analysis of existing procedures to determine if an ERP system will satisfy the current and future needs of the institution.

The analytical strategies require a holistic understanding of legacy procedures and the new system (De Toni et al., 2015). Managerial deficiencies in the business and implementation processes require knowledgeable external support (De Toni et al., 2015). Participant 3 indicated the design of the new system was more involved than initially thought. The expectation was to implement the ERP system within 20-24 months. However, the project took three years.

During the implementation process, the project team's knowledge evolved in system design. System development included (a) designing, (b) aligning processes, (c) migrating data from the legacy system, (d) testing, (e) training, and (f) building the infrastructure. With the assistance of the ERP system consultants, the participants began the transition of understanding some of the embedded ERP system best practices. Knowledge sharing created an opportunity to improve collaboration.

The change management process included adapting to the system delivered best practices or customizing the system to satisfy the institution requirements. Participants realized the system best practices did not match some of the existing practices. For example, participant 3 stated the software provider asserted no changes to practices or processes would occur. However, participant 1 stated minimal customization happened as the practices adopted fit the institution needs. Parthasarathy and Sharma (2014) concurred with Schniederjans and Yadav (2013) that minimal customization is appropriate as issues may arise when upgrading the system. Participants realized customization required time,

resources, and money. Surmising the cost of the system as never-ending, participant 4 expressed a sense of displeasure. Noaman & Ahmed (2015) emphasized that upgrades are the next major task after the implementation.

Theme 3: Post-Implementation Strategies

The success of implementing an ERP system advances the project to a post-implementation phase. While the implementation occurred, this is the beginning of the success evolution. The implementation was successful, but participant 2 indicated the system itself had some problems. Developing strategies to sustain and maintain the system is vital to ongoing success. Emerging themes in this phase of the project are (a) success, (b) transition, and (c) continuous improvement as shown in Table 3. Additionally, closing the gap between expectation and reality begins at this point in the project. The formation of a new team addressed evolving gaps. The participants agreed that continuing to improve the success of the system required the use of effective (a) communication, (b) commitment, and (c) change management from the implementation strategies.

Table 3

Post-implementation Strategies

Theme	*n*	% of frequency of occurrence
Success	7	36.84%
Transition	3	15.78%
Continuous improvement	9	47.36%

Note: n=frequency

Success. The definition of success may vary depending on the individual making the determination (Lech, 2013). The iron triangle is one method of determining success (McLeod, Doolin, & MacDonell, 2012). Measuring project success in terms of time, within budget, and quality are the three factors of the iron triangle (Stanciu & Tinca, 2013). Continuity of strategic principles improves the outcome as well as facilitates attaining the project goal (Yeh & Xu, 2013). Additionally, Zouine and Fenies (2014) agrees with Shaul and Tauber (2013) that top management support is critical throughout the ERP life cycle.

Transition. The post-implementation phase often referred to as the onward and upward phase is the opportune time to assess the benefits of the system (Lotfy & Halawi, 2015). User acceptance and satisfaction is another gauge of assessing the success of the project (Schniederjans & Yadav, 2013). During the post-implementation stage, institutions transition into a state of (a) support, (b) stabilization, and (c) refinement of the system. In conjunction with transitioning to the system, participants 1, 3, and 5 stated a user integrity team continue to support and learn the cross-functional processes associated with the system and end users.

Continuous improvement. Factors of determining ERP system success contribute to unifying the institution. The findings indicated the benefits and challenges of the ERP system implementation. The success of the system relies on continuous improvement strategies. The level of success will increase if the commitment, communication, and change management elements continue to be the focus. The commitment by management is a significant component of the process. As the institution

continues to advance the success of the system, participants 1, 3, and 5 acknowledged the significance of the integrity team.

Theme 4: Continuous Improvement Strategies

Continuous improvements may coincide with the post-implementation phase or emerge as an institution declares the ERP system implementation success. Determining the success of implementing an ERP system depends on multiple criteria. Researchers determined one method of measuring success is by using the iron triangle principles (Cserháti & Szabó, 2014; McLeod et al., 2012; Stanciu & Tinca, 2013). In contrast, Zouine and Fenies (2014) associated (a) individual, (b) work group, and (c) organizational performance levels as criteria for measuring success. The attributes of on time, within budget, and use of a quality system were not exactly realistic for the participants of this study. Participant 2 stated that even with the implementation of the system, problems existed.

The realization of using the ERP system began the process for continuous improvements. According to participant 5, system utilization range was 90% to 95%. Participant 1 professed that developing and empowering process owner to make decisions helped with enhancing business processes that required changing. The continuous strategies engaged at this point includes the establishment of (a) performance metrics, (b) support, and (c) upgrades as shown in Table 4. All participants remain committed to the process of continuous improvements.

Table 4

Continuous Improvement Strategies

Themes	*n*	% of frequency of occurrence
Performance	6	100%
Support	6	100%
Upgrades	4	66.66%

Note: n=frequency

Performance. Enhancing the system to perform at its maximum requires instituting internal controls. Those controls include maintaining quality data (Noaman & Ahmed, 2015; Qian et al., 2015). Additionally, data integrity requirements include creation, maintenance, storage, and accessing. The development of a data strategy is an acute factor in implementing an ERP system that requires many components. Managing data consist of many elements, which includes ownership as well as the equipment that a stakeholder will access the data. The dialog with participants in the interview process revealed the emergence of working together was necessary throughout the project process.

The findings of this study indicated the integration of the system forced the engagement of collaboration both internally and externally. Participant 3 cited an issue that occurred a week before system go-live. During a test scenario, we realized the dependencies of the system. For the first time, an integration test demonstrated how the registration process affects the bursar process. Qian et al. (2015) suggested reengineering business processes requires strong collaboration. Participant 3 indicated process

designing and training occurred in a silo, as cross training was not a part of the initial training strategy. Poor quality of consultant competency can create a gap in the implementation process (Noaman & Ahmed, 2015). Also, external collaboration occurred due to the minimal technical training. Participant 6 asserted acquiring technical insights occurred through collaboration with colleagues in another institution that implemented the same ERP system.

Support. Ongoing training and support expand stakeholder knowledge and use of the system. Training is a significant factor in implementing an ERP system (Hepner & Dickson, 2013). The absence of adequate training could expose an institution to failure (Zouine & Fenies, 2014). Training affects stakeholder job performance (Sykes et al., 2014). Participant 1 stated effective training required developing documentation manuals that included transaction screen shots for end users. Utilizing sessions for professional development, orientation, and other workshops keeps training active. The integrity team continues to address cross training.

Training supports the continuous development of the system. The findings exposed that assigning a technical support person to each team provided a preview of the system functionality. For the purpose of developing and supporting reports in the system, this was an appropriate assignment. However, participants 2 and 3 indicated the vendor did not deliver programing training for supporting the system. The technical staff was part of each team, but not involved with the design of the system. However, technical support from the IT department consisted of setting up the network infrastructure.

Shortcomings in training occurred because the software provider performed all customizing and coding of the system as indicated by participant 2.

Upgrades. Within the institution's project team, the technical staff set up test and production servers. A technical strategy should include a disaster recovery component (Qian et al., 2015). According to the participants, external support for the technical team found through building relationships with other colleagues is helpful. Future endeavors of the institution involve joining a state consortium to develop a best of breed standard business model for institutions to adopt. Expressing concerns about improving efficiency, participant 3 expressed the desire to develop a more streamlined version of an ERP system statewide for consistency. Simplifying the system could reduce implementation expense and support common definitions for reporting purposes. Also, students transferring across the state would not have to experience the disparities that currently exist statewide.

Tie Findings to Conceptual Framework

The conceptual framework for this study was systems theory. The term used by von Bertalanffy (1972) was wholeness when referring to a system. Drack and Schwarz (2010) defined a system as having complex interactive components. Cabrera, Cabrera, and Powers (2015) asserted a system consist of parts and wholes. Midgley (2011) acknowledged using a foundational theory with complementary theories provide a different way to make sense of a phenomenon. Cabrera et al. (2015) added a germane dimension to systems thinking that consist of four universal rules called (a) distinctions, (b) systems, (c) relationships and (d) perspectives (DSRP). Cabrera et al. (2015) refer to

distinctions as things and ideas; systems as parts and wholes; relationships as actions and reactions; and perspectives as a point and view. The evolution of systems theory to systems thinking embodies the findings of this study. Moving from a series of fragmented systems and processes to an automated system requires different thinking (Whittington, 2014). An ERP system converges divergent processes onto a single software application (Nazemi et al., 2012).

The findings of this study established the strategies used by managers facilitated the transition of legacy business processes and systems to an automated unified system. The integration of business processes, people, and systems are key tenets of systems theory. Managers worked together with assistance from the software provider to design, test, train, and evaluate the effectiveness of the ERP system. The conceptual framework connected throughout the project to the four themes. The pre-implementation strategies set the foundation for the implementation, post-implementation, and the continuous improvement phases. Each phase served as building blocks for the next one.

Tie Findings to Existing Literature on Effective Business Practice

The findings of this study coincide with the research on best business practices for implementing an ERP system. The managerial practices employed in this ERP system implementation include investigating potential systems, collaborating with other institutions that use ERP systems, and gaining buy-in from all stakeholders. The institution extended an invitation for all stakeholders to attend the three selected software vendor presentations followed by a paper survey. Feedback from the survey assisted with the final ERP software provider selection.

After selecting the ERP software provider, the executive management team began their pre-implementation strategy (Qian et al., 2015). As expressed in the conceptual framework of systems theory, converging parts and wholes facilitate forming a unified system (Cabrera et al., 2015). Making sense of a phenomenon required a foundational theory as well as complementary theories (Midgley, 2011). In conjunction with theoretical pluralism, managers using multiple strategies enhanced ERP project success (Yeh & Xu, 2013).

Adapting the three common subthemes throughout this study of (a) commitment, (b) communication, and (c) change management applied to every phase of the ERP project. Researchers identified (a) commitment, (b) communication, and (c) change management as critical factors in the pursuit of ERP system success (Frimpon, 2012; Grabski et al., 2011; Noaman & Ahmed, 2015; Shaul & Tauber, 2013; Sudhakar, 2012). Committed managers with effective communication skills set the stage for transitioning an institution from legacy systems to innovative solutions for the future. Effective business practices for implementing an ERP system involved adapting diverse strategies and theories to optimize ERP system implementation success.

Applications to Professional Practice

During the data analysis process, four themes emerged. I interviewed six managers involved in the entire ERP system project that remain. The participants have longevity with the institution. The managers are competent in the operations of higher education, but enhanced and gained new skills in ERP system dynamics. After the ERP system implementation, a shift in employee status changed the landscape. Employee

retention became a concern. Some project team members left for various reasons or retired, and a few moved into managerial positions. An outcome of the implementation morphed into succession planning. Those remaining realize the benefits of the implementation and that success is an ongoing process. The findings of this study could facilitate managers in the ERP system selection process, implementation, and continuous support strategies.

The data collected from the six managers in higher education indicated the ERP system implementation consisted of multiple strategies. During the interview process, each manager identified the importance of working together as a critical factor throughout the project. The findings of the study were significant to professional business practices for several reasons. First, management sought buy-in and feedback from all stakeholders throughout the selection process. Acquiring the right system required buy-in from all stakeholders. Extending an invitation to all institution stakeholders to presentations and demonstrations by three software providers facilitated diverse feedback.

Additional factors comprised of forming internal teams based on specific functions complemented with consultants from the selected software vendor. Assigning a project manager expedited the progress of the project because this individual maintained and coordinated activities. Assembling a team of competent stakeholders with the functional and technical expertise of legacy systems and processes helped with educating the ERP provider's team. Collaboration between the project stakeholders is critical when designing new business processes and practices (Whittington, 2014). Communication is

another key factor in selecting the (a) right system, (b) competent stakeholders, and (c) the system design. The findings in this study could assist managers with developing critical strategies for pre-implementation, implementation, post-implementation, through continuous improvement.

The findings of this study are relevant because the managers of this institution recognized the significance of strategic planning. The strategies used in this ERP project serves as a framework for identifying requirements for each phase and the associated dependencies. The institution engaged everyone in the ERP system selection process. Addressing components such as resource management, dedicated space devoted to training, balancing daily workload, and consultant management contributed to the success of the project. The interview participants asserted the best strategies used include employing diverse teams with dedicated persons confined to a classroom setting. Engaging, executing, and supporting stakeholders working together throughout the process supports the tenets of system theory. The team commitments to the project created a shift in thinking. Focusing on automating, integrating, and improving operations the institution began unifying business processes.

Data collected from the participants indicated that higher education institutions challenges of improving academic experiences for students require meaningful and timely data. The development of an institutional strategic plan identified the goals and objectives of acquiring and implementing an ERP system to facilitate this mission. Designing and developing an infrastructure for an ERP system required focusing on current and future needs of the institution. The legacy systems and processes were no

longer sustainable. The cost of doing business, making sound decisions, and sustainability challenges require new practices of operations. Operating business with a silo mentality required change. Moving from fragmented systems and processes to an automated system requires a different thought process (Whittington, 2014). Qian et al. (2015) support the assertion of Cao et al. (2013) that ERP systems enhance the decision-making process and improve business practices. The findings of this study are relevant to improving professional business practice as it confirms strategic planning is a significant factor in implementing an ERP system.

The findings of this study indicate managers realize the significance of continuous growth. Managers pursued acquiring knowledge in processes outside of their immediate routines to improve understanding the new system. A training strategy included continuous training as this helps maximize managers' competency. The findings are relevant to improved business practice because managers understand the significance of implementing an ERP system. An outcome of an ERP system implementation included people, processes, and technology changes (Noaman & Ahmed, 2015). Eliminating silo thinking brought about collaborative approaches to improve working together. Throughout the project, reengineered business processes created new relationships, challenges, and opportunities. The goals of the implementation were to (a) improve services to internal and external stakeholders, (b) enhance the decision-making process, (c) meet federal and state requirements, (d) improve business processes, and (e) access accurate and reliable data. Also, migrating to a system that supports current and future requirements was essential.

Implications for Social Change

Higher education institutions are a social community that focuses on improving the quality of life, enhancing the workforce, and assisting students in achieving their academic goal of graduation. Access to the right data provide managers of higher education institutions to help students design a plan to succeed. ERP systems are a tool in the process of transforming an institution that facilitates disseminating and sharing knowledge (Bubel, Turek, & Cichon, 2015). The integration of data forms new relationships with those accessing information in the decision-making process concerning student success. ERP systems require a large investment in human resources (Plaza, 2016). The participants agreed that an ERP system is more than a technology system. It is no longer about executing transactions but requires a collaborative process orientation. Several social changes resulted from the ERP system implementation in this study.

In the operation of the institution, relationships changed between faculty, staff, and students. Business processes improved. Participant 1 acknowledged learning to work together was critical to a successful implementation. Participant 4 indicated the ERP system gives us the opportunity to have a different type of dialog with students because of the immediate access to current information. Improvements occurred in business processes, people, and the organization. The findings of this study affect social change because managers realized the dependencies embedded in the best practices of the system. Not only did the interactions between managers change, but so did the relationship with IT staff. Managers engaged in the design of the system began to understand the integration points of each other's modules. For example, student records

have a dependency on finance because students must pay tuition and other fees. In the legacy process, the connection between student records and finance did not exist.

When managers understand the strategies required to implement an ERP system, knowledge transfers freely, empowered stakeholders make timely decisions, and relationships improve. The interactions between stakeholders take on a more integrated attitude. A new social network emerges because of an ERP system implementation as well as the organization's structure (Sykes et al., 2014). However, organizations realize the importance of social networking by developing intra-organizational networks (Kügler, Dittes, Smolnik, & Richter, 2015). The social influence of an ERP system changed the institution's communication strategy.

Recommendations for Action

The purpose of this qualitative case study was to explore the strategies employed by managers in a successful ERP system implementation in a higher education institution. Higher education institutions have some unique qualities in comparison to the other industries. Uniqueness applies to administrative and educational requirements (Qian et al., 2015). Managers of IT, projects, ERP team leads, and departmental managers should consider the results of this study as an opportunity to establish, customize, and incorporate strategies as appropriate throughout an ERP system plan. I will provide a one to two page summary of my findings to my contact at the data collection institution as well as the participants. I will pursue publishing my study in the ProQuest database and other scholarly journals. As an independent consultant and adjunct instructor, I look forward to sharing my study in a classroom setting or professional development session.

Recommendations for Further Research

In this qualitative exploratory case study, I identified strategies used by managers in a higher education institution implementing an ERP system. To enhance my understanding of the dynamics of an ERP system implementation, I selected the case study method. The case study approach is appropriate as it facilitated exploring an in-depth examination of the dynamics of phenomena as well as contextual conditions (Yin, 2013). Data collection occurred at a single higher education institution through semistructured interviews. The participants held managerial positions in different disciplines of the institutional processes associated with admissions, IT, academic success, and recruitment.

Future research recommendations involve (a) exploring shifts in IT data management, (b) extending the post-implementation phase for continuous success, (c) outcomes such as succession planning, and (d) consultancy selection strategies. The importance of collaboration and contingency planning are other significant areas that improve ERP system success. Managers involved with ERP system implementations should have a holistic understanding of ERP projects that is more than technology. The technological changes require engaging personnel ongoing. Additionally, researchers can address developing (a) IT soft skills, (b) succession planning, and (c) retention strategies.

The limitations of this study focused on the strategies used by managers in one higher education institution. Recommendations for further research include involving other stakeholder perspectives, such as non-managerial individuals. Also, I recommend

extending the study to multiple higher education institutions. Other researchers may consider a quantitative or mixed methods study.

Reflections

While going through this doctoral process, I encountered many challenges, made adjustments, and persevered to complete the journey. I gained a new perspective and respect for anyone achieving and pursuing a terminal degree. My topic for research from the start of this pursuit was ERP system project with a focus on the pharmaceutical industry. I was not able to acquire the participants from the pharmaceutical industry, so I changed my focus to ERP system implementation in higher education. Having experience with ERP system implementation in manufacturing facilitated my understanding the dynamics of the process, but not all the strategic managerial intricacies. I acknowledged my biases and minimized them throughout the interview process. I gained a deeper understanding of strategic management requirements in a higher education institution's ERP system implementation. During the data collection process, I learned higher education institutions experience some of the same issues as other industries as well as some unique characteristics.

The possible effects on the participants are the realization of how resilient they are. During the ERP system implementation, the chaos encountered brought about new relationships as well as help to diminished silo thinking. The participants realized personal growth from the ERP system project. A single comment that resonates from one of the interviews is I would do it again in spite of all the chaos. Despite the issues and chaos, the participants are motivated and committed to continuous process improvements.

Conclusion

The purpose of this qualitative single case study was to explore the strategies managers in a higher education institution used to ensure a successful ERP system implementation. Managers employed multiple strategies during an ERP system project as the system reframed the institution. The ERP system implementation was more than a technology initiative. Outcomes of the ERP system implementation exposed participants to reframe their thinking when interacting with colleagues in executing business processes. A shift in management styles occurred. This shift created a new community of learners, strategic thinkers, continuous processing, and lifelong learners.

The unique disciplines in higher education institutions require industry-specific ERP system solutions, which is different from manufacturing industry ERP solutions. It is difficult to associate specific strategies to a particular industry, as the starting variables are not exact (Dey et al., 2013). Managerial understanding of core business processes facilitate and minimize chaos during the process (Butler & McGovern, 2012). Customizing an implementation model that is composed of the appropriate managerial strategies could maximize the ERP system implementation success (Yeh & Xu, 2013). The success of an ERP system project begins during the post-implementation stage.

The findings leave me with the conclusion that the three most common threads of this study are (a) commitment, (b) communication, and (c) change management. Developing managerial strategies for these three components and integrating them throughout the ERP system project should facilitate optimizing the rate of success. Noaman and Ahmed (2015) asserted that ERP projects are people oriented and not

technology. The participants of this study emphasized the use of teams dedicated to the project was the most appropriate strategy used in the process. If knowledgeable committed managers clearly communicate the vision and objective of an ERP project, stakeholders may embrace the change and not be resistant.

References

Aguinis, H., Boyd, B. K., Pierce, C. A., & Short, J. C. (2011). Walking new avenues in management research methods and theories: Bridging micro and macro domains. *Journal of Management*, *37*, 395-403. doi:10.1177/0149206310382456

Al-Haddad, S., & Kotnour, T. (2015). Integrating the organizational change literature: A model for successful change. *Journal of Organizational Change Management*, *28*, 234-262. doi:10.1108/JOCM-11-2013-0215

Aloini, D., Dulmin, R., & Mininno, V. (2012). Risk assessment in ERP projects. *Information Systems*, *37*, 183-199. doi:10.1016/j.is.2011.10.001

Andriopoulos, C., & Slater, S. (2013). Exploring the landscape of qualitative research in international marketing: Two decades of IMR. *International Marketing Review*, *30*, 384-412. doi:10.1108/IMR-03-2012-0061

Ara, A., & Al-Mudimigh, A. S. (2011). The role and impact of project management in ERP project implementation life cycle. *Global Journal of Computer Science and Technology*, *11*(5), 7-10. Retrieved from http://computerresearch.org/

Arvidsson, V., Holmström, J., & Lyytinen, K. (2014). Information systems use as strategy practice: A multi-dimensional view of strategic information system implementation and use. *Journal of Strategic Information Systems*, *23*, 45-61. doi:10.1016/j.jsis.2014.01.004

Baškarada, S. (2014). Qualitative case study guidelines. *Qualitative Report 2014*, *19*, 1-18. Retrieved from http://www.nova.edu/

Basole, R. C., Seuss, C. D., & Rouse, W. B. (2012). IT innovation adoption by enterprises: Knowledge discovery through text analytics. *Decision Support Systems, 54,* 1044-1054. doi:10.1016/j.dss.2012.10.029

Bednar, P. M., & Welch, C. (2012). Critical systemic thinking as a foundation for information systems research practice. *Journal of Information, Communication and Ethics in Society, 10,* 144-155. doi:10.1108/14779961211261058

Billany, R. (2013). Chiasmatic interpretative communities: An innovative methodology. *Qualitative Research Journal, 13,* 196-213. doi:10.1108/QRJ-04-2013-0025

Birkinshaw, J., Brannen, M. Y., & Tung, R. L. (2011). From a distance and generalizable to up close and grounded: Reclaiming a place for qualitative methods in international business research. *Journal of International Business Studies, 42,* 573-581. doi:10.1057/jibs .2011.19

Blocker, C. P. (2012). The dynamics of satisfaction and loyalty after relational transgressions. *Journal of Services Marketing, 26,* 94-101. doi:10.1108/08876041211215257

Bluhm, D. J., Harman, W., Lee, T. W., & Mitchell, T. R. (2011). Qualitative research in management: A decade of progress. *Journal of Management Studies, 48,* 1866-1891. doi:10.1111/j.1467-6486.2010.00972.x

Boonstra, A. (2013). How do top managers support strategic information system projects and why do they sometimes withhold this support? *International Journal of Project Management, 31*(4), 498-512. doi:10.1016/j.ijproman.2012.09.013

Briody, E., Pester, T.M., & Trotter, R. (2012). A story's impact on organizational culture change. *Journal of Organizational Change Management, 25*, 67-87. doi:10.1108 /09534811211199600

Bubel, D., Turek, I., & Cichon, S. (2015). Multidimensional management of a higher education institution. *International Journal of Arts & Sciences, 8*(2), 199-213. Retrieved from http://ezp.waldenulibrary.org/

Butler, T., & McGovern, D. (2012). A conceptual model and IS framework for the design and adoption of environmental compliance management systems. *Information Systems Frontiers, 14*, 221-235. doi:10.1007/s10796-009-9197-5

Cabrera, D., Cabrera, L., & Powers, E. (2015). A unifying theory of systems thinking with psychosocial applications. *Systems Research and Behavioral Science, 32*, 534-545. doi:10.1002/sres.2351

Candra, S. (2012). ERP implementation success and knowledge capability. *Procedia-Social & Behavioral Sciences, 65*, 141-149. doi:10.1016/j.sbspro.2012.11.103

Cao, J., Nicolaou, A. I., & Bhattacharya, S. (2013). A longitudinal examination of enterprise resource planning system post-implementation enhancements. *Journal of Information Systems, 27*(1), 13-39. doi:10.2308/isys-50398

Chang, J. Y., Wang, E. T., Jiang, J. J., & Klein, G. (2013). Controlling ERP consultants: Client and provider practices. *Journal of Systems and Software, 86*, 1453-1461. doi:10.1016/j.jss .2013.01.030

Chou, H. W., Chang, H. H., Lin, Y. H., & Chou, S. B. (2014). Drivers and effects of post-implementation learning on ERP usage. *Computers in Human Behavior*, *35*, 267-277. doi:10.1016/j.chb.2014.03.012

Chowdary, B. V., & George, D. (2012). Improvement of manufacturing operations at a pharmaceutical company: A lean manufacturing approach. *Journal of Manufacturing Technology Management*, *23*, 56-75. doi:10.1108/17410381211196285

Clegg, B., & Wan, Y. (2013). Managing enterprises and ERP systems: A contingency model for the enterprization of operations. *International Journal of Operations & Production Management*, *33*, 1458-1489. doi:10.1108/IJOPM-07-2010-0201

Corvera Charaf, M., Rosenkranz, C., & Holten, R. (2013). The emergence of shared understanding: Applying functional pragmatics to study the requirements development process. *Information Systems Journal*, *23*(2), 115-135. doi:10.1111/j.1365-2575.2012.00408.x

Cserháti, G., & Szabó, L. (2014). The relationship between success criteria and success factors in organisational event projects. *International Journal of Project Management*, *32*, 613-624. doi:10.1016/j.ijproman.2013.08.008

Darmani, A., & Hanafizadeh, P. (2013). Business process portfolio selection in re-engineering projects. *Business Process Management Journal*, *19*, 892-916. doi:10.1108/BPMJ-08-2011-0052

Dawson, P. (2014). Reflections: On time, temporality and change in organizations. *Journal of Change Management*, *14*, 285-308. doi:10.1080/14697017.2014.886870

De Bernardis, L. (2012). Social dimension in ERP adoption and implementation: The evolution of organizational identity after an M&A. *Journal of Information, Communication and Ethics in Society, 10,* 156-186. doi:10.1108/14779961211261067

Demirel, P., & Mazzucato, M. (2010). The evolution of firm growth dynamics in the U.S. pharmaceutical industry. *Regional Studies, 44,* 1053-1066. doi:10.1080/00343400903241469

Denzin, N. K. (2012). Triangulation 2.0. *Journal of Mixed Methods Research, 6*, 80-88. doi:10.1177/1558689812437186

De Toni, A. F., Fornasier, A., & Nonino, F. (2015). The impact of implementation process on the perception of enterprise resource planning success. *Business Process Management Journal, 21*, 332-352. doi:10.1108/BPMJ-08-2013-0114

Dey, P. K., Clegg, B., & Cheffi, W. (2013). Risk management in enterprise resource planning implementation: A new risk assessment framework. *Production Planning & Control: The Management of Operations, 24*, 1-14. doi:10.1080/09537287.2011.597038

Dezdar, S. (2012). Strategic and tactical factors for successful ERP projects: Insights from an Asian country. *Management Research Review, 35*(11), 1070-1087. doi:10.1108/01409171211276945

Dezdar, S., & Ainin, S. (2011). Examining ERP implementation success from a project environment perspective. *Business Process Management Journal, 17,* 919-939. doi:10.1108/14637151111182693

Dorantes, C. A., Li, C., Peters, G. F., & Richardson, V. J. (2013). The effect of enterprise systems implementation on the firm information environment. *Contemporary Accounting Research*, *30*, 1427-1461. doi:10.1111/1911-3846.12001

Drack, M., & Schwarz, G. (2010). Recent developments in general system theory. *Systems Research and Behavioral Science*, *27*, 601-610. doi:10.1002/sres.1013

DuBois, J. M., Beskow, L., Campbell, J., Dugosh, K., Festinger, D., Hartz, S., ... Lidz, C. (2012). Restoring balance: a consensus statement on the protection of vulnerable research participants. *American Journal of Public Health*, *102*(12), 2220-2225. doi:10.2105/AJPH.2012.300757

Eden, R., Sedera, D., & Tan, F. (2014). Sustaining the momentum: Archival analysis of enterprise resource planning systems (2006–2012). *Communications of the Association for Information Systems*, *35*(1), 39-82. Retrieved from http://aisel.aisnet.org/

Engelstätter, B. (2012). It is not all about performance gains–enterprise software and innovations. *Economics of Innovation and New Technology*, *21*, 223-245. doi:10.1080/10438599.2011.562359

Esteves, J. M. (2014). An empirical identification and categorisation of training best practices for ERP implementation projects. *Enterprise Information Systems*, *8*, 665-683. doi:10.1080/17517575.2013.771411

Frimpon, M. F. (2012). A project approach to enterprise resource planning implementation. *International Journal of Business and Management*, *7*(10), 116-133. doi:10.5539/ijbm.v7n10p116

Fryling, M. (2015). Investigating the effect of customization on rework in a higher education enterprise resource planning (ERP) post-implementation environment: A system dynamics approach. *Journal of Information Technology Case and Application Research*, *17*, 8-40. doi:10.1080/15228053.2015.1014750

Fulford, R. (2013). A case study of strategic enterprise resource planning management in a global corporation: Standardisation is the basis of competitive advantage. *Journal of Systems and Information Technology, 15*, 117-132. doi:10.1108/13287261311322611

Gallagher, K. P., Worrell, J. L., & Mason, R. M. (2012). The negotiation and selection of horizontal mechanisms to support post-implementation ERP organizations. *Information Technology and People*, *25*, 4-30. doi:10.1108/09593841211204326

Grabski, S. V., Leech, S. A., & Schmidt, P. J. (2011). A review of ERP research: A future agenda for accounting information systems. *Journal of Information Systems*, *25*(1), 37-78. doi:10.2308/jis.2011.25.1.37

Grant, D., Hwang, Y., & Tu, Q. (2013). An empirical investigation of six levels of enterprise resource planning integration. *Computers in Human Behavior*, *29*, 2123-2133. doi:10.1016/j.chb.2013.05.008

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18,* 59-82. doi:10.1177 /1525822X05279903

Harper, M., & Cole, P. (2012). Member checking: Can benefits be gained similar to group therapy? *Qualitative Report, 17,* 510-517. Retrieved from http://www.nova.edu/ssss /QR/QR17-2/harper.pdf

Hart, C. (1998). *Doing a literature review: Releasing the social science research imagination*. London, England: Sage Publications.

Hasibuan, Z. A., & Dantes, G. R. (2012). Priority of key success factors (KSFS) on enterprise resource planning (ERP) system implementation life cycle. *Journal of Enterprise Resource Planning Studies, 2012*, 1-15. doi:10.5171/2012.122627

Hepner, M., & Dickson, W. (2013). The value of ERP curriculum integration: Perspectives from the research. *Journal of Information Systems Education, 24*, 309. Retrieved from http://jise.org/

Hidding, G. J. (2012). Information systems as a professional discipline: Focus on the management of information technology. *Journal of Organizational Computing and Electronic Commerce, 22*, 347-360. doi:10.1080/10919392.2012.723587

Hirschheim, R., & Klein, H. K. (2012). A glorious and not-so-short history of the information systems field. *Journal of the Association for Information Systems, 13*, 188-235. Retrieved from http://aisel.aisnet.org/

Hirschheim, R., Saunders, C., & Straub, D. (2012). Historical interpretations of the IS discipline: An introduction to the special issue. *Journal of the Association for Information Systems, 13*, i-viii. Retrieved from http://aisel.aisnet.org/

Hopkins, M. S. (2010). Your next supply chain. *Sloan Management Review, 51*(2), 17-24. Retrieved from http://sloanreview.mit.edu/article/your-next-supply-chain/

Horwitch, M., & Stohr, E. A. (2012). Transforming technology management education: Value creation-learning in the early twenty-first century. *Journal of Engineering and Technology Management, 29*, 489-507. doi:10.1016/j.jengtecman.2012.07.003

Hung, W. H., Ho, C. F., Jou, J. J., & Kung, K. H. (2012). Relationship bonding for a better knowledge transfer climate: An ERP implementation research. *Decision Support Systems, 52*, 406-414. doi:10.1016/j.dss.2011.09.007

Hunt, C. S., & Choi, H. (2015). Critique of the empirical literature on enterprise systems-over a half decade of research. *Journal of Management Information and Decision Sciences, 18*(1), 1-12. Retrieved from http://www.alliedacademies.org/

Hwang, Y., & Grant, D. (2014). An empirical study of enterprise resource planning integration global and local perspectives. *Information Development*, *1*, 1-11. doi:10.1177 /0266666914539525

Ibezim, N. E., & Obi, C. A. (2013). Re-Engineering university education through strategic information management: The Nigerian experience. *Modern Economy*, *2*, 783-789. doi:10.4236/me.2013.411083

Jacobs, G., van Witteloostuijn, A., & Christe-Zeyse, J. (2013). A theoretical framework of organizational change. *Journal of Organizational Change Management*, *26*, 772-792. doi:10.1108/JOCM-09-2012-0137

Janvier-James, A. M. (2012). A new introduction to supply chains and supply chain management: Definitions and theories perspective. *International Business Research, 5*(1), 194-297. doi:10.5539/ibr.v5n1p194

Jugdev, K. (2012). Learning from lessons learned: Project management research program. *American Journal of Economics and Business Administration*, *4*, 13-22. doi:10.3844 /ajebasp.2012.13.22

Katerattanakul, P., Lee, J. J., & Hong, S. (2014). Effect of business characteristics and ERP implementation on business outcomes: An exploratory study of Korean manufacturing firms. *Management Research Review, 37,* 186-206. doi:10.1108/MRR-10-2012-0218

Kerrigan, M. R. (2015). Social capital in data-driven community college reform. *Community College Journal of Research and Practice, 39,* 603-618. doi:10.1080/10668926.2013.866061

Kügler, M., Dittes, S., Smolnik, S., & Richter, A. (2015). Connect me! Antecedents and impact of social connectedness in enterprise social software. *Business & Information Systems Engineering, 57,* 181-196. doi:10.1007/s12599-015-0379-z

Kwak, Y. H., Park, J., Chung, B. Y., & Ghosh, S. (2012). Understanding end-users' acceptance of enterprise resource planning (ERP) system in project-based sectors. *Engineering Management, IEEE Transactions on*, *59*(2), 266-277. doi:10.1109/TEM.2011.2111456

Lech, P. (2013). ERP project success perception by the adopters: An exploratory study of the projects beyond budget and schedule. *International Journal of Information Technology Project Management (IJITPM)*, *4*(1), 13-26. doi:10.4018/jitpm.2013010102

Lee, J., Elbashir, M. Z., Mahama, H., & Sutton, S. G. (2014). Enablers of top management team support for integrated management control systems innovations. *International Journal of Accounting Information Systems, 15,* 1-25. doi:10.1016/j.accinf.2013.07.001

Livermore, C. R., & Rippa, P. (2010). What is the difference? The case of two ERP implementations. *Journal of Information Technology Case and Application Research, 12,* 60-77. doi:10.1080/15228053.2010.10856183

Lotfy, M. A., & Halawi, L. (2015). A conceptual model to measure ERP user-value. *Issues in Information Systems, 16*(3). Retrieved from http://www.iacis.org/iis/iis.php

Madapusi, A., & D'Souza, D. (2012). The influence of ERP system implementation on the operational performance of an organization. *International Journal of Information Management, 32,* 24-34. doi:10.1016/j.ijinfomgt.2011.06.004

Markus, M. L., & Tanis, C. (2000). The enterprise systems experience-from adoption to success. In R. W. Zmud (Ed.), *Framing the domains of IT management: Projecting the future…through the past* (pp. 173-207). Cincinnati, OH: Pinnaflex Educational Resources, Inc.

Marshall, B., Cardon, P., Poddar, A., & Fontenot, R. (2013). Does sample size matter in qualitative research: A review of qualitative interviews in is research. *Journal of Computer Information Systems*, *54*(1), 11-22. doi:10.1080/08874417.2013.11645667

Marshall, C., & Rossman, G. B. (2011). *Designing qualitative research* (5th ed.). Thousand Oaks, CA: Sage Publications.

Masumi, M. (2013). The CSFs, quality governance, BPR performance and gaining competitive advantage. *International Journal of Business and Management*, *8*(24), 48-63. doi:10 .5539/ijbm.v8n24p48

Mathias, B., Oludayo, O., & Ray, M. (2014). Identifying critical success factors: The case of ERP systems in higher education. *African Journal of Information Systems, 6*(3), 65-84. Retrieved from http://digitalcommons.kennesaw.edu/

Maxwell, J. A. (2010). Using numbers in qualitative research. *Qualitative Inquiry, 16,* 475-482. doi:10.1177/1077800410364740

McLeod, L., Doolin, B., & MacDonell, S. G. (2012). A perspective-based understanding of project success. *Project Management Journal, 43*(5), 68-86. doi:10.1002/pmj.21290

Merriam, S. B. (2014). *Qualitative research: A guide to design and implementation*. San Francisco, CA: John Wiley & Sons.

Metrejean, E., & Stocks, M. H. (2011). The role of consultants in the implementation of enterprise resource planning systems. *Academy of Information and Management Sciences Journal, 14*(1), 1-24. Retrieved from http://mkwright.org/files/AIMSJ_Vol_14_No_1_2011.pdf

Midgley, G. (2011). Theoretical pluralism in systemic action research. *Systemic Practice and Action Research, 24*, 1-15. doi:10.1007/s11213-010-9176-2

Minoja, M. (2012). Stakeholder management theory, firm strategy, and ambidexterity. *Journal of Business Ethics*, *109*, 67-82. doi:10.1007/s10551-012-1380-9

Mitev, N., & De Vaujany, F. X. (2012). Seizing the opportunity: Towards a historiography of information systems. *Journal of Information Technology, 27*, 110-124. doi:10.1057 /jit.2012.1

Mundy, J., & Owen, C. A. (2013). The use of an ERP system to facilitate regulatory compliance. *Information Systems Management, 30,* 182-197. doi:10.1080/10580530.2013.794601

Myers, M. D., & Klein, H. K. (2011). A set of principles for conducting critical research in information systems. *MIS Quarterly, 35*, 17-36. Retrieved from http://aisel.aisnet.org/

Narayana, S. A., Pati, R. K., & Vrat, P. (2014). Managerial research on the pharmaceutical supply chain–A critical review and some insights for future directions. *Journal of*

Purchasing and Supply Management, *20*, 18-40. Retrieved from http://www.sciencedirect.com/

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, (1979). *The Belmont report: Ethical principles and guidelines for the protection of human subjects of research*. Retrieved from http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html

Nazemi, E., Tarokh, M. J., & Djavanshir, G. R. (2012). ERP: a literature survey. *International Journal of Advanced Manufacturing Technology*, *61*(9-12), 999-1018. doi:10.1007/s00170-011-3756-x

Niederman, F., Alhorr, H., Park, Y. H., & Tolmie, C. R. (2012). Global information management research: What have we learned in the past decade? *Journal of Global Information Management*, *20*(1), 18-56. doi:10.4018/jgim.2012010102

Noaman, A. Y., & Ahmed, F. F. (2015). ERP systems functionalities in higher education. *Procedia Computer Science*, *65*, 385-395. doi:10.1016/j.procs.2015.09.100

Norton, A. L., Coulson-Thomas, Y. M., Coulson-Thomas, C. J., & Ashurst, C. (2012). Delivering training for highly demanding information systems. *European Journal of Training and Development*, *36*, 646-662. doi:10.1108/03090591211245530

Nwankpa, J. K. (2015). ERP system usage and benefit: A model of antecedents and outcomes. *Computers in Human Behavior*, *45*, 335-344. doi:10.1016/j.chb.2014.12.019

Olhager, J. (2013). Evolution of operations planning and control: From production to supply chains. *International Journal of Production Research*, *51*, 6836-6843. doi:10.1080/00207543.2012.761363

O'Reilly, M., & Parker, N. (2012). 'Unsatisfactory saturation': A critical exploration of the notion of saturated sample sizes in qualitative research. *Qualitative Research*, *13*, 190-197. doi:10.1177/1468794112446106

Otto, B., Hüner, K. M., & Österle, H. (2012). Toward a functional reference model for master data quality management. *Information Systems and e-Business Management*, *10*, 395-425. doi:10.1007/s10257-011-0178-0

Parthasarathy, S., & Sharma, S. (2014). Determining ERP customization choices using nominal group technique and analytical hierarchy process. *Computers in Industry*, *65*, 1009-1017. doi:10.1016/j.compind.2014.03.003

Peslak, A. R. (2012). An analysis of critical information technology issues facing organizations. *Industrial Management & Data Systems*, *112*, 808-827. doi:10.1108/02635571211232389

Petter, S., DeLone, W., & McLean, E. R. (2013). Information systems success: The quest for the independent variables. *Journal of Management Information Systems*, *29*(4), 7-62. doi:10.2753/MIS0742-1222290401

Plaza, M. (2016). Balancing the costs of human resources on an ERP project. *Omega*, *59*, 171-183. doi:10.1016/j.omega.2015.06.005

Powell, D., Riezebos, J., & Strandhagen, J. O. (2013). Lean production and ERP systems in small-and medium-sized enterprises: ERP support for pull production. *International Journal of Production Research*, *51*, 395-409. doi:10.1080/00207543.2011.645954

Qian, L., Schmidt, E. K., & Scott, R. L. (2015). ERP pre-implementation framework for higher education institution: A case study in Purdue University. In *Industrial Engineering and*

Engineering Management (IEEM), 2015 IEEE International Conference, 1546-1550. IEEE. doi:10.1109/IEEM.2015.7385906

QSR International (2015). *NVIVO*. Retrieved from http://www.qsrinternational.com/

Ram, J., Wu, M. L., & Tagg, R. (2014). Competitive advantage from ERP projects: Examining the role of key implementation drivers. *International Journal of Project Management*, *32*, 663-675. doi:10.1016/j.ijproman.2013.08.004

Rao, N., & Jigeesh, N. (2012). A study of reasons behind delays in pharmaceutical projects. *IUP Journal of Operations Management*, *11*(2), 19-28. Retrieved from http://www.iupindia.in/

Razmi, J., & Sangari, M. S. (2013). A comprehensive decision support system for ERP pre–implementation phase. *European Journal of Industrial Engineering*, *7*, 475-496. Retrieved from http://inderscience.metapress.com/

Rose, J., & Schlichter, B. R. (2013). Decoupling, re-engaging: Managing trust relationships in implementation projects. *Information Systems Journal*, *23*, 5-33. doi:10.1111/j.1365-2575.2011.00392.x

Ross, J. W., & Vitale, M. R. (2000). The ERP revolution: Surviving vs. thriving. *Information Systems Frontiers*, *2*, 233-241. doi:10.1023/A:1026500224101

Rossetti, C. L., Handfield, R., & Dooley, K. J. (2011). Forces, trends, and decisions in pharmaceutical supply chain management. *International Journal of Physical Distribution & Logistics Management*, *41*, 601-622. doi:10.1108/09600031111147835

Rowley, J. (2012). Conducting research interviews. *Management Research Review*, *35*, 260-271. doi:10.1108/01409171211210154

Sandhil, S. G., & Gupta, N. V. (2013). Enterprise resource planning (ERP) – A tool for uninterrupted supply in pharmaceutical supply chain management. *International Journal of Pharmacy & Pharmaceutical Sciences*, *5*(3), 103-106. Retrieved from http://ijppsjournal.com

Saunders, M. (2012). Choosing research participants. In G. Symon & C. Cassell (Eds.), *Qualitative organizational research: Core methods and current challenges*, (pp. 35-52). Thousand Oaks, CA: Sage Publications.

Schniederjans, D., & Yadav, S. (2013). Successful ERP implementation: An integrative model. *Business Process Management Journal*, *19*, 364-398. doi:10.1108/14637151311308358

Shanks, G., & Bekmamedova, N. (2012). Achieving benefits with business analytics systems: An evolutionary process perspective. *Journal of Decision Systems*, *21*, 231-244. doi:10.1080/12460125.2012.729182

Shao, Z., Feng, Y., & Liu, L. (2012). The mediating effect of organizational culture and knowledge sharing on transformational leadership and enterprise resource planning systems success: An empirical study in China. *Computers in Human Behavior*, *28*, 2400-2413. doi:10.1016/j.chb.2012.07.011

Shaul, L., & Tauber, D. (2013). Critical success factors in enterprise resource planning systems: Review of the last decade. *ACM Computing Surveys (CSUR)*, *45*, 55:1-55:39. doi:10.1145/2501654.2501669

Sinkovics, R. R., & Alfoldi, E. A. (2012). Progressive focusing and trustworthiness in qualitative research. *Management International Review*, *52*, 817-845. doi:10.1007/s11575-012-0140-5

Sloan, K., Klingenberg, B., & Rider, C. (2013). Towards sustainability: Examining the drivers and change process within SMEs. *Journal of Management and Sustainability*, *3*(2), 19-30. doi:10.5539/jms.v3n2p19

Soja, P., & Paliwoda-Pękosz, G. (2013). Comparing benefits from enterprise system adoption in transition and developed economies: An ontology-based approach. *Information Systems Management, 30*, 198-217. doi:10.1080/10580530.2013.794606

Soliman, M., & Karai, N. (2015). Enterprise resource planning (ERP) system as an innovative technology in higher education context in Egypt. *International Journal of Computing Academic Research (IJCAR)*, *5*, 265-269. Retrieved from http://www.meacse.org/ijcar/

Staehr, L., Shanks, G., & Seddon, P. B. (2012). An explanatory framework for achieving business benefits from ERP systems. *Journal of the Association for Information Systems*, *13*(6), 424-465. Retrieved from http://aisel.aisnet.org/

Stanciu, V., & Tinca, A. (2013). ERP solutions between success and failure. *Accounting and Management Information Systems*, *12*, 626-649. Retrieved from https://www.researchgate.net/

Subramanian, G. H., & Peslak, A. R. (2012). ERP Implementation model, research findings, and its applications to government. In S. Chhabra & M. Kumar (Eds.), *Strategic enterprise resource planning models for e-government: Applications and methodologies,* 25-39. Hershey, PA: Information Science Reference.

Subramoniam, S., Tounsi, M., & Krishnankutty, K. V. (2009). The role of BPR in the implementation of ERP systems. *Business Process Management Journal, 15*, 653-668. doi:10.1108/14637150910987892

Sudhakar, G. P. (2012). A model of critical success factors for software projects. *Journal of Enterprise Information Management*, *25*, 537-558. doi:10.1108/17410391211272829

Suri, H. (2011). Purposeful sampling in qualitative research synthesis. *Qualitative Research Journal*, *11*(2), 63-75. doi:10.3316/QRJ1102063

Sykes, T. A., Venkatesh, V., & Johnson, J. L. (2014). Enterprise system implementation and employee job performance: Understanding the role of advice networks. *MIS Quarterly*, *38*, 51-72. Retrieved from http://misq.org/

Thomas, W. S., Babb, D., & Spillan, J. E. (2012). The impact of a focus on change in technology in successful implementation of SAP enterprise resource planning systems in North and South America. *Journal of Management Policy & Practice*, *13*(5), 19-34. Retrieved from www.na-businesspress.com/JMPP/ThomasWS_Web13_5_.pdf

Tsai, W. H., Lee, P. L., Shen, Y. S., & Lin, H. L. (2012). A comprehensive study of the relationship between enterprise resource planning selection criteria and enterprise resource planning system success. *Information & Management*, *49*, 36-46. doi:10.1016/j.im.2011.09.007

Tsang, E. W. (2014). Case studies and generalization in information systems research: A critical realist perspective. *Journal of Strategic Information Systems*, *23*, 174-186. doi:10.1016/j.jsis.2013.09.002

Tufford, L. & Newman, P. (2012). Bracketing in qualitative research. *Qualitative Social Work*, *11*, 80-86. doi:10.1177/1473325010368316

Urban, J. B., Hargraves, M., & Trochim, W. M. (2014). Evolutionary evaluation: Implications for evaluators, researchers, practitioners, funders and the evidence-based program

mandate. *Evaluation and Program Planning, 45,* 127-139. doi:10.1016/j.evalprogplan .2014.03.011

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly, 37,* 21-54. Retrieved from http://misq.org/

von Bertalanffy, L. (1972). The history and status of general systems theory. *Academy of Management Journal, 15,* 407-426. doi:10.2307/255139

Wang, Z., & Wang, N. (2012). Knowledge sharing, innovation, and firm performance. *Expert Systems with Applications, 39,* 8899–8908. doi:10.1016/j.eswa.2012.02.017

Waring, T., & Skoumpopoulou, D. (2013). Emergent cultural change: Unintended consequences of a strategic information technology services implementation in a United Kingdom university. *Studies in Higher Education, 38,* 1365-1381. doi:10.1080/03075079.2011 .625495

Watson, T. J. (2012). Making organisational ethnography. *Journal of Organizational Ethnography, 1,* 15-22. doi:10.1108/20466741211220615

Weick, K. E. (2012). Organized sensemaking: A commentary on processes of interpretive work. *Human Relations, 65,* 141-153. doi:10.1177/0018726711424235

Whittington, R. (2014). Information systems strategy and strategy-as-practice: A joint agenda. *Journal of Strategic Information Systems, 23,* 87-91. doi:10.1016/j.jsis.2014.01.003

Wickramasinghe, V., & Karunasekara, M. (2012). Impact of ERP systems on work and work-life. *Industrial Management & Data Systems, 112,* 982-1004. doi:10.1108 /02635571211238554

Williams, R., & Pollock, N. (2012). Research commentary—moving beyond the single site implementation study: How (and why) we should study the biography of packaged enterprise solutions. *Information Systems Research, 23*, 1-22. doi:10.1287/isre.1110.0352

Williams, J., Williams, M. D., & Morgan, A. (2013). A teleological process theory for managing ERP implementations. *Journal of Enterprise Information Management, 26*, 235-249. doi:10.1108/17410391311325216

Xu, M.A. & Storr, G. B. (2012). Learning the concept of researcher as instrument in qualitative research. *Qualitative Report, 17*(42), 1-18. Retrieved from http://www.nova.edu/

Yeh, C. H., & Xu, Y. (2013). Managing critical success strategies for an enterprise resource planning project. *European Journal of Operational Research, 230*, 604-614. doi:10.1016/j.ejor.2013.04.032

Yin, R. K. (2013). *Case study research: Design and methods* (5th ed.). Thousand Oaks, CA: Sage Publications.

Zeng, Y., & Skibniewski, M. J. (2013). Risk assessment for enterprise resource planning (ERP) system implementations: A fault tree analysis approach. *Enterprise Information Systems, 7*, 332-353. doi:10.1080/17517575.2012.690049

Zhang, X. J. (2013). The evolution of management information systems: A literature review. *Journal of Integrated Design & Process Science*, *17*(2), 59-88. doi:10.3233/jid-2013-0009

Zouine, A., & Fenies, P. (2014). The critical success factors of the ERP system project: A meta analysis methodology. *Journal of Applied Business Research, 30*(5), 1407-1448. doi:10.19030/jabr.v30i5.8796

Appendix A: Interview Questions

Participant Background Information

In regards to ERP system implementations, please give me a summary of your experience.

Please describe your role and if it has changed over the last five years.

How many full cycle ERP system implementations have you experienced?

Semistructured Interview Questions

1. What are the reasons for your organization's implementation of an ERP system?
2. What strategies did you employ that supported your successful ERP system implementation and operation?
3. What factors did you use to select the ERP project team members?
4. How did the ERP system align with your business processes?
5. What internal and external challenges arose during the implementation of the ERP system?
6. What other information can you share about your ERP system implementation experience?

Appendix B: Consent Form

Dear Potential Participant,

You are invited to take part in a research study entitled "Successful Enterprise Resource Planning Implementation: A Higher Education Managerial Perspective." You are selected because of your experience with implementing an ERP system in this higher education institution. This form is part of a process called informed consent to help you understand the intent of the study before deciding to take part.

A researcher named Elizabeth Arthur, who is a doctoral student at Walden University, is conducting this proposed study. Her research involves collecting data to investigate managerial strategies employed in the process of implementing an ERP system at a higher education institution.

Background Information

The purpose of the study is to explore the dynamics of implementing an ERP system in a higher education institution located in the northeastern region of the United States. Data collected for the research may provide insight into the risks and benefits of the implementation. The study will involve understanding changes in management, business practices, organization culture, and the criteria for measuring success.

Procedures

If you agree to be in this proposed study, you will be asked to:

- Participate in a one-on-one interview with the researcher, responding to questions related to your knowledge of business practices within your realm of ERP system implementation process. In addition, you grant permission to record the interview.
- After the interview, review a transcript of the interview to confirm the accuracy of the information. The transcript review should take approximately 30 minutes or less.

  Here are some sample questions:
  - What was your role in the ERP system project (operational, technical, or strategic)?
  - What changes did the ERP system create in your job responsibilities?

Voluntary Nature of the Study

I am inviting individuals that served on the ERP system project in a leadership role and have five years' experience using the system to participate in my study. Participation in

this proposed study is voluntary. If you decide to join the study now, you can still change your mind during or after the study. You may withdraw at any time.

Risks and Benefits of Being in the Study

Being in this type of proposed study involves some risk of minor discomforts encountered in daily life, such as stress or becoming upset. Being in this proposed study would not pose risk to your safety or wellbeing. Any risk of injury or harm during the study interview is virtually nonexistent, and the duration of the interview session will be limited to 1 hour. The interview involves audiotaping to maintain the accuracy of all data collected.

Compensation

Participation in this proposed study is voluntary; there will be no form of payment for participation.

Privacy

Any information you provide will be anonymous. I will not use your personal information for any purposes outside of this research project. In addition, I will not include your name or anything else that could identify you in the study reports. The privacy of all participants will be protected with all sensitive data coded in place of your name. All study documents, collected data, and consent forms will be stored in a fire-protected secured vessel for 5 years from completion of the study, as required by Walden University. After 5 years, the information will be destroyed.

Contacts and Questions

You may ask any questions you have now. Alternatively, if you have questions later, you may contact me via [redacted] or email [redacted]. If you want to talk privately about your rights as a participant, you can call **Dr. Leilani Endicott**. She is the Walden University representative who can discuss this with you. Her phone number is [redacted]. Walden University's approval number for this proposed study is 05-31-16-0172364. Please keep this form for your records.

Statement of Consent

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By replying to this email with the words, "I consent", I understand I am agreeing to the terms described above.

Appendix C: Pre-implementation (PI)

Factor	Category Description	Sub-category
PI1	ERP Selection	Requirements
PI2	Management Support	Senior management, champion
PI3	Project Management	Project manager, team member, resource management, competency
PI4	Change Management	Organization culture, business process
PI5	Integration Management	Interfaces
PI6	Human Resource Management	Restructure personnel, job changes
PI7	Benchmarks	Goals, expectations
PI8	Training	Management, end users

Appendix D: Post-Go-Live Activity (PGLA)

Factor	Category Description	Sub-category
PGLA1	Stabilize System	
PGLA2	Performance Measures	
PGLA3	System Support	Issues/Resolution
PGLA4	Continuous Training	

Appendix E: Lessons Learned (LL)

Factor	Category Description	Sub-category
LL1	Organization Perspective	Management, User
LL2	Consulting Partner Perspective	Knowledge transfer
LL3	Software Provider Perspective	Customization
LL4	Regulatory Compliance	

Appendix F: National Institutes of Health Certificate of Completion

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Elizabeth Arthur** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 04/28/2016.

Certification Number: 2065662.