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Critical Success Factors in Enterprise Resource Planning Implementation in U.S. Manufacturing

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Abstract

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Justin Lee Goldston

MS, Pennsylvania State University, 2012

BS, North Carolina Agricultural and Technical State University, 2006

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Organizational leaders have increasingly turned to enterprise resource planning (ERP) applications, also known as decision-support systems, to make their firms' operational, tactical, and strategic processes more efficient and effective in the changing global marketplace. High failure rates in ERP systems implementations make these projects risky, however. Most prior research on critical success factors for conventional ERP implementation has been on large enterprises, resulting in a gap in knowledge on these factors in the small and medium enterprises that constitute the majority of U.S. employer firms. A qualitative modified Delphi study with an expert panel of U.S. manufacturing consultants and 3 iterative rounds of data collection and analysis revealed consensus on 8 critical success factors in ERP implementations, with the highest agreement on top management support and commitment, enterprise resource planning fit with the organization, quality management, and a small internal team of the best employees. In addition to furthering knowledge in the fields of leadership and enterprise applications, the study expands enterprise resource planning experts' and scholars' understanding of strategies to improve project success and the triple bottom line for any size enterprise in the manufacturing industry. Practitioners in the ERP industry can also apply approaches outlined during ERP implementations to mitigate risk during these engagements. Implications for positive social change include additional job opportunities and higher wages through increased efficiencies in ERP applications.

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Chapter 1: Introduction to the Study

Enterprise resource planning (ERP) applications, also known as decision-support systems, are used by leaders of mid-to-large organizations to make financial and operational decisions. As many companies continue to expand on a global scale, there may be an increasing need for ERP applications to provide visibility, collaboration, and communication throughout organizational supply chains due to increased competition and customer demands (Vermeulen, Niemann, & Kotzé, 2016). To minimize barriers and consequences when implementing change, leaders of organizations should devise a constructive approach, according to Al-Haddad and Kotnour (2015). Managers should analyze their current business environment, reflect on the organization's strategic vision, and act on the issues many organizations currently face.

In the major sections of this chapter, I include the background of the study and the problem the study addressed. I then provide the purpose of the study, the research question and subquestions, and the conceptual framework for the study. The remaining sections include the nature of the study; definitions of key terms, and discussion of assumptions, scope and delimitations, and limitations. The chapter also includes the significance of the study as it pertains to practice, to theory, and to positive social change. A summary of key points concludes the chapter.

Background of the Study

ERP applications are implemented in manufacturing environments to provide operational visibility throughout an organization's supply chain network. There are roughly 350,000 manufacturing organizations in the United States as of the first quarter

of 2018 (U.S. Department of Labor, 2018). As new manufacturers enter the market and existing manufacturers update their legacy systems, there will be an increasing need to identify ERP critical success factors. Many researchers have indicated high failure rates in ERP systems implementations on the metrics of budget, schedule overruns, and overall fit of planned business processes with implementation deliverables (Bintoro, Simatupang, Putro, & Hermawan, 2015; Ravasan & Mansouri, 2016; Shiri, Anvari, & Soltani, 2014). Because of these failure rates, it is important to identify ways to mitigate these failures. Bansal and Agarwal (2015) used a small sample size of ERP consultants to build a consensus on critical success factors in South Asian small and medium enterprises in their Delphi study. No Delphi researchers have focused on building a consensus using a large sample size of ERP consultants in the United States, according to my review of the literature.

As the global market shrinks because of technological and logistical advances, organizational leaders are looking for ways to make strategic decisions to maintain or increase their market share in their respective industries. In their research, Shao, Wang, and Feng (2015) found that firms have turned to ERP systems to make their operational, tactical, and strategic processes more efficient and effective. Lin (2010) characterized an ERP system as an integrated, customized and packaged software-based system that handles most system requirements in all functional areas of a business such as finance, human resources, manufacturing, sales, and marketing. In addition to using ERP systems as a tool to make day-to-day business decisions, leaders can also use these systems as tools to improve knowledge sharing within the organization (Ifinedo & Olsen, 2014; Xie,

Allen, & Ali, 2014). With ERP applications, organizational leaders can enable departments and facilities to share knowledge and collaborate instead of operating out of disparate systems.

Although empirical field experience has shown that ERP systems affect businesses positively, the implementation and installation of these applications do come with potential risks. In one survey of 117 executives, 40% of the panelists stated that their ERP projects failed to achieve their business case after 1 year of going live (Tsai, Li, Lee, & Tung, 2011). Because of the complexity of system functionalities, the implementation and assimilation process is always associated with high risk, leading to a high failure rate of ERP systems (Shao et al., 2015). With organizations of any kind and size increasingly adopting these systems to avoid technical obsolescence and to create a sustainable competitive advantage (Maditinos, Chatzoudes, & Tsairidis, 2012), further analysis was required to identify ways to leverage these tools to improve business performance, both internally and externally. I focused on identifying a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States.

Problem Statement

ERP implementations cost organizations capital, human resources, and time. Although research on critical success factors in ERP implementations dates back to the 1970s (Rockart, 1979), a knowledge gap regarding critical success factors identified in the literature versus those applied in manufacturing environments still exists (Deokar & Sarnikar, 2016; Khan, Nicho, & Takruri, 2016; Tarhini, Ammar, & Tarhini, 2015).

Depending on the source or survey, researchers have estimated between 70% and 85% of ERP implementations fail based on metrics such as cost, schedule overruns, or overall fit (Conteh & Akhtar, 2015; Ravasan & Mansouri, 2016; Sudhaman & Thangavel, 2015). According to researchers, implementation failures have cost large enterprises from $6 million to $100 million to implement (Conteh & Akhtar, 2015; Maas, Fenema, & Soeters, 2014; Mo & He, 2015). In more extreme cases, companies have filed for bankruptcy due to supply chain disruptions attributed to their ERP implementations (Haddara & Hetlevik, 2016; Joia, Macêdo, & Oliveira, 2014; Love, Matthews, Simpson, Hill, & Olatunji, 2014). With this level of investment and the expectation for operational optimization, it is important for firms to identify the critical success factors that are integral to an implementation.

The general problem was that, despite the identification of a myriad of ERP implementation critical success factors in the literature, implementation failures continue to occur at a high rate in the manufacturing industry (Hughes, Dwivedi, Rana, & Simintiras, 2016; Maas et al., 2014). Given the shift in managerial approaches, including the rise of partially distributed teams and other factors, the critical success factors previously noted in the literature may no longer apply (Saade & Nijher, 2016). This study may be important because research on the interactions between ERP applications and positive social change is also lacking (Grabski, Leech, & Schmidt, 2011; Elbardan & Kholeif, 2017; Seth, Goyal, & Kiran, 2017).

The specific problem was that given the rise in complexity, adversity, and uncertainty across the manufacturing landscape, the desirability and feasibility of

conventional ERP implementation critical success factors may require reassessment among small and medium manufacturers (Alharthi, Alassafi, Walters, & Wills, 2017; Turner, Kutsch, & Leybourne, 2016). Due to the increased competitiveness and customer expectations within the small and medium manufacturing sector, ERP implementation critical success factors should be reviewed periodically for refinement (Rashid et al., 2018; Sharma, Dixit, & Qadri, 2015). Technological advancements during what has been referred to as Industry 4.0, or the fourth industrial revolution, have changed the way small and medium manufacturing organizations conduct business, creating paradigm shifts in organizational culture and leadership approaches (De Soete, 2016; Elkhani, Soltani, & Ahmad, 2014; Jackson, Nelson, & Proudfit, 2014).

As small and medium manufacturers embrace the Internet of Things (IoT), future-oriented technologies have triggered a requirement for leaders to develop lean, automated environments (Qin & Kai, 2016). Forecasting the global trends of the IoT; of the four industries that included healthcare; communication; and natural resources such as food, water, and energy; and technology would significantly affect the manufacturing industry over the next 10-15 years (Basl, 2016). To remain competitive in their respective markets, manufacturing leaders are looking to ERP vendors and consultants to develop and deliver innovative products, services, and processes (Lasi, Fettke, Kemper, Feld, & Hoffmann, 2014; Qin & Kai, 2016). In performing an in-depth analysis of critical success factors implemented in the field, I attempted to narrow the scholar-practitioner gap by aligning the most cited critical success factors in the literature with those implemented during Industry 4.0.

Purpose of the Study

The purpose of this qualitative modified Delphi study was to identify a consensus among an expert panel of 42 ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. The purpose of a Delphi study is to acquire a reliable consensus among a panel of experts through a series of surveys (Habibi, Sarafrazi, & Izadyar, 2014; von der Gracht & Darkow, 2013). I conducted this study to reduce the scholar-practitioner gap regarding critical success factors identified in the literature versus those applied in manufacturing environments. Building a consensus among ERP manufacturing consultants and scholars on ways to improve project success and the triple bottom line for organizations in the manufacturing industry may lead to positive social change. ERP applications can contribute to social change by providing firms with additional operational visibility, both internally and externally (Hassan & Mouakket, 2016). Additionally, sustainable ERP (S-ERP) applications could provide a solution to support sustainable initiatives for an organization and its environment (Chofreh et al., 2016). By integrating sustainable operations, processes, and information through knowledge-sharing within an organization, organizational leaders could have a positive effect on social change by fostering employee collaboration, innovation, and empowerment.

Research Questions

I undertook this study to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. To provide a value justification and merit

to the critical success factors identified in the literature, I assessed consultants' perceptions of desirability. To measure the practicality of the critical success factors identified in the literature, I assessed consultants' perceptions of feasibility. The research question and subquestions were as follows:

RQ1- Qualitative: What is the level of consensus among ERP manufacturing consultants as to the desirability and feasibility of critical success factors for ERP implementations?

RQ1 Subquestion 1 - Qualitative: What is the level of consensus among ERP manufacturing consultants as to the desirability of critical success factors for ERP implementations?

RQ1 Subquestion 2 - Qualitative: What is the level of consensus among ERP manufacturing consultants as to the feasibility of critical success factors for ERP implementations?

Conceptual Framework

A conceptual framework encompasses the structure of a study and serves as a bridge between background theory and how the study will be conducted. As Vrasidas and Zembylas (2004), the conceptual framework informs the design of the study and can be helpful to researchers in answering the research questions. In qualitative research, researchers analyze the data as data are collected from participants (Porter, 2011). I used a modified Delphi method to analyze participants' views on critical success factors in small and medium manufacturers in the United States and thereby answer the research questions of this study.

To build a consensus among panelists regarding the critical success factors in ERP implementations, I chose the critical success factor framework (Rubin & Seeling, 1967) as the conceptual framework for this study. In the most cited study regarding critical success factors, Rockart (1979) defined critical success factors as competencies necessary to ensure successful performance. As described in more detail in Chapter 2, the critical success factor framework was first introduced by Rubin and Seeling (1967) to analyze the effect of project managers in the success or failure of projects in the government sector. In response to this seminal study, Avots (1969) concluded that project manager selection and leadership support are also critical success factors in project implementations. Figure 1 includes a summary of critical success factors in projects as identified by various researchers.

Martin[16] (1976)	Locke[14] (1984)	Cleland and King[25] (1983)	Sayles and Chandler[26] (1971)	Baker, Murphy and Fisher[9] (1983)	Pinto and Slevin[7] (1989)	Morris and Hough[11] (1987)
Define goals	Make project commitments known	Project summary	Project manager's competence	Clear goals	Top management support	Project objectives
Select project organizational philosophy	Project authority from the top	Operational concept	Scheduling	Goal commitment of project team	Client consultation	Technical uncertainty innovation
General management support	Appoint competent project manager	Top management support	Control systems and responsibilities	On-site project manager	Personnel recruitment	Politics
Organize and delegate authority	Set up communications and procedures	Financial support	Monitoring and feedback	Adequate funding to completion	Technical tasks	Community involvement
Select project team	Set up control mechanisms (schedules, etc.)	Logistic requirements	Continuing involvement in the project	Adequate project team capability	Client acceptance	Schedule duration urgency
Allocate sufficient resources	Progress meetings	Facility support		Accurate initial cost estimates	Monitoring and feedback	Financial contract legal problems
Provide for control and information mechanisms		Market intelligence (who is the client)		Minimum start-up difficulties	Communication	Implement problems
Require planning and review		Project schedule		Planning and control techniques	Trouble-shooting	
		Executive development and training		Task (vs. social orientation)	Characteristics of the project team leader	
		Manpower and organization		Absence of bureaucracy	Power and politics	
		Acquisition			Environment events	
		Information and communication channels			Urgency	
		Project review				

Figure 1. Seven sets of critical success factors identified in the literature. Reprinted from "A New Framework for Determining Critical Success/Failure Factors in Projects," by W. Belassi and O. I. Tukel, 1996, *International Journal of Project Management, 14*, p. 143. Copyright 1996 by Elsevier Science Ltd and IPMA. Reproduced with permission.

Although Martin (1976) and Sayles and Chandler (1971) performed studies on the benefits of information systems, their findings were too broad in scope regarding enterprise implementations (Belassi & Tukel, 1996). In studying complex systems such as ERP applications, researchers may consider analyzing all phases of these projects to create a more manageable framework (Baxter & Sommerville, 2011). To address this gap in the research, Ho and Lin (2004) and Ngai, Cheng, and Ho (2004) created critical success factor frameworks for ERP implementations, as outlined in Figure 2. In their conclusions, Ho and Lin and Ngai et al. found that if leaders of organizations performed a systematic consideration of critical success factors during each phase of the implementation, the risk of project failure could be reduced.

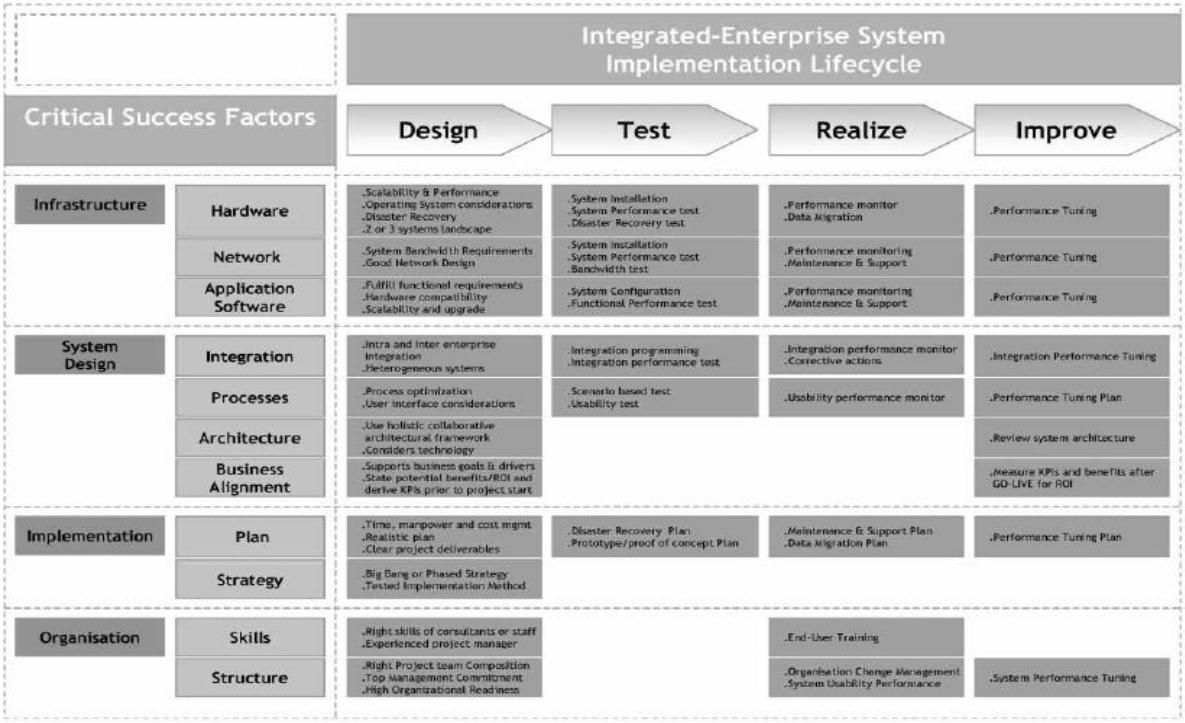

Figure 2. Integrated-enterprise system implementation critical success factor framework reference matrix. Adapted from "Critical Success Factor Framework for the Implementation of Integrated-Enterprise Systems in the Manufacturing Environment," by L. T. Ho and G. C. I. Lin, 2004, *International Journal of Production Research, 42*, p. 3736. Copyright 2004 by Taylor and Francis Group, LLC.

Nature of the Study

I reviewed the research methods used by other scholars who have conducted studies of ERP implementations in small and medium manufacturing environments for this study (Ngai, Law, & Wat, 2008; Remus & Wiener, 2010; Zeng, Wang, & Xu, 2015). After appraising quantitative, qualitative, and mixed-methods research designs, I selected a qualitative approach and Delphi design.

To answer the research questions, I reviewed qualitative approaches such as grounded theory, phenomenology, and the Delphi technique. Although grounded theory is a valuable approach when collecting empirical research (Eisenhardt, 1989; Orlikowski,

1993), the grounded theory approach was not selected because the aim of the study will not be to develop a theory (Glaser & Strauss, 2012). Because the goal of this study was to establish a consensus to the desirability and feasibility of critical success factor benchmarks for ERP implementations, a phenomenological approach was not chosen given its focus on exploring the essence and meaning participants attach to the lived experience of a phenomenon (Moustakas, 1994). The Delphi method was selected for this study given its record as a good approach to anticipate long-term trends in technology (Adler & Ziglio, 1996; Linstone & Turoff, 2002).

The Delphi technique is a qualitative research design used to establish a consensus through the input from a panel of experts without the requirement of face-to-face interaction (Linstone & Turoff, 2002; von der Gracht & Darkow, 2013). Developed by Dalkey and Helmer at the RAND Corporation in 1953, the researchers were asked by the U.S. military to solicit expert opinion to the selection of the optimal U.S. target system while also reducing the munitions output by establishing a prescribed number of atomic bombs (Brady, 2015; Dalkey & Helmer, 1963; Dalkey, Rourke, Lewis, & Snyder, 1972). In this study, the purpose of the Delphi approach was to predict a future outcome using expert opinion (Dalkey & Helmer, 1963; Dalkey et al., 1972).

The traditional Delphi technique consists of three rounds of surveys to reach a consensus. Also, the typical panel size in a traditional Delphi study consists of six to 12 experts (Habibi et al., 2014; Romano, 2010). Because the expert panel of consultants were asked to comment on existing critical success factors and propose modifications in the first round of the study, the approach was a modified study as compared to a classical

Delphi study. Because the Delphi study was designed with a target sample of 50 ERP manufacturing consultants to narrow a gap in the research, to align this study with the types of Delphi studies identified in the literature, a modified Delphi approach was conducted (Hung, Chang, Hung, Yen, & Chou, 2016; Zeng et al., 2015). This modified Delphi study was administered through SurveyMonkey.com, a secure online survey provider. While there is not much consensus among the ERP implementation of critical success factors in the literature, using the Delphi method helped to find a consensus as to the desirability and feasibility of critical success factors in ERP implementations in the United States.

My Delphi study involved three rounds of data collection and analysis. In the first round, the expert panel of ERP manufacturing consultants were asked to comment on the existing critical success factors outlined in Figure 4 in Chapter 3 that they thought were most desirable and propose modifications. Focusing on the desirability and modifications in Round 1 is noted as an acceptable and common approach in modified Delphi studies (Elnasr, Sobaih, Ritchie, & Jones, 2012; Hsu & Sandford, 2007). After reviewing the responses, the top 10 most desirable critical success factors with the highest frequency were moved to Round 2 of the study. To provide a value justification and merit to the critical success factors identified in the literature, perceptions of desirability were selected for this study. To measure the practicality of the critical success factors identified in the literature, the perceptions of feasibility were selected for this study.

In Round 2 the panelists rated the desirability and feasibility of the critical success factors using a Likert-type scale. The critical success factors with the highest ratings of desirability and feasibility in Round 2 were moved to Round 3, during which the ERP manufacturing consultants rated the remaining critical success factors for desirability and feasibility. Subsequent rounds of rating were not required as consensus was reached in Round 3.

To determine the level of consensus, researchers have identified when 75% of experts select 4 or 5 on a Likert-type scale, consensus has been met (Diamond et al., 2014; Fox et al., 2016; Paoloni et al., 2017). In the current study, 4 pertained to desirable or feasible; 5 pertained to highly desirable or highly feasible. In performing this methodical approach, I attempted to narrow the gap between the critical success factors identified in the literature versus the critical success factors employed in the field of ERP consulting.

Definitions

Terms in the industry, as well as in academia, can take on different meanings. Because definitions conflict in certain disciplines, clearly defining the terms in this study is essential. This section includes definitions of the terms used in this study as they pertain to ERP implementations.

Blockchain: A blockchain is a distributed public ledger collectively kept up to date according to strict rules and general agreement. Blockchain enables all parties to reach a consensus in a system with potentially malicious actors without a central authority (Dai & Vasarhelyi, 2017; Hofmann & Rüsch, 2017).

Business process reengineering (BPR): The business process reengineering process is the modification of business processes and procedures to increase operational efficiencies within an organization (Mitra & Mishra, 2016).

Change management: Change management within an organization involves planning, developing, and implementing internal initiatives to transition from current state to future state processes (Zhang, Schmidt, & Li, 2016).

Critical failure factors: Critical failure factors are the metrics and processes during an ERP implementation where things go wrong, resulting in failure to meet project expectations (Malaurent & Avison, 2015; Ravasan & Mansouri, 2016).

Critical success factors (CSFs): Critical success factors within an implementation are the operational strategies, practices, and tools believed to lead to the successful adoption and installation of ERP applications (Fayaz, Kamal, Amin, & Khan, 2017; Ram & Corkindale, 2014).

Desirability: Desirability in ERP implementations is the added value or significance of deploying the critical success factor in the implementation project (Ludlow & Blackham, 2015).

ERP: Enterprise resource planning applications are information systems packages that integrate all of the business functions of an organization into one core application (Gajic, Stankovski, Ostojic, Tesic, & Miladinovic, 2014; Ravasan & Mansouri, 2016; Shen, Chen, & Wang, 2016).

Feasibility: Feasibility within an ERP implementation is the likelihood a strategy, process, or tool will be successfully implemented within a project (Day & Bobeva, 2005; Steurer, 2011).

Fourth industrial revolution: Also referred to as Industry 4.0, the fourth industrial revolution is an initiative adopted by the manufacturing industry to use technology such as big data analytics, the Internet of Things, cloud computing, and robotics to streamline processes, reduce operating costs, and improve employee environments (Qin & Kai, 2016).

Go live: An ERP go live is the established cut-over date when end users move from the organization's legacy application and use the full features of the new ERP application (Abdinnour & Saeed, 2015; Li, Chang, & Yen, 2017).

Implementation: An implementation is a project an organization undertakes that is composed of a variety of phases such as the acquisition, design, implementation, stabilization, and transformation phases (Bansal & Agarwal, 2015; Ravasan & Mansouri, 2016).

Information systems: Information systems are a set of interrelated applications that store and retrieve information to support decision-making activities across all departments within an organization (Hu, Pedrycz, Wang, & Wang, 2016).

Knowledge sharing (KS): Knowledge sharing is the process through which one organizational unit is affected by the experience of another as an event through which one entity learns from the experience of another (Rezania & Ouedraogo, 2013).

Large enterprises (LE): Large enterprises are organizations that employ more than 500 employees in the United States (Amba & Abdulla, 2014).

Legacy systems: Legacy systems are existing information technology applications that have been used to operate business processes but which firms may replace with new ERP solutions (Conteh & Akhtar, 2015).

Modules: Modules are sub-areas of an ERP application such as finance, purchasing, warehouse management, and sales that firms can implement in a phased approach during the implementation (Amba & Abdulla, 2014).

Project scope: The project scope is defined as the required tasks or modules that should be implemented to ensure ERP project success. Some implementations will split out projects into different phases with each having a detailed scope (Orouji, 2016).

Small and medium enterprises (SMEs): Small and medium enterprises are organizations that employ less than 500 employees in the United States (Amba & Abdulla, 2014).

Stakeholders: Stakeholders are individuals and organizations directly and indirectly affected by an ERP implementation (Saade & Nijher, 2016). Stakeholders include executive leadership, managers, supervisors, employees, vendors, and customers (Carvalho & Guerrini, 2017; Huang, 2016).

Super users: Super users are individuals and resources on the implementation team assigned to learn the processes and procedures of the new ERP application and train coworkers and subordinates on the new processes (Mahdavian, Wingreen, & Ghlichlee, 2016).

Triple bottom line: The triple bottom line is defined as the economic, social, and environmental intentions of corporate responsibility and measures the organization's sustainability (Glavas & Mish, 2015).

Assumptions

This qualitative modified Delphi study included several assumptions, which are necessary for a modified Delphi study. These assumptions are not exhaustive but assisted in framing the study. Based on the criteria to compose an expert panel of ERP manufacturing consultants with at least 5 years of ERP implementation experience in the manufacturing industry, the first assumption was the participants who self-selected into the study were knowledgeable in the field. Another assumption was the participants would respond to the survey questions based on empirical experience in ERP manufacturing implementations and would not be influenced by the nature of the questions or by outside sources or individuals. A third assumption was that a sufficient number of ERP manufacturing consultants were willing to participate in each round of the study given the pool of available ERP manufacturing consultants solicited through LinkedIn. The fourth assumption was the ERP manufacturing consultants would respond openly and honestly to the survey questions because of their experience and interest in the research topic.

Another assumption was the early participants could drop out of the study due to the nature of a Delphi approach. To mitigate this risk to maintain sufficient retention through all rounds to achieve a consensus, each participant in the study was selected based on meeting criteria about tenure in the industry. The study involved a mitigation

strategy to encourage participants in the first round to complete all subsequent rounds. By sending reminders to all members of the initially targeted participants through LinkedIn before and during each round, a sufficient number of participants was attained. The final assumption was the appropriateness of the modified Delphi technique to answer the research question and execution of this approach with fidelity based on the foundations outlined by previous researchers (Habibi et al., 2014; von der Gracht & Darkow, 2013).

Scope and Delimitations

In establishing the scope of this study, three primary criteria were considered: what to study, who to study, and the requirements for the sample size. With firms continuing to implement ERP solutions that fail to meet expectations amid extensive research, additional examination was required to mitigate ERP implementation risk. Although a controlled vocabulary search on Google Scholar of ERP critical success factors returned 24,400 results, researchers have estimated between 70% and 85% of ERP implementations continue to fail based on metrics such as cost, schedule overruns, or overall fit (Conteh & Akhtar, 2015; Ravasan & Mansouri, 2016; Sudhaman & Thangavel, 2015). With ERP implementations carrying this high level of risk, proven critical success factors that have been put into practice in the past were reviewed to analyze their desirability and feasibility in future implementations.

To reduce bias in creating selection criteria for participants in the current study, pertinent literature informed the desired characteristics. Several findings influenced identifying which expertise and experience were required. Although some studies

revealed that project managers provide insight throughout each phase of the implementation (Mahdavian et al., 2016), other findings support a stronger case with ERP consultants in revealing that these resources have greater influence on project success through their direction on establishing future state processes and procedures (Sudhaman & Thangavel, 2015; Tsai, Lin, Chen, & Hung, 2007). By selecting ERP consultants from a number of ERP providers, the results of the study will be transferable across all ERP platforms and implementation methodologies.

Based on the requirements for ERP consultants in a study focusing on small and medium manufacturers, the participants in the study were consultants who have implemented ERP solutions in the manufacturing industry. Given the premise of the Delphi technique to establish a consensus through the input from a panel of experts, the ERP manufacturing consultants had a minimum of 5 years of experience in implementing ERP solutions in the manufacturing industry. Additionally, because the majority of ERP research has been focused on large enterprises (Conteh & Akhtar, 2015; Maas et al., 2014; Mo & He, 2015), I focused on small and medium enterprises. Finally, I only focused on critical success factors that have been deployed during ERP implementations at manufacturers in the United States. With the different cultures, processes, and procedures applied in United States small and medium manufacturers as compared to other parts of the world, the results of this study may not be applicable in other countries.

Limitations

The limitations outlined in this study were common to studies with a qualitative Delphi research approach. Limitations are identified as situations that are out of the

researcher's control. Due to the nature of the Delphi study, some ERP manufacturing consultants dropped out of the study during each of the rounds. Also, there was a possibility of a low response rate in this study. The time requirement was also a limitation in this study. A drawback to a Delphi study was that several days or weeks could have passed due to the analysis and collection of surveys (Aengenheyster et al., 2017). Because of the time-lapse in data collection and analysis, the risk of consultant attrition could have arisen due to time constraints or scheduling conflicts (Gray, 2016; McMillan, King, & Tully, 2016). Although I allocated a week-long period to allow sufficient time for data analysis, I was able to analyze the data within a day due to the analysis tools within SurveyMonkey.com and SPSS.

Although the sampling criteria included ERP manufacturing consultants with at least 5 years of experience implementing ERP solutions, the participants could have had varying levels of expertise and experience. Because some consultants may not have possessed the in-depth knowledge of some of the critical success factors identified in the survey, an uneven distribution of experience could have been represented in the results (Hsu & Sandford, 2007). To minimize this uneven distribution, the study involved a purposive sampling technique to ensure meaningful results in the study. Screening questions at the beginning of the survey helped to ensure that participants had the required expertise and experience.

Another limitation in the study was that of researcher bias. Given the researcher has a decade of experience implementing ERP applications in small and medium manufacturing environments, the selection of participants was inherent. As I may have

known ERP consultants', and thus, participants' positions about ERP implementations during the participant self-selection selection process, I as the researcher had preconceptions before the study was conducted (Hasson, Keeney, & McKenna, 2000; Okoli & Pawlowski, 2004). Although purposive sampling was used in order to obtain expert panelists with the required expertise and experience, this approach could be viewed as a strength of the study (Elledge & McAleer, 2015).

In addressing the limitation of response bias, some bias and assumptions may have played a factor in the results. Response bias may have arisen when panelists provided the expected answer in each round of a Delphi study (Elledge & McAleer, 2015). Because the minimum recommended response rate for each round is between 40% and 50% (Atkinson & Gold, 2001), an initial target group of 125 consultants was invited to participate in the study to reach the anticipated sample size of 50 consultants, in anticipation of a Round 1 response rate range of 48% to 74% (Mokkink et al., 2010) and potential attrition in later rounds (Hasson et al., 2000; Hsu & Sandford, 2007). Because study participants should have had first-hand experience in implementing these applications, the results of the study should be more realistic.

The critical success factors in this study were limited to those identified by Saade and Nijher (2016) in their research. Although the Round 1 survey included definitions of each critical success factor, a limitation was that the potential for the ERP manufacturing consultants to have inaccurate perceptions of the critical success factors due to naming conventions used in their respective environments. To counter these inaccurate perceptions, I performed a field test where I added additional definitions to

one metric based on the expert feedback to ensure the participants fully understood the critical success factor when taking the survey. Finally, in performing a study on small and medium manufacturers in the United States, the results of the study may not be generalizable to different populations, industries, or geographical regions.

Significance of the Study

My aim for this study was to provide a blueprint to implement ERP applications successfully for both scholars and practitioners. To complete this task, a Delphi study was performed with panelists who are regarded in the ERP industry as the experts–the consultants (Bansal & Agarwal, 2015; Bronnenmayer, Wirtz, & Göttel, 2016a; Chang, Wang, Jiang, & Klein, 2013). The identification of critical success factors in the ERP consulting community is highly subjective due to the empirical evidence of implementing these applications in various environments (Sun, Ni, & Lam, 2015).

Failed traditional ERP applications focus on the profitability aspect of an organization, whereas sustainable ERP (S-ERP) applications are focused on all aspects of the triple bottom line (Bintoro et al., 2015; Chofreh, Goni, Shaharoun, Ismail, & Klemeš, 2014; Malaurent & Avison, 2015). Chofreh et al. (2016) posited that S-ERP systems are based on people, planet, and profit, which in turn will create a collaborative, synergistic, sustainable environment for business partners and communities. With the increase in collaboration and strategic relationships between business partners, a demand to support these organizational systems will spur firms to increase their workforces, resulting in a positive impact to communities around the world.

In addition to the positive effect to firm's triple bottom line, this study may contribute to positive social change by reducing the risk of implementing unprofitable ERP solutions. For ERP vendors, this study may assist in educating, certifying, and employing additional members of their workforce through the successful delivery of consulting services (Bronnenmayer, Wirtz, & Göttel, 2016b). Additionally, the results could provide valid a foundation for educational and training programs (Denzin & Lincoln, 2005). This approach will be beneficial for ERP vendors to provide a reliable and validated education plan that will assist in successfully onboarding new hires, as well as a continuous improvement process to ensure tenured consultants are aligned with the recent technological developments. The results of the study may contribute to positive social change by mitigating the risk of failed ERP implementations by outlining a forward-looking view of critical success factors through the lens of ERP manufacturing consultants given their expertise in the field.

Significance to Practice

In ERP implementations, researchers have stated consultants are integral to the success of the project (Ravasan & Mansouri, 2016; Sudhaman & Thangavel, 2015; Tsai et al., 2007). Because ERP providers that support the manufacturing industry focus on niche markets, selecting ERP manufacturing consultants from various ERP vendors could potentially provide a broader view of critical success factors for this industry. As ERP implementations cost organizations hundreds of thousands of dollars in capital and resource hours, I conducted this study to identify the CSFs that could potentially mitigate the risk in these projects.

Along with the risk mitigation strategies, deploying critical success factors in ERP implementations can lead to a strategic competitive advantage (Forcht, Kieschnick, Aldridge, & Shorter, 2007; Habibzadeh, Meshkani, & Shoshtari, 2016). By using the capabilities of ERP applications, not only can leaders of organizations improve their operational efficiencies, they can also enhance their supply chain visibility, resulting in a competitive differentiation (Ghosh & Biswas, 2017; Ram, Wu, & Tagg, 2014).

Significance to Theory

ERP applications were first established in the 1970s, but the industry continues to grow, both in size and capabilities. With project teams continuing to experience failed ERP implementations, it is important for leaders within organizations first to understand how IT and business to synergize to increase operational efficiencies and profitability (Chen, 2010). Although recent research on ERP critical success factors has focused on a limited amount of case studies on small and medium manufacturers, a limited amount of research has included consultants as the sample. Because ERP manufacturing consultants are viewed as experts both from an IT and best business practice perspective (Bansal & Agarwal, 2015; Chang et al., 2013), the results of this study may contribute to the theoretical body of knowledge by referring to the perspectives of the expert panel of ERP manufacturing consultants to build a consensus on critical success factors within ERP implementations. In producing the results, the scholar-practitioner gap may be narrowed by reviewing and implementing the top critical success factors identified in this study.

Significance to Social Change

To identify a consensus among a panel of ERP manufacturing consultants, the future-oriented approach of the modified Delphi technique may contribute to positive social change by improving the efficiencies and work environments for employees in small and medium manufacturing firms in the United States. The results of this qualitative modified Delphi study may contribute to the ERP body of knowledge by revealing consensus about the critical success factors of implementations in small and medium manufacturers in the United States. Positive social change occurs when ERP providers and users create a positive impact on the industrial sectors they serve, educate, and certify (Lin, Ma, & Lin, 2011). The study's results may provide information that is beneficial for leaders of organizations, as well as ERP vendors throughout each phase of future implementations. Application of the results of this study could also improve the implementation methodologies of ERP providers and increase the probability of successful ERP implementations by mitigating the risks that arise during the implementation life cycle by instituting the critical success factors outlined in this study.

The findings of the study may also have the potential to influence business success. Positive social change within ERP implementations may to enhance employee knowledge, critical thinking skills, and organizational collaboration (Al-Johani & Youssef, 2013; Le Pennec & Raufflet, 2016). ERP applications have been shown to provide a sustainable competitive advantage to organizations by empowering employees to share ideas and promote job stability (Azevedo, Romão, & Rebelo, 2014; Beheshti, Blaylock, Henderson, & Lollar, 2014). In implementing ERP applications, leaders can

promote positive social change by providing additional job opportunities and higher wages through the increased efficiencies ERP applications provide within an organization (Gajic et al., 2014; Pishdad, Koronios, Reich, & Geursen, 2014).

Summary and Transition

Enterprise resource planning applications are integrated systems that centralize processes, information, and data from all departments or sites within an organization. Many project teams implement these applications to gain visibility across their supply chains, improve operational efficiencies, and to align with the strategic objectives of their shareholders (Chen, Harris, Lai, & Li, 2016; Yassien, 2017). The problem is ERP implementation failures continue to occur at a high rate in the manufacturing industry despite the various critical success factors identified in the literature (Hughes et al., 2016; Maas et al., 2014). The purpose of this qualitative modified Delphi study was to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States.

The research methodology was a qualitative modified Delphi approach. Based on the conceptual framework, the critical success factor framework was reviewed to answer the research question outlined above. By identifying a consensus among an expert panel of ERP manufacturing consultants, the results may provide a blueprint to implement ERP applications successfully for both scholars and practitioners.

Chapter 2 includes a thorough review of the history of enterprise applications and managerial theories as they relate to enterprise applications. Chapter 2 also covers the

benefits of ERP systems, as well as drawbacks as identified in the current research. Chapter 2 includes a summary of the literature, along with the gaps identified when conducting the literature review.

Chapter 3 includes how the study was conducted to identify critical success factors in ERP implementations in small and medium enterprises. The chapter also includes the research design and rationale, followed by the role of the researcher. The participants, how and why they were selected, along with an overview of the sample size are discussed. Additionally, the instrumentation is reviewed in detail, followed by the data analysis procedures. The rest of the chapter includes issues with trustworthiness, which includes credibility, transferability, dependability, confirmability, and ethical procedures.

Chapter 4 includes a presentation of the results, the aggregated sample characteristics, and the major findings. Chapter 4 also includes answers to the research question and subquestions. Chapter 5 includes a discussion of the results, where they fit into the body of literature, and their implications for theory, practice, and future research.

Chapter 2: Literature Review

ERP applications are tools leaders use to make managerial decisions and provide visibility throughout their organizations. Although researchers have outlined the benefits of implementing these applications, they have also noted that these projects are considered a risky endeavor for organizations of all sizes (Abdelmoniem, 2016; Bansal & Agarwal, 2015; Shao et al., 2015). The costs of these implementations range from 1-3% of an organization's annual revenue and projects can last on average of one to three years (Stanciu & Tinca, 2013). In SMEs, risks and expenditures are further amplified because of limited resources, expertise, and budgets. As Ghobakhloo, Hong, Sabouri, and Zulkifli (2012) noted, these firms face greater challenges in adopting technology as compared to large enterprises due to these constraints. Such external risks could lead SMEs to delay ERP implementation projects or forego them altogether. In addition, internally, leaders of SMEs may find it difficult to implement reengineering projects due to limited resources. For these reasons, I considered it imperative to focus this study on ERP implementations in SME environments.

Leading researchers have formulated a definition of ERP systems in recent years as information systems packages that integrate all of the business functions of an organization into one core application (Gajic et al., 2014; Ravasan & Mansouri, 2016; Shen et al., 2016). In addition to this characterization, ERP applications can bring many disparate systems into one application to create a synergistic environment within the organization. The size of these projects supports the importance of focusing on SMEs to identify the metrics that will enable these organizations to become successful in this

endeavor. Leaders of large enterprises can use large budgets and pools of experienced resources for an ERP implementation (Amba & Abdulla, 2014). In contrast, leaders or SMEs are constrained in their ability to support large implementations due to limited capital and human resources (Bansal & Agarwal, 2015; Mittal, 2016). A range of inherent characteristics distinguish SMEs from large enterprises, such as ownership type, structure, culture, and market (Zach & Munkvold, 2012). In order to mitigate the risks of these implementations, scholars should educate practitioners of these SMEs of the CSFs that have been identified from previous successful implementations.

In reviewing the literature on CSFs in ERP implementations, I found that many factors contribute to the success of these implementations. Contrary to popular belief, very few of these factors are technological in nature (Ravasan & Mansouri, 2016). My review of the literature revealed many studies regarding CSFs and critical failure factors in ERP implementations undertaken by SMEs. In this chapter, I present a literature review of the related works, theories, and frameworks supporting this study. The aim of this research was to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of CSFs in ERP implementations in the United States. The research question and subquestions were as follows:

RQ1: What is the level of consensus among ERP manufacturing consultants as to the desirability and feasibility of critical success factors for ERP implementations?

RQ1 Subquestion 1: What is the level of consensus among ERP manufacturing consultants as to the desirability of critical success factors for ERP implementations?

RQ1 Subquestion 2: What is the level of consensus among ERP manufacturing consultants as to the feasibility of critical success factors for ERP implementations?

In order to perform a thorough analysis of the literature, this chapter is divided into five separate parts: Part 1: Literature Search Strategy, Part 2: Theoretical Framework, Part 3: Review of the Literature, Part 4: Gaps in the Literature, and Part 5: Summary and Conclusion.

Literature Search Strategy

I consulted a number of peer-reviewed journals, books, periodicals, and reports to compose the literature review. Although my primary sources were Google Scholar and the EBSCO Business Search Premier database for reviewing peer-reviewed journal articles, I also referenced ProQuest Dissertations and Walden University dissertations on the research topic. Table 1 shows the combination of sources I used for the literature review section of this study. In gathering articles for this review, I performed a controlled vocabulary search on Google Scholar. Some of the search terms included *ERP theory, ERP Delphi, CSF, ERP critical success factors, critical success factor framework ERP, John Rockart CSF, ERP transformational leadership, ERP consultant, ERP SME, ERP small and medium, industry 4.0, fourth industrial revolution, ERP critical success factors research questions quantitative, quantitative ERP critical success factor framework, population ERP critical success factors, failed ERP implementations,* and *mitigating ERP implementation risk.* Performing this controlled vocabulary search enabled me to filter the journal articles based on respective areas of the literature review being constructed or revised.

Table 1

Summary of Sources

Sources	< 2013 #	< 2013 %	2013-2018 #	2013-2018 %
Scholarly books	3	3.5	0	0
Peer-reviewed journals	9	10.5	66	76.7
Trade journals and periodicals	4	4.7	0	0
Reports	1	1.1	3	3.5
Total	17	19.8	69	80.2

Conceptual Framework

The acceleration of globalization and collaboration among business partners has resulted in a need for leaders of organizations to increase their visibility and collaboration. Through the use of enterprise applications, leaders are now able to make this vision a reality. I developed the conceptual framework for this study based on the CSFs related to project success in the findings of Avots (1969), Belassi and Tukel (1996), Ho and Lin (2004), Ngai et al. (2004), Rockart (1979), Rubin and Seeling (1967), and Saade and Nijher (2016). In formulating the framework, I sought to blend the empirical experience of ERP manufacturing consultants with the conceptual conclusions in the literature (Berman, 2013; Leshem & Trafford, 2007; Smith, Bonacina, Kearney, & Merlat, 2000).

Rubin and Seeling (1967) were the first researchers to introduce CSFs when they analyzed the impact of project managers on the success or failure of projects in the

government sector. Rubin and Seeling concluded that although the experience of the project manager has no impact on project success, the size of previous projects does affect a project manager's performance. In another study, Avots (1969) concluded that leadership support is integral to the success of projects. Leadership support is a CSF on which many researchers have reached a consensus (Baxter & Sommerville, 2011; Belassi & Tukel, 1996; Cleland & King, 1983). Regarding these factors in ERP implementations, Ho and Lin (2004) and Ngai et al. (2004) found that if leaders of organizations performed a systematic consideration of CSFs during each phase of the implementation, the risk of project failure might be reduced.

In applying the critical success factor framework to ERP implementations, project sponsors, team members, and stakeholders should collaboratively work together to ensure project success (Dwivedi et al., 2015; Giachetti, 2016). As global expansion and customer expectations continue to increase, leaders of organizations implement enterprise applications to remain competitive (Gupta, Aye, Balakrishnan, Rajagopal, & Nguwi, 2014; Zughoul, Al-Refai, & El-Omari, 2016). Using the right tools and approaches make the job easier while using the wrong approaches make the job difficult. In the most cited study regarding critical success factors, Rockart (1979) defined critical success factors as competencies necessary to ensure successful performance. By transferring the knowledge identified in previous studies, the aim of the current study was to gather different viewpoints and perspectives from different ERP manufacturing consultants to reach a consensus as to the desirability and feasibility of critical success factors in ERP implementations in the United States.

Identified as one of the most important business innovations (Zughoul et al., 2016), ERP systems handle complex business cases for organizations around the world (Fu-Long, Lei, & Ji-Hong, 2017). To mitigate the risks of these projects, leaders could implement a combination of knowledge, skills, and individual characteristics identified critical success factor framework studies to ensure project success (Müller & Turner, 2007). Manufacturing leaders of large, medium, and small organizations implement ERP solutions to integrate complex processes such as supply chain management, customer service, engineering, purchasing, and finance. The objective of these projects is to increase the collaboration and visibility throughout the organization's supply chain network.

During times of change such as an ERP implementation, uncertainty and risk are inherent (Bintoro et al., 2015; Zeng et al., 2015). How project teams implement these projects can have positive or negative effects on organizational performance (Akca & Ozer, 2014; Chien, Lin, & Shih, 2014). Many studies that focused on the critical success factor framework within ERP implementations identified project team activities as critical success factors in their findings (Ho & Lin, 2004; Ngai et al., 2004; Saade & Nijher, 2016). Given ERP success can be difficult to measure (Abelein & Paech, 2013; Althonayan & Althonayan, 2017), the use the critical success factor framework may provide a true measure of ERP implementation success. The critical success factor framework was selected for the current study given this conceptual framework has been validated, challenged, and adopted to measure success in IS projects (Ho & Lin, 2004; Ngai et al., 2004).

Literature Review

Enterprise applications are complex architectures that assist leaders of organizations to make tactical and strategic business decisions. Many of the studies in the literature review investigated the history of ERP systems, the future of enterprise applications, implementation success, ERP implementations in small and medium manufacturing environments, and managerial approaches during times of organizational change. In the remaining parts of this section, I analyze and synthesize the literature as it pertains to enterprise applications.

The Evolution of Enterprise Applications

As computers were introduced in the 1960s, organizations began to develop applications to track inventory, assist in ordering materials, and produce finished goods. In a concept identified as inventory control, firms took the first step in systematically running the operational side of their organization (Jacobs & Weston, 2007; Thakur, 2016). In the 1970s, Materials Requirements Planning (MRP) applications were introduced to enable manufacturers to purchase, forecast, and schedule production, spawning the founding firms of the industry such as SAP and J. D. Edwards (Egdair, Rajemi, & Nadarajan, 2015; Jacobs & Weston, 2007; Singh & Nagpal, 2014). With the number of organizations creating additional requirements to reduce their overhead costs, J. D. Edwards enhanced their MRP applications to include closed-loop scheduling, enhanced shop floor reporting, and forward scheduling known as MRP-II (Jacobs & Weston, 2007; Kumar & Van Hillegersberg, 2000). As organizational leaders began to revert to technology to assist in daily operational decision-making, by the end of the

1980s, the primary ERP vendors were established - SAP, IBM, J. D. Edwards, Baan, PeopleSoft, and Oracle (Razzhivina, Yakimovich, & Korshunov, 2015). With enterprise applications enabling decision-makers to provide better visibility of their inventory and production levels, organizations also looked to these applications to set themselves apart from their competition.

In the 1990s, with the market becoming more competitive, the major players looked for a competitive advantage and began to release applications that integrated the operational portion of the organization with the accounting area of the firm (Bhuiyan, Chowdhury, & Ferdous, 2014). Coined ERP by the Gartner Group, this new technological development spurred immense growth with the core six business application vendors (Jacobs & Weston, 2007). With the fear of the unknown approaching for the year 2000 with Y2K, ERP industry marketing caused firms to scramble to install these applications sparking dramatic growth in ERP vendors and offerings (Brumberg et al., 2016; Salimi, Dankbaar, & Davidrajuh, 2015). When the dot-com bubble of 2001 rocked the entire technology industry, the major players in the industry were pressured to downsize (Fadlalla & Amani, 2015). By the end of the 2000s, the ERP landscape changed as J. D. Edwards, and PeopleSoft were acquired by Oracle (Palanisamy, Verville, & Taskin, 2015) and a new entrant in the market, Infor Global Solutions acquired Baan (Verdouw, Robbemond, & Wolfert, 2015) and IBM's MAPICS product (Banerjee, 2015), resulting in SAP, Oracle, and Infor becoming the top three ERP vendors in the market respectively.

In reaching the maturity stage of its lifecycle, ERP applications have continued to progress with the gradual introduction of cloud computing. Cloud computing reduces the information technology (IT) overhead for firms by moving all hardware to support its ERP application off premise to a vendor-hosted site (Bento, Bento, & Bento, 2015). In a 2016 ERP Report performed by Panorama Consulting, the survey of 215 organizations deploying ERP applications uncovered a 40% increase in firms implementing cloud versus on-premise solutions compared to 2015 (Solutions, 2016). To analyze the dramatic increase, the reduced misconceptions of cloud computing also led to the dramatic increase (Solutions, 2016). As ERP providers continue to increase application security to mitigate the risk against security breaches, more organizations are moving from on-premise solutions to cloud-based offerings.

In addition to cloud computing, in an effort to reduce waste within operations, the supply chain community instituted Lean initiatives over the past decade which were also integrated into ERP applications (De Soete, 2016). In an effort to develop a tool to track sustainable processes, researchers have begun to call these new applications Sustainable Enterprise Resource Planning (S-ERP) applications. As the next phase of business applications, the premise of the next section focuses on how S-ERPs can positively impact all three aspects of an organization's TBL, as well as global sustainability. Refer to Table 2 for a graphical representation of the evolution of business applications.

Table 2

The Evolution of Business Applications

Decade	Applications
1960s	Early computers, Reorder point systems, and early Materials Requirements Planning (MRP)
1970s	MRP
1980s	MRPII and early Enterprise Resource Planning
1990s	ERP
2000s	Introduction to ERP cloud computing, early ERP vendor consolidations, mergers, and acquisitions
The future	Sustainable Enterprise Resource Planning (S-ERP)

The Birth of S-ERP

As firms become more innovative and socially conscious, leaders are utilizing technology to integrate sustainable operations, processes, and information through knowledge-sharing within their organization. Sustainable development and production can be characterized as development that fulfills current requirements of individuals without compromising the requirements of individuals in the future (De Soete, 2016). As business partners of global firms continue to question whether their supply chains and productions facilities are sustainable and safe (De Soete, 2016), these companies have vowed to become environmentally sustainable. To document their efforts, these companies are working with ERP providers to modify their current applications to create modules to track their information. Zvezdov and Hack (2016) performed a study of a multinational food company that created a carbon information management (CIM)

module within their ERP system to track carbon emissions across their portfolio of manufacturing facilities. In addition to carbon emissions tracking, De Soete (2016) provided the following examples of how organizations can utilize their existing business applications to make more sustainable decisions:

- Utilizing a product's bill of materials to track plastics and solvent use
- Tracking the time duration of a chemical synthesis step
- Analyzing the energy consumption of a production line

Although initial steps have been taken to develop S-ERP applications, with the failure rates of traditional ERP implementations ranging in the area of 60% (Maas et al., 2014; Ravasan & Mansouri, 2016), the adoption of S-ERP applications could be even more complex to implement (Chofreh et al., 2016). With new data types, data, and stakeholders such as environmentalists and scientists of a firm that previously would not have interacted with the ERP application, Chofreh et al. (2016) posited that the implementation of S-ERP applications would be new territory for firms.

The foundation of traditional ERP applications is built upon optimizing operational and financial processes resulting in increased profits. In an S-ERP world, all facets of the TBL are covered within an organization, which in turn will affect all stakeholders of an organization (Chofreh et al., 2014). In comparing the two applications, the philosophy of traditional ERP systems focuses primarily on profit to centralize all data and decision-making functions within one application. With S-ERP, the primary focus is on the TBL, which is composed of profit, people, and planet (Ahmad & Mehmood, 2015; Gianni, Gotzamani, & Tsiotras, 2017). Profit within the TBL refers

to value-added activities performed within an organization (Chofreh et al., 2014). The people component refers to a firm's most important asset, the employees. Finally, planet refers to the environment, and the world's natural resources (Chofreh et al., 2016). Although the environmental impact has not yet been fully realized with a phased sustainability approach, organizations can leverage technology to make a positive impact on social change.

Implementing S-ERP Applications

As Information Technology (IT) projects have varying methodologies, S-ERP applications could be implemented utilizing similar approaches (Chofreh et al., 2016). Referring to the proposed S-ERP implementation methodology as the S-ERP master plan, this plan would shorten the implementation timeline, cost, and resources (Chofreh et al., 2016). In developing a structured approach, risk can be mitigated throughout the implementation lifecycle. Similar to other implementation methodologies, the S-ERP methodology has three parts – the project roadmap, the application framework, and the project guidelines. In reviewing recent studies, a gap was uncovered regarding the outcome of successful S-ERP implementations. In scoping out the proposed architecture of an S-ERP application, Figure 3 depicts the complexity of this application. While decision-makers in firms can utilize existing technology using the tools and information they currently have at their disposal, the following caveats could be identified regarding the implementation of S-ERP applications:

- Data management in organizations
- Data penetrations through ERP systems consistency in data logging

- Supply chain transparency
- Supply chain reliability
- The language (and education) issue (De Soete, 2016)

While leaders of organizations speak to supply chain concepts from a theoretical perspective, these leaders could move toward advanced sustainable technology to put these theories into practice.

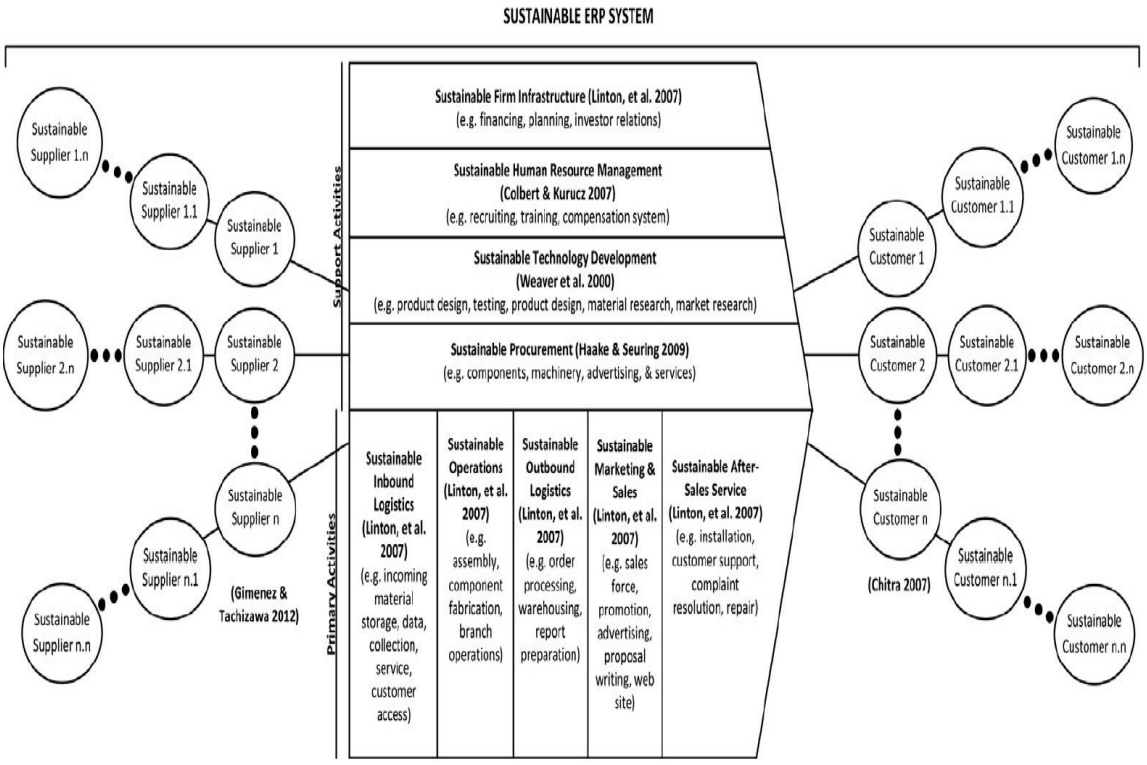

Figure 3. Proposed S-ERP system with modules. Adapted from "Sustainable Enterprise Resource Planning: Imperatives and Research Directions" by A. G. Chofreh, F. A. Goni, A. M. Shaharoun, S. Ismail, and J. J. Klemeš, 2014, *Journal of Cleaner Production, 71*, p. 141. Copyright 2014 by Elsevier Limited.

ERP Systems in Small and Medium Manufacturing Environments

Although ERP systems were initially developed to run large scale enterprises, SMEs are increasingly motivated to introduce ERP implementations (Upadhyay, Basu,

Adhikary, & Dan, 2010). Small and medium manufacturing enterprises are represented by a range of inherent characteristics that distinguish them from large enterprises, such as ownership type, structure, culture, and market (Amba & Abdulla, 2014). Concerning the issue of IT/IS adoption, limited resources, limited IS knowledge, and the lack of IT expertise are constraints facing SMEs in implementation projects (Bansal & Agarwal, 2015). In an SME environment, once approved, a full annual IT budget could be spent on ERP implementation efforts (Hsu, Ray, & Li-Hsieh, 2014). Researchers found that ERP implementation costs, as a percent of revenue, range from 0.82% for large firms compared to 13.65% for SME firms due to economies of scale working for the larger firms (Bohórquez & Esteves, 2008).

Major SME projects face increased external and internal risks when compared to large organizations. Externally, SMEs are more fragile than large companies and face greater difficulty in obtaining credit (Zach & Munkvold, 2012). Such external risks could lead SMEs to delay the project of ERP implementation or forego it altogether. Internally, SMEs may find it difficult to implement reengineering projects due to limited resources. Overall, SMEs may face greater challenges in adopting technology as compared to large enterprises given the constraints mentioned above (Zach & Munkvold, 2012).

Given the hidden costs of ERP implementations, SMEs should understand the total cost of ownership of an ERP application before embarking on a project of this magnitude. Successfully implemented, ERP applications allow an organization to gain a competitive advantage by saving resources and by responding to the ever-changing

business environment (Mahdavian et al., 2016; Sudhaman & Thangavel, 2015). Additionally, a successfully deployed ERP system can increase customer satisfaction, reduce inefficient spending, strengthen sales and forecasts, reduce inventory turn-around times, and enhance employee productivity (Maas et al., 2014). Because large enterprises have been implementing ERP solutions since the mid-1990s, SMEs view an ERP solution as the answer to set them apart from the competition – but this belief could be due to their lack of experience and knowledge of ERP implementations. If leaders of SMEs continue to implement these applications without education, unless the differences between SMEs and large enterprises are clearly conceived, ERP implementations may continue to be painful and unfruitful for SMEs (Huin, 2004).

Managerial Theories in ERP Implementations

Although researchers have outlined various critical failure factors in the literature, management and leadership approaches are identified as failure factors in ERP implementations (Elkhani et al., 2014; Mitra & Mishra, 2016). Although prior research focused on IT-related theories such as the task-technology-fit (TTF) theory and the DOI theory (Pishdad et al., 2014), researchers still identify a gap between leadership theories and ERP implementation risk. In the next section, leadership theories, and how they can be integrated into CSFs in ERP implementations are reviewed.

Transformational leadership theory. Leaders are instruments of transformation exerted through the followers or employees to bring about change in governance and productivity (Dunn, Lafferty, & Alford, 2012; García-Morales, Jiménez-Barrionuevo, & Gutiérrez-Gutiérrez, 2012). First introduced by Burns (1978), transformational

leadership can be characterized as the ability of a leader to inspire employees to perform work beyond their expectations (Elkhani et al., 2014). When leaders of organizations embark on an ERP implementation, they are performing an internal business process reengineering (BPR) initiative. With this new project, firms should appoint a leader to the project that is equipped with BPR skills and has experience in being a change agent (Mitra & Mishra, 2016).

In research on change management during ERP implementations, Iveroth (2016) found that change management should be at the top of executive's strategic agenda and the leaders should refer to the empirical experience of internal and external resources. Also, during this time of change, leaders should act as transformational managers and focus on continuous improvement even after the project is closed (Iveroth, 2016). Although the external consultant working with the leader most likely has these skills, an internal change agent may be included on the implementation team to influence and lead operational decisions.

In portraying the following traits, transformational leaders can inspire, encourage, empower, and influence project team members to work toward the common objective of a successful implementation. When leaders encourage creativity through transformational leadership, users are more likely to experiment with the system features, enabling them to learn the system more quickly (Elkhani et al., 2014). Additionally, transformational leadership can create a higher level of psychological empowerment (PE), commitment to the project, and trust (Mittal, 2016).

Leadership and organizational change will help develop leaders and managers to adapt to change and complex situations. Valuable information for future leaders involves continued training in specialized areas such a communication, adapting to change, complex situations, and effective leadership and management skills. Research has shown a large percentage of leaders lack global leadership skills, and less than ten percent of organizations have a program in place to fulfill this gap (Minner, 2015). Regarding the future of management, there is room left for improvement that will be achieved through transformational leadership.

Servant leadership theory. Another leadership theory that is compared to transformational leadership is servant leadership. In comparing the two theories, it has been found that transformational leaders focus on organizational objectives while servant leaders focus on people as followers (Elkhani et al., 2014). Introduced by Greenleaf (1970, 1977), servant leadership includes ethics, virtues, and morality and has been noted as a model that may assist a leader in dealing with issues that arise within an organization. The primary objective of a servant leader is to empower followers to make a positive impact on the organization (Flynn, Smither, & Walker, 2015). Servant leaders are more empathetic than transformational leaders and incorporate emotional intelligence (EI). Kennedy (2012) found that EI has more importance to multicultural leadership than task-related knowledge or IQ. An emotionally intelligent leader demonstrates the ability to, identify not only the emotions of others but also acknowledge personal bias. With EI, leadership becomes the base for servant leadership by promoting the strengths of others. In researching servant leadership qualities within ERP implementations, Krog and

Govender (2015a) described five additional servant leadership dimensions: altruistic calling, emotional healing, wisdom, persuasive mapping, and organizational stewardship. In reviewing each of these dimensions as they pertain to projects, several studies revealed that persuasive mapping and altruistic caring would lead to employee empowerment, which in turn would harness innovative behavior, commitment, and trust (Hassan, Asad, & Hoshino, 2016; Krog & Govender, 2015b). Given little research has been performed on the servant leadership as it pertains to the implementation of ERP applications, this study will look to promote the input of all stakeholders that participate in these projects.

Challenging Conventional Leadership

Although leaders in various industries have shifted to transformational or servant leadership approaches, many leaders of small and medium manufacturing organizations continue to follow conventional leadership methods (Larteb, Benhadou, Haddout, & Nahla, 2016; Ndalila, Mjema, Kundi, & Kerefu, 2015). As a conventional leadership culture is established by its leaders, to harness creativity and innovation to create a competitive advantage for an organization, leaders may consider a transition from conventional leadership (Chawla & Sujatha, 2015). In the next section, approaches of how leaders have challenged conventional leadership will be reviewed (Acar, 2012).

Challenging conventional leadership with shared leadership. In the complex environment of increased global presence, conventional wisdoms and old managerial approaches are continually challenged. Leaders should be more improvisational and innovative as organizations leverage technology to gain a competitive edge over their competitors (Kasemsap, 2016; Ranjan, Jha, & Pal, 2016). To expand on this philosophy,

former General Electric Chief Executive Officer Jack Welch posited “if the outside environment is changing faster than the inside environment, the company is doomed” (Harvey & Buckley, 2002, p. 371). Although there may not be a universal managerial approach, managers must analyze their current business environment, reflect on the organization’s strategic vision, and act on complexities many organizations face in the late 2010s.

Mitra and Mishra (2016) stated that leadership is the most important factor in a successful or unsuccessful ERP implementation. Given ERP applications integrate all operational and financial functions of an organization, the traditional hierarchical leadership approaches have been proven unfavorable in these types of projects. With the cross-functional requirement of these engagements, a distribution of leadership may be required. The concept of shared leadership is a concept that has been studied at the executive and board member level in the past. To place shared leadership at the ERP project level, this approach could improve team effectiveness by sharing responsibilities which in turn could bring collaboration, trust, and mutual accountability (Le Pennec & Raufflet, 2016). Given younger professionals are more technologically experienced, and more tenured professionals have years of managerial experience, a shared leadership approach could be implemented during ERP implementations. In following this approach, blending technical and managerial experience could lead to successful ERP implementations within organizations.

Challenging conventional leadership with sponsor-leader exchange. Because ERP projects can last from 6 months to 2 years (Bansal & Agarwal, 2015), power

struggles could potentially arise among project leaders and team members. In the world of ERP implementations, the common misconception is that when one refers to a leader within a project, they are referring to upper-level management. In this case, the leader could be internal Project Manager, an external Project Manager or lead consultant, and organizational leaders are referred to as executive sponsors. With firms of all sizes implementing enterprise applications, leaders from different departments may be identified as the project leader resulting in various leadership styles. A managerial approach extensively researched in the area of leadership is known as leader-manager exchange (LMX). With this approach, leaders perform knowledge-sharing to provide the agreed upon vision of the firm's leadership team. LMX could lead to employee commitment and job satisfaction within an organization (Hall, Baker, Andrews, Hunt, & Rapp, 2015).

In translating this approach to ERP projects, when the executive sponsor (corporate leader) assigns a project leader to the implementation, he or she must outline the reasons why the organization decided to embark on implementing a new business application in a concept that could be coined as sponsor-leader exchange (SLX). By instituting an SLX approach in an ERP implementation, the leader is not only sharing information with managers and employees, but they are also sharing responsibilities. This approach not only enables alignment throughout the organization's network, but it also increases the interpersonal trust between the centralized leadership, decentralized management, and employees of the organization (Scandura & Pellegrini, 2008). In the implementation of SLX, project team members will have the ability to take the

information regarding the executive sponsor's vision and knowledge of the application to other employees within the organization, enabling decentralized decision-making, empowerment, and job enrichment.

In reflecting on the transformational and servant leadership theories, one possible conclusion is the appropriate approach depends on the project and culture of the organization. To enhance the innovativeness and creativity within ERP implementations, firms can blend transformational and servant leadership (Elkhani et al., 2014). On the topic of challenging conventional leadership, shared leadership and SLX can share the responsibilities of the implementation to harness the experiences and creativity of all members of a project. In closing, while there is no one-size-fits-all approach, as the business landscape continues to change, firms must find innovative ways to mitigate risk and remain sustainable within their respective markets.

Benefits of ERP Systems

As the global market shrinks because of technological and logistical advances, leadership teams of organizations are looking for ways to make strategic decisions to maintain or increase their market share in their respective industries. To turn these systems into a competitive advantage, leaders of firms have utilized ERP systems to make their operational, tactical and strategic processes more efficient and effective (Shao et al., 2015). ERP systems are integrated, customized, and packaged software-based systems that handle the majority of system requirements in all functional areas of a business such as finance, human resources, manufacturing, sales and marketing (Lin, 2010). In addition to using ERP systems as a tool to make day-to-day business decisions,

these systems can also be used as a tool to improve knowledge sharing within the organization. With ERP applications, organizations will enable departments and facilities to share knowledge and collaborate instead of operating out of disparate systems.

Technological benefits of ERP systems. With the rise of technology in the recent decades, ERP systems have made advances by shrinking the supply chain for organizations and their networks. ERP systems bring numerous competitive advantages to enterprises, including the reduction of business cost, quick response to customers, and the acceleration of corporate connections (Tsai et al., 2011). Moreover, ERP systems can increase an organization's financial performance by reducing inventory turnover, increasing receivables turnover, and increasing profit margins.

In addition to internal advantages, these systems also impact social change by passing on cost savings, as well as communicating important information generated by these systems to the consumer. In various studies, researchers have found that ERP systems increase trading partner satisfaction with the use of the Supplier Relationship Management (SMR) and Customer Relationship Management (CRM) modules within the application. In one study, May, Dhillon, and Caldeira (2013) found ERP systems will ensure the ability for firms to understand customer desires to provide suggestions based on buying patterns generated by the application. With the increase in communication and visibility through the use of ERP systems, organizations can work closer with their partners to build stronger alliances.

Knowledge sharing benefits of ERP systems. Given ERP systems can be leveraged to positively impact management decisions, knowledge sharing can be

included with the implementation of these applications. Knowledge sharing, also known as knowledge transfer is defined as the process through which one organizational unit is affected by the experience of another as an event through which one entity learns from the experience of another (Rezania & Ouedraogo, 2013). Typically, when organizations implement ERP systems, they will hire outside consultants that have the knowledge of the application, along with the familiarity of the industry best practices needed to successfully implement these solutions. Although selecting an experienced consultant is a critical success factor in the implementation and maintenance of an ERP system (Maditinos et al., 2012), the effective transfer of knowledge is more vital. Jeng and Dunk (2013) found knowledge creation within a firm is a strong predictor of ERP success. As organizational leaders continue to build their knowledge base throughout the implementation lifecycle, they will increase the likelihood of a successful ERP installation.

Regarding social impact, companies are using technology to alert their vendors and customers of inventory levels, forecasts, etc., allowing these trading partners can better manage their supply chains. With this information, an organization's trading partners can be proactive in identifying demand spikes, enabling them to increase headcount by employing more members of their communities. While technology and knowledge sharing can impact positive social change within an organization, management and leadership also play an important role.

Leadership benefits of ERP systems. When organizational leaders make the decision to bring new technology within an organization, management teams of these

organizations play a key role in the decision-making process throughout the life of the implementation. For a new technology installation to be successful, management buy-in is one of the critical success factors. In one study, the researchers found that top management support is a prerequisite for the successful ERP system implementation (Maditinos et al., 2012). In another study, Lin (2010) concluded that top management support influences both perceived usefulness and ERP system usage. With the level of change of an ERP implementation, some leaders may encounter resistance from their workforce, which could indicate the need for a change in leadership approach.

Once an ERP application is installed, management support does not stop there. Just as with any operational process or procedure, the management team of organizations must practice continuous improvement methods to realize the full capability of ERP applications. In organizations that have installed ERP systems, the post implementation calls for intensive interactions among managers with system users consisting of knowledge creating, sharing, extraction, preservation, and learning (Tsai et al., 2011). Throughout the life of the installed application, management must periodically review the usage of the ERP application to ensure users are not reverting to legacy systems and external applications, creating islands of information. From a strategic management perspective, Maditinos et al. (2012) found when top management works closely with ERP users, the communication between business groups is enhanced, and conflict resolution becomes attainable. Based on a review of the research on technology and knowledge sharing in organizations, all stakeholders of an organization should be held accountable for attaining the long-term success of installing an ERP application.

Common Methods and Techniques Used to Research ERP Implementations

Research methods and techniques conducted on ERP implementations in small and medium manufacturing environments were analyzed for the current study. Many quantitative, qualitative, and mixed methods studies have been conducted on the critical success factors in ERP implementations, with researchers outlining the strengths and weaknesses of each method. Additionally, although many approaches and techniques were identified for each design, the most cited approaches will be discussed for each method.

Quantitative studies have been used in analyzing critical success factors in ERP implementations because quantitative research designs are more amenable to this topic than qualitative designs (Hicks & Berg, 2014). With quantitative studies ranging from causal-comparative designs (Bansal & Agarwal, 2015; Ravasan & Mansouri, 2016; Uwizeyemungu & Raymond, 2009) to correlational designs (Beheshti et al., 2014; Garg & Agarwal, 2014; Ram & Corkindale, 2014), surveys were the most referenced quantitative approach in reviewing critical success factors in small and medium manufacturing ERP implementations (Ab Talib & Abdul Hamid, 2014; Ab Talib, Abdul Hamid, & Thoo, 2015; Bansal & Agarwal, 2015; Pishdad et al., 2014). Surveys were used to quantify the current and future state of ERP implementations in small and medium manufacturing environments (Tatari, Castro-Lacouture, & Skibniewski, 2007). In surveys, the Likert-type scale was the most used scale for measuring patterns, attitudes, and opinions of participants responding to critical success factors in ERP

implementations (Costa, Ferreira, Bento, & Aparicio, 2016; Garg & Agarwal, 2014; Tatari et al., 2007).

In their conclusion of researching critical success factors, Gajic et al. (2014) stated quantitative studies on ERP applications and their impact on business performance are not sufficient. Additionally, Markus, Axline, Petrie, and Tanis (2000) concluded that the economic benefits of ERP applications are difficult to measure through the use of quantitative analysis. Reviewing the literature revealed that researchers who analyzed critical success factors in ERP implementations used qualitative case studies (Abdelmoniem, 2016; Alharthi et al., 2017; Mo & He, 2015; Saade & Nijher, 2016) and phenomenological research designs (Jrad & Sundaram, 2015; Yurtseven & Buchanan, 2016).

During the review of the literature, the mixed method approach was cited less often than quantitative and qualitative methods. Mixed methods may be effective when one research method can be used to inform the other (Fetters, Curry, & Creswell, 2013). In studies on ERP critical success factors where either the qualitative or quantitative data are lacking, a mixed method approach could assist in strengthening the study (Gajic et al., 2014). In the ERP implementation studies that included both interviews and surveys, researchers referred to the mixed method design to conduct their research (Dwivedi et al., 2015; Peng & Nunes, 2013). Although the mixed methods approach provides the in-depth, contextualized insights of qualitative research coupled with the more efficient but less rich quantitative research (Zha & Tu, 2016), the disadvantage to this approach is that it is more time consuming compared to other methods.

Ali and Miller (2017) concluded that because the findings in ERP studies are repetitive and lack empirical research, scholars and practitioners should collaborate to produce more innovative research techniques. Additionally, Scholtz, Calitz, and Cilliers (2013) found empirical studies on small and medium-sized enterprises are limited. Aligned with my study, Scholtz et al. (2013) outlined the importance of consultants to identify critical success factors in an ERP implementation. After many researchers have analyzed a small set of organizations that measured the CSFs of their implementations (Gajic et al., 2014; Ghobakhloo et al., 2012; Ravasan & Mansouri, 2016), by developing a sample size of experienced consultants, a larger sample size of ERP implementations was measured in my study, as consultants generally have implemented multiple ERP applications during their tenure. Because these consultants have performed multiple ERP implementations, by using a Delphi approach, each CSF can be measured to establish a more defined list of CSFs SMEs can use to implement their ERP solutions successfully.

Gaps in the Literature

A review of the literature uncovered ERP implementations continue to fail due to a number of reasons. Although researchers have concluded that top management support, user feedback, training and education, project management, and ERP package selection are factors that can mitigate the risk of failed implementations, a gap still exists (Baykasoğlu & Gölcük, 2017; Leyh & Sander, 2015; Shao, Feng, & Hu, 2016; Sun et al., 2015; Tarhini et al., 2015). With the lack of consensus regarding critical success factors identified in the literature versus those applied in small and medium manufacturing

environments (Alshardan, Goodwin, & Rampersad, 2015; Venkatraman & Fahd, 2016), the goal of this study was to narrow the scholar-practitioner gap.

In performing a literature search on positive social change and ERP implementations, the search results uncovered the gap still exists on the research topic (Elbardan & Kholeif, 2017; Seth et al., 2017). Narrowing this gap may contribute to positive social change by working toward building a consensus among ERP manufacturing consultants and scholars to improve project success and the triple bottom line for large enterprises and small and medium enterprises in the manufacturing industry. By producing the results of the study, the scholar-practitioner gap may be narrowed by reviewing and implementing the top critical success factors identified in this study.

Summary and Conclusions

This chapter included a review of the existing literature that focused on ERP applications and the impact on organizations. The conceptual framework and implications related to ERP implementation success were also examined. Additionally, the history of ERP applications was introduced, as well as the benefits of implementing ERP systems. Because many leaders of organizations will be implementing ERP systems for the first time, leadership methods and approaches to successfully install these applications were also discussed.

Although leaders of organizations continue to implement ERP systems to create a competitive advantage, the results of the literature review uncovered implementing these applications without knowledge and education can lead to unsatisfactory results such as

budget, schedule overruns, and overall fit of planned business processes with implementation deliverables (Bintoro et al., 2015; Ravasan & Mansouri, 2016). The literature review also uncovered a variety of quantitative, qualitative, and mixed methods designs. Even though each method has advantages and disadvantages, a qualitative modified Delphi research approach best assisted in answering the research question. With the request from researchers to provide more innovative research techniques (Ali & Miller, 2017), a modified Delphi approach may fill the gap in the research.

The research design and justification for the current qualitative modified Delphi study are discussed in Chapter 3. I also discuss the role of the researcher and the methodology, which will include the data collection instruments, sampling specifics, measurement tools, and the data analysis approach. I will conclude the chapter with the issues with trustworthiness and the ethical procedures that were used in this study.

Chapter 3: Research Method

The purpose of this qualitative modified Delphi study was to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of CSFs in ERP implementations in the United States. The study involved sampling an expert panel of ERP manufacturing consultants, who participated in three rounds of online surveys. Data collection continued until consensus was achieved in Round 3.

Enterprise projects are complex, and require resources, time, and capital (Bansal & Agarwal, 2015). Although these applications can lead to a strategic competitive advantage for an organization (Habibzadeh et al., 2016), the large number of failed implementations may require additional research on CSFs in information systems projects (Schönberger & Čirjevskis, 2017). Due to the increased competitiveness and customer expectations within the small and medium manufacturing sector, researchers have suggested that CSFs for ERP implementation be periodically reviewed for refinement (Rashid et al., 2018; Sharma et al., 2015). Furthermore, the CSFs previously noted in the literature may no longer apply (Saade & Nijher, 2016). In conducting this study, I was able to uncover previously unexplored CSFs through the analysis of participants' narrative comments in Round 1.

Chapter 3 includes descriptions of and rationales for the research method and design, followed by discussion of the role of the researcher. The participants, how and why they were selected, along with an overview of the sample size will also be discussed. Additionally, the instrumentation will be described in detail, followed by the data analysis procedures. I will conclude the chapter with a consideration of issues of

trustworthiness, which includes credibility, transferability, dependability, and confirmability. Ethical procedures will also be described.

Research Design and Rationale

I undertook the research in this study to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of CSFs in ERP implementations in the United States. The research question and subquestions were as follows:

RQ1: What is the level of consensus among ERP manufacturing consultants as to the desirability and feasibility of critical success factors for ERP implementations?

RQ1 Subquestion 1: What is the level of consensus among ERP manufacturing consultants as to the desirability of critical success factors for ERP implementations?

RQ1 Subquestion 2: What is the level of consensus among ERP manufacturing consultants as to the feasibility of critical success factors for ERP implementations?

I reviewed the research methods that have been used by other scholars who have examined ERP implementations in small and medium manufacturing environments (Ngai et al., 2008; Remus & Wiener, 2010; Zeng et al., 2015). After appraising quantitative, qualitative, and mixed-methods research designs, I selected the qualitative method because of the request for further qualitative research on ERP implementations in SMEs (Ho & Lin, 2004; Ngai et al., 2004; Scholtz et al., 2013). Another reason why I chose the

qualitative method was to identify patterns among CSFs in ERP implementations (see Pishdad et al., 2014; Ravasan & Mansouri, 2016; Shen et al., 2016; Turner, 2014).

To answer the research questions, I reviewed qualitative approaches such as grounded theory, phenomenology, and the Delphi method. Although grounded theory is a valuable approach when collecting empirical research (Eisenhardt, 1989; Orlikowski, 1993), it was not appropriate because the aim of the study was not to explain ERP implementations by developing a theory grounded in the data (Glaser & Strauss, 2012). Instead, the goal of this study was to establish a consensus as to the desirability and feasibility of CSF benchmarks for ERP implementations. For this reason, I also opted against using a phenomenological approach, the focus of which is on exploring the essence and meaning participants attach to the lived experience of a particular phenomenon (Moustakas, 1994). The Delphi method was selected for this study because of its demonstrated value in anticipating long-term trends in technology (Adler & Ziglio, 1996; Linstone & Turoff, 2002).

The Delphi technique is a qualitative research design that is used to establish a consensus through the input of a panel of experts without the requirement of face-to-face interaction (Linstone & Turoff, 2002; von der Gracht & Darkow, 2013). The classical Delphi technique consists of three rounds of surveys to reach a consensus (Linstone & Turoff, 2002). The typical panel size in a classical Delphi study consists of six to 12 experts (Habibi et al., 2014; Romano, 2010). Round 1 of a classical Delphi is typically composed of open-ended questions that are included to explore the research topic fully (Adler & Ziglio, 1996; Linstone & Turoff, 2002; Skulmoski, Hartman, & Krahn, 2010).

A modified approach is an iterative data collection procedure that relies on a panel of experts to analyze the future state of a given scenario or phenomena (Elnasr et al., 2012; Hsu & Sandford, 2007). Modified Delphi studies are based on what is already known about a topic, as available in the literature (Keeney, Hasson, & McKenna, 2006; Upton & Upton, 2006). Because Round 1 of this study was composed of closed-ended questions rated on a scale and the expert panel proposed modifications to existing CSFs, the approach was a modified Delphi study. Because the Delphi study was composed of a target sample of 42 ERP manufacturing consultants to narrow a gap in the research, to align this study with the types of Delphi studies identified in the literature, a modified Delphi approach was conducted (Hung et al., 2016; Zeng et al., 2015).

Researchers who have completed Delphi studies that focused on ERP implementations have indicated that future research should be conducted using larger sample sizes, as the results may be more useful given that smaller Delphi groups face potential bias (Chuang, Lin, Chen, Chen, & Wang, 2015). Compared to other Delphi studies conducted on a small subset of ERP manufacturing consultants to analyze CSFs (Bansal & Agarwal, 2015; Islam, Anis, & Abdullah, 2015; Sun et al., 2015), finding a consensus among ERP consultants may have provided a more holistic view of CSFs for manufacturers regardless of the chosen solution because of the diverse perspectives of the panelists. Hiring consultants has become a common practice for organizations implementing ERP solutions (Chang et al., 2013; Mitra & Mishra, 2016). In the study findings, my goal was to provide a forward-looking analysis on CSFs that scholars,

practitioners, and firms can put into practice as the manufacturing industry moves further into Industry 4.0.

Role of the Researcher

As the researcher, I was the primary source of instrumentation, data collection, and analysis for this study. Given that I drew from my professional networks through LinkedIn groups to recruit panelists, professional relationships may exist between myself and the study participants, who remained anonymous. To my knowledge, I did not have supervisory or instructor relationships with any of the participants. I have been a member of some of the LinkedIn groups in which I asked permission to post my survey. To reduce researcher bias, I joined other groups to reduce the likelihood of having relationships with study participants prior to the submission of the main study to the Walden University Institutional Review Board (IRB).

To mitigate the risk of bias due to my ERP manufacturing consulting experience, I used the approach of Polkinghorne (1989) to support the validity of the findings. The first phase of the Delphi study was qualitative in nature. As such, Polkinghorne's (1989) five questions provided a foundation for validation in the study:

- Did the researcher influence the participants' descriptions that do not reflect their empirical experience?
- Were the survey questions easily understood?
- In analyzing the surveys, were there other conclusions that could have been derived? If so, where these identified?

- Was it possible to disseminate the responses and relate to the panelists' experience?
- Was the survey description situation specific?

After performing the narrative data collection, I analyzed the data through Likert-type response data using coding and statistical means. The Likert-type scale can provide more accurate information about the panelists' perceptions to answer the research questions (Oppenheim, 1992). This approach also led to more valid and reliable research because the data were collected through online surveys and increased its diversity while reducing chances of error and bias. When data are collected through the various ways, there will be relatively fewer chances that the information gathered could contain bias (Burkholder, Cox, & Crawford, 2016). Therefore, the research should be more accurate, and the data analysis techniques should have reduced bias.

Methodology

The research questions drive the research methodology to be used (Coyle & Tickoo, 2007; Creswell, 2007, 2009). A research methodology provides the foundation for a study, as well as the framework for participant selection, data collection methods and processes, and data analysis (Burkholder et al., 2016; Frankfort-Nachmias & Nachmias, 2009). Although the qualitative studies reviewed included a range of approaches, after performing an exhaustive analysis, I focused on the qualitative Delphi method. Given the Delphi method has been used to anticipate long-term trends in technology (Adler & Ziglio, 1996; Linstone & Turoff, 2002), I used this method to rely on the experts' opinions to predict the future outcomes of critical success factors in ERP

implementations within small and medium manufacturing environments. In the following sections, I will detail my methodological approach to the study.

Target Population

The target population for this study was ERP manufacturing consultants in the United States with ERP implementation experience. ERP manufacturing consultants are regarded as the experts in their specified manufacturing sector and are highly trained in the technical and practical implementation of enterprise applications (Chang et al., 2013; Mitra & Mishra, 2016). Because consultants spend a large amount of time at customer sites during implementations, they are typically distributed across the United States to support multiple client facilities and projects. Due to the increasing number of small and medium manufacturing organizations implementing ERP applications (Mayeh, Ramayah, & Mishra, 2016; Soler, Feliks, & Ömürgönülşen, 2016), determining the number of consultants in the target population in the United States that support these implementations was difficult. With the U.S. government estimating the number of consultants nationwide growing to 993,000 by 2020, a minimum of 200,000 consultants would be included in the ERP application industry segment (Joshi, Kuhn, & Niederman, 2010; Orr & Orr, 2013). Although the current study could have included ERP project managers as the expert panel to expedite the rate of reply, choosing ERP consultants provided a ground level view of the critical success factors that can be implemented in ERP implementations.

The participants for this study were selected based on ERP implementation experience, not their geographical region. I solicited participants for this study through

the following 10 groups on LinkedIn: (a) SAP Community; (b) Dynamics AX ERP Professionals Group; (c) Oracle ERP User Network; (d) JD Edwards OneWorld and EnterpriseOne Professionals; (e) Microsoft Dynamics 365; (f) QAD Community; (g) Infor Global Solutions Professionals; (h) Netsuite Users Group; (i) Epicor ERP 10 Consultants; and, (j) Acumatica ERP Software User Group. These LinkedIn groups are focused on connecting ERP consultants to share knowledge and best practices on their respective applications and can range from 175 to 342,000 members.

See Appendix A for the request sent to each LinkedIn group moderator and the permission obtained from each LinkedIn group moderator to post the study invitation to their group. The invitation message appears in Appendix B. Although I have been a member of a number of the LinkedIn groups from which I asked permission to post my survey, to reduce researcher bias I also joined other LinkedIn groups from which participants were solicited to reduce the likelihood of having relationships with study participants prior to the submission of the main study to the IRB. The selection of ERP manufacturing experts that implement different ERP solutions should have produced unbiased results due to varying implementation methodologies, application functionalities, and organizational cultures.

Participant Selection Logic

The careful selection of participants is the cornerstone to a successful Delphi study to obtain valid and trustworthy results (Lohuis, van Vuuren, & Bohlmeijer, 2013; Orte, Ballester, Amer, & Vives, 2014; Steurer, 2011). Because some consultants may not possess the in-depth knowledge of some of the critical success factors identified in the

survey, an uneven distribution of experience may be represented in the results (Hsu & Sandford, 2007). To minimize this uneven distribution, the study involved a purposive sampling technique to ensure meaningful results in the study. The purposive sampling technique, also known as judgment sampling, is a non-probability approach that is most effective when a study requires expert knowledge within a particular domain (Etikan, Musa, & Alkassim, 2016). In purposive sampling, the aim is to reach data saturation (Guest, Bunce, & Johnson, 2006; Ravitch & Carl, 2016). Purposive sampling was appropriate to the study given the purpose of the Delphi technique is to obtain expert opinion from the participants (Fink & Kosecoff, 1985).

To acquire relevant data, I carefully selected ERP manufacturing consultants for the expert panel for this study. Participants for the study were selected based on the following criteria: (a) at least 5 years of experience implementing ERP applications; (b) perform ERP implementations in the United States; (c) perform ERP implementations in the industrial or manufacturing sector; and, (d) perform ERP implementations for small and medium enterprises (firms that employ fewer than 500 employees). The ERP manufacturing consultants self-selected based on the criteria provided in the invitation. After completing the informed consent, the participants were presented with screening questions where they were prompted to check yes or no in response to each question (see Appendix C). If they selected no for any of the questions, they were thanked for their interest and were not able to access the survey.

Because the minimum recommended response rate for each round is between 40% and 50% (Atkinson & Gold, 2001), at least 125 consultants were solicited in Round

1 of this study to achieve saturation in the narrative data and to retain the target sample size of 50 ERP manufacturing consultants for the subsequent rounds of data collection. Data saturation in qualitative research occurs when new themes are no longer found, and enough information has been collected to replicate the study (Fusch & Ness, 2015; Ravitch & Carl, 2016). Although Delphi studies typically range between 15 to 20 participants (Hsu & Sandford, 2007), at least 125 consultants were solicited in Round 1 of this study to achieve saturation in the narrative data and to retain the target sample size for the subsequent rounds of data collection. The exact number is difficult to determine due to the solicitation process via social media.

Because of the length of the study and the multiple rounds of data collection, it was imperative to alleviate the possibility of participants dropping out during multiple points of the study. To alleviate this risk, I outlined the premise of a Delphi study in the survey invitation, stated there would be a minimum of three rounds, and pointed out that this study would build on the knowledge of the ERP consulting practice.

Instrumentation

In their research on critical success factors, Sun et al. (2015) identified more than 80 critical success factors in the literature. The Round 1 instrument in this study was limited to the critical success factors identified by Saade and Nijher (2016). In their study, Saade and Nijher performed a literature review of 37 case studies from different countries and contexts. The results of the study resulted in a consolidated list of 22 distinct critical success factors that can be applied to the five ERP implementation stages identified by Saade and Nijher: (a) the organizational state, (b) business requirements

gathering, (c) the proposed technical solution, (d) implementation, and (e) post-implementation.

The data collection instruments in this study consisted of online surveys. These surveys were administered through SurveyMonkey.com, a secure online survey provider. In the first round, the expert panel of ERP manufacturing consultants were asked to complete the survey outlined in Appendix D. The expert panel rated the critical success factors on a 5-point Likert-type scale. The ratings on the scales ranged from 1 to 5: 1-highly undesirable, 2-undesirable, 3-neutral, 4-desirable, and 5-highly desirable. Using the definitions outlined by Linstone and Turoff (2002), the following desirability descriptions were included to provide clarity for the participants: 1-highly undesirable: will have a major negative impact to the implementation; 2-undesirable: will have a negative impact to the implementation with little positive to no positive effect; 3-neutral: will have no impact on the implementation; 4-desirable: will have a minimal positive impact to the implementation with little negative effect; and 5-highly desirable: will have a positive impact to the implementation with no negative effect.

In addition to the instrument outlined above, the Round 1 survey included demographic questions. The demographic questions included (a) age range, (b) gender, (c) education level, (d) years of experience, (e) number of implementations completed in small and medium manufacturing environments (organizations that employ less than 500 employees), and (f) geographic region. Identifying the demographic characteristics of the study participants validated the level of distribution among the expert panel regarding their expertise and experience. The age range choices on the survey were: (a) 21 and

under, (b) 22 to 34, (c) 35 to 44, (d) 45 to 54, (e) 55 to 64, and (f) 65 and over. The participants entered their gender in response to a question in the survey. The choices for participants' years of experience were: (a) 5 to 10 years, (b) 11 to 15 years, (c) 16 to 20 years, and (d) 21 years or more. The choices for participants' highest education level were: (a) high school diploma, (b) bachelor's degree, (c) master's degree, and (d) doctoral degree. The choices for the number of implementations the participant completed in small and medium manufacturing environments were: (a) 1 to 5, (b) 6 to 10, (c) 11 to 15, (d) 16 to 20, and, (e) 20 or more. The choices for geographic regions were: (a) Northeast, (b) Midwest, (c) Southeast, (d) Southwest, and (e) West. The participants were also encouraged to add additional ERP factors not outlined in the survey. After reviewing the responses, the 10 critical success factors with the highest frequency were moved to Round 2 of the study.

In Round 2 the panelists rated the desirability and feasibility of the critical success factors using two separate 5-point Likert-type scales. The instrument included the 10 top critical success factors identified in Round 1. The ratings on the scale ranged from 1 to 5: 1-highly undesirable/highly infeasible, 2-undesirable /infeasible, 3-neutral, 4-desirable/feasible, and 5-highly desirable/highly feasible. In Round 2, the participants were provided with the same descriptions for desirability as were used in Round 1.

Along with the desirability descriptions, the following feasibility descriptions were included to provide clarity for the participants (Ravasan & Mansouri, 2016; Linstone & Turoff, 2002): (a) highly infeasible: should not be implemented due to the project schedule, cost, or resource constraints; (b) infeasible: some indication or

empirical experience that the critical success factor should not be implemented due to an impact to the project schedule, cost, or resource constraints; (c) neutral: will have no impact on the implementation; (d) feasible: some indication or empirical experience that this critical success factor can be implemented successfully without an impact to the project schedule, cost, or resources; and (e) highly feasible: this critical success factor can be implemented successfully without an impact to the project schedule, cost, or resources. The critical success factors with the highest ratings of desirability and feasibility in Round 2 were moved into Round 3, during which the ERP manufacturing consultants rated the remaining critical success factors for desirability and feasibility. The same desirability and feasibility descriptions used in Round 2 were presented to the participants in Round 3. Subsequent rounds of rating were not required as consensus was reached in Round 3.

Field Test

Prior to IRB approval, the study included a field test of the Round 1 survey to test the clarity and relevance of the open-ended questions on the survey. In Figure 4, I outlined the critical success factors that were used in the field test to ensure the experts clearly understood the scope of the research. San-Jose and Retolaza (2016) stated the phrasing of a survey is important to ensure the participants accurately answer the questions. The goal of the field test was to identify ambiguities in the objective, definitions, and survey questions. No data were collected.

Cultural change readiness (CCR)	Detailed data migration plan (DMP)
Top management support and commitment (TMSC)	Measurable goals (MG)
Knowledge capacity production network (KCPN)	Small internal team of best employees (STBE)
Minimum customization (MC)	Open and transparent communication (OTC)
Legacy systems support (LSS)	Base point analysis (BPA)
ERP fit with the organization (EFO)	Morale maintenance (MM)
Local vendors partnership (LVP)	Contingency plans (CP)
Detailed cost (DC)	ERP success documentation (ESD)
Business process re-engineering (BPR)	User feedback usage (UFU)
Quality management (QM)	Maximum potential usage (MPU)
Risk management (RM)	Results measurement (RM)

Figure 4. ERP critical success factors. Adapted from "Critical Success Factors in Enterprise Resource Planning implementation: A Review of Case Studies" by R. G. Saade and H. Nijher, 2016, *Journal of Enterprise Information Management, 29*, p. 88. Copyright 2016 by Emerald Group Publishing Limited.

In the field test, eight experts with knowledge of ERP implementations and item construction reviewed the surveys for face and content validity of the questions. Four of the eight experts who participated in the field test had experience with ERP implementations in an academic setting and four had experience consulting within the ERP industry. The four ERP consulting experts were ERP manufacturing consultants I connected with through LinkedIn, through which I messaged them my study instrument for their feedback. In conducting my literature review, I uncovered four academic ERP experts who previously chaired dissertations on the topics of ERP applications or Delphi

studies. Using their contact information, I sent them an email explaining the purpose of the field test and requested their feedback. All surveys were returned within 2 days of sending the surveys to the experts. The participants in the field test did not participate in the main study.

The field test experts were emailed the Round 1 survey questions for feedback. After reviewing the questions, the experts were asked to provide feedback on the clarity and relevance of the questions by responding to two questions about the survey. See Appendix E for the field test questions. Based on the feedback, the survey questions for Round 1 were modified. The feedback from this field test assisted in identifying areas that needed revision before the main study began.

One of the experts stated they had to read the survey objective twice before understanding how to answer the survey questions. With this feedback, I rephrased the objective to make it more understandable to the expert panel before Round 1 began. Regarding the definitions for the study, one of the experts stated that they were somewhat unclear of the local vendor's partnership metric. To resolve this issue, I added additional definitions to this metric to ensure the participants fully understood the critical success factor when taking the survey. The results of the field test are outlined in Chapter 4.

Internal Consistency Reliability

To test the internal reliability of each of the items pertaining to critical success factors in Round 2 and Round 3, Cronbach's (1951) coefficient alphas were calculated in SPSS using the main study data. Cronbach's alpha is used to examine the internal consistency reliability of multipoint scales (Heitner, Kahn, & Sherman, 2013; Tavakol &

Dennick, 2011). Ranging from 0 to 1, the closer the coefficient value is to 1, the more reliable the scale (Anderson & Gerbing, 1988). A value greater than or equal to 0.7 is an acceptable reliability coefficient (Nunnally, 1967; Wijkstra et al., 1994).

Procedures for Recruitment, Participation, and Data Collection

Procedures for recruitment. Permission was obtained from each LinkedIn group moderator for the moderator to post my survey to their respective LinkedIn group. Using social media in conjunction with an online survey tool not only reduces the time to collect data, but it also allowed access to a larger pool of ERP manufacturing consultants for the expert panel.

Procedures for participation. Participants were presented with an invitation post on their respective LinkedIn group pages that included information about the research purpose, as well as the SurveyMonkey link to access the URL for the informed consent process and the survey. The invitation post also included my contact information in the event that the participants had questions regarding the study. In an attempt to minimize the time for the data collection, I asked the participants to submit the survey as soon as possible for each round of my study.

Data collection. Once the study commenced, the study spanned 1.5 months due to the iterative nature of a Delphi study. Delphi studies can take around 45 days to administer while allowing the ERP manufacturing consultants 2 weeks to respond during each round of the study (Delbecq, Gustafson, & Van de Ven, 1986; Ludwig, 1997). Although ERP consultants spend a large amount of time onsite with clients, the lead time to receive responses did not have to be extended.

My Delphi study involved three rounds of data collection and analysis. The study was administered through SurveyMonkey.com, a secure online survey provider. Online surveys are advantageous in studies where controlled samples are required (Burgess, Sellitto, Cox, & Buultjens, 2011; Evans & Mathur, 2005). Additionally, performing an online survey provided speed, convenience, and cost savings compared to conventional surveys (Dixon & Turner, 2007; Evans & Mathur, 2005). Figure 5 includes the strengths and weaknesses of online surveys.

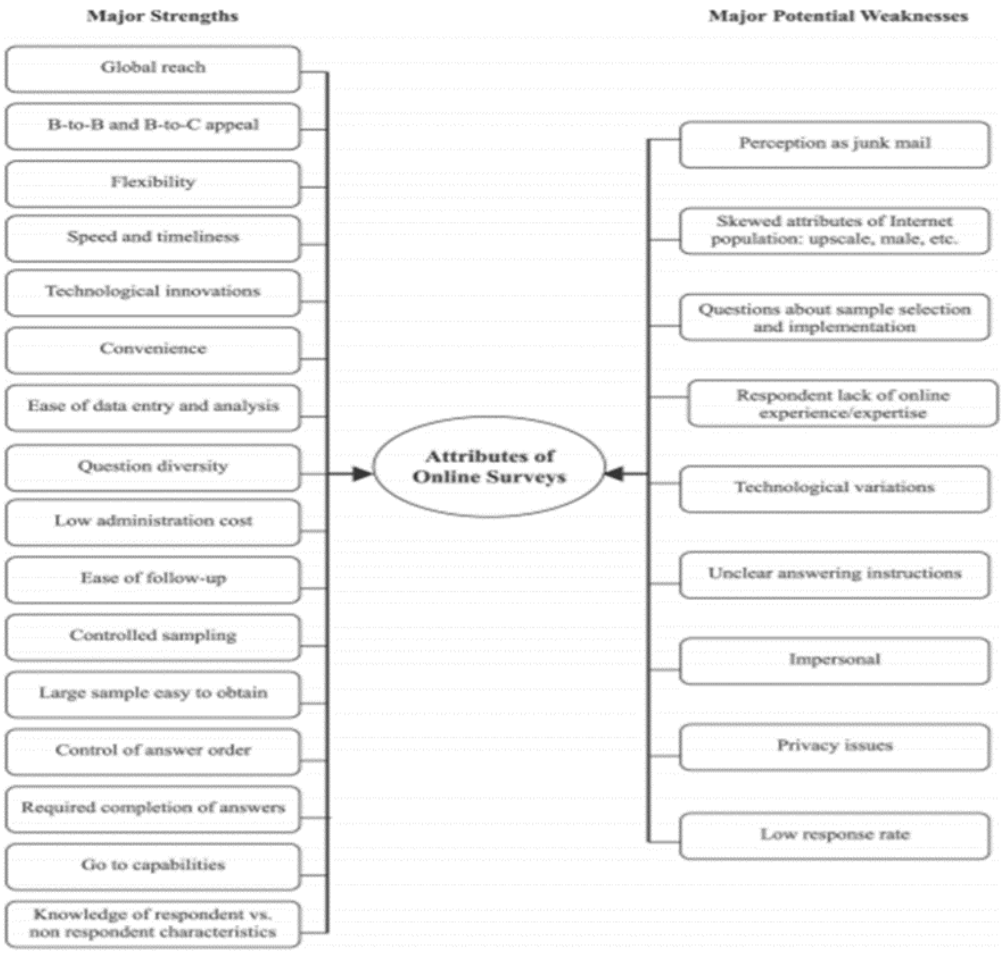

Figure 5. Online survey strengths and weaknesses. Adapted from "The Value of Online Surveys" by J. R. Evans and A. Mathur, 2005, *Internet Research, 15*, p. 197. Copyright 2005 by Emerald Group Publishing.

In the first round, the expert panel of consultants were asked to provide narrative comments on the existing critical success factors. The participants were also encouraged to provide additional factors not outlined in the survey. After reviewing the responses, the top 10 critical success factors with the highest desirability were moved to Round 2 of the study.

Round 2 data were comprised of the ERP manufacturing consultants' ratings of the desirability and feasibility of the top 10 most desirable critical success factors from Round 1 using two separate 5-point Likert-type scales. The top two percentages (rating of 4 or 5) with 75% or higher on both the desirability and feasibility scales were moved to Round 3. Because percentage agreement and median of agreement may be used in the same Delphi study (Heitner et al., 2013), I also examined each critical success factor's median score. Given a median score of greater than or equal to 3.5 has been identified as an acceptable of consensus in a Delphi study (Diamond et al., 2014; Fox et al., 2016; Paoloni et al., 2017), items with a median score of 3.5 or higher were also included in Round 3.

Round 3 data were comprised of the ERP manufacturing consultants' ratings of the remaining critical success factors for desirability and feasibility. In Delphi studies, consensus is reached when saturation of opinion occurs, or when sufficient information has been exchanged (Skulmoski et al., 2010). To determine the level of consensus, researchers have identified when 75% of experts select 4 or 5 on a Likert-type scale, consensus has been met (Diamond et al., 2014; Fox et al., 2016; Paoloni et al., 2017). Although I used a median score in Round 2, only the top two percentages with 75% or higher on both the desirability and feasibility scales were used for Round 3.

Although many researchers have noted that Delphi studies require three or more rounds to reach a consensus (Hasson & Keeney, 2011; Loo, 2002; Powell, 2003), Taraba, Mikusz, and Herzwurm (2014) concluded that the majority of changes occur in the first two rounds of a Delphi study. According to Mitchell (1991), "there is not much gained in

conventional Delphi by iterating more than twice" (p. 347). Given the lack of consensus in the literature regarding the appropriate number of rounds, the current study participants were informed that a maximum of five rounds would take place to reach a consensus. Subsequent rounds of rating were not required, as consensus was reached in Round 3.

After all responses were received, the summary data from SurveyMonkey.com were downloaded to an Excel file. The data were then reviewed for incomplete or inaccurate information. The time for this process was minimized as SurveyMonkey.com has built-in logic to make questions mandatory, allows for only a defined set of answers, and can be set to only allow one submission per participant. Once the data review was completed, the final Excel file was saved for analysis. Researchers have identified when 75% of experts select 4 or 5 on a Likert-type scale, consensus has been met (Diamond et al., 2014; Fox et al., 2016; Paoloni et al., 2017). In performing this methodical approach, the goal of this study was to narrow the gap between the critical success factors identified in the literature versus the critical success factors employed in the field of ERP consulting.

Data Analysis Plan

Throughout all rounds of the study, I analyzed the data to produce reliable findings and to answer the research question and subquestions using an iterative approach (Kerwin-Boudreau & Butler-Kisber, 2016). In this study, I used the critical success factor conceptual framework as a tool to analyze the data. To reduce the time gap between Round 1 and Round 2, I began the data analysis process as soon as the panelists begin to submit the Round 1 responses.

Round 1 survey responses were coded using the open coding method. The open coding method was used to categorize, sort through, and compare the new critical success factors identified by the participants (Iamratanakul, Badir, Siengthai, & Sukhotu, 2014; Remus, 2007). For the narrative data, I searched for common themes to group the new critical success factors into thematic categories given thematic analysis is the most used analysis tool in the first round of a Delphi study (Heitner et al., 2013). To organize the data, I created an Excel file to track participant responses and modifications. Once the new critical success factors were categorized, because they were not among the top 10 most desirable critical success factors with the highest frequency, they were not added to the new critical success factors in the Round 2 survey list.

Throughout data analysis, I analyzed the numeric, Likert-type scale data. In the first round, the top 10 critical success factors with the highest desirability were moved to Round 2 of the study. The Round 2 data were comprised of the ERP manufacturing consultants' ratings of the desirability and feasibility of the top 10 most desirable critical success factors from Round 1 using two separate 5-point Likert-type scales. Although I used a median score in Round 2, only the top two percentages with a median score of 3.5 or higher on both the desirability and feasibility scales were included in Round 3. Round 3 data were comprised of the ERP manufacturing consultants' ratings of the remaining critical success factors for desirability and feasibility.

Demographic data were analyzed to describe the characteristics of the sample. For the nominal variables of gender and geographic region, I described the distribution of these variables using the mode and frequency counts and percentages. For the ordinal

variables of age, highest level of education attained, years of experience, and number of implementations completed in small and medium manufacturing environments, I used frequency counts and percentages and the mode.

The research question pertained to the level of consensus among ERP manufacturing consultants as to the desirability and feasibility of critical success factors for ERP implementations. To answer the research question and subquestions, the critical success factors with the highest consensus on desirability were used to answer Subquestion 1. The critical success factors with the highest feasibility were used to answer Subquestion 2. The critical success factors with the highest consensus on both desirability and feasibility were used to answer the primary research question.

Issues of Trustworthiness

Qualitative studies consist of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). Trustworthiness contributes to the credibility of data elements such as prolonged engagement, consistent observations, competence, participant checks, and debriefing (Abro, Khurshid, & Aamir, 2015). In the next section, I will outline each criterion in detail as it pertained to the current study.

Credibility

Reviewing different methodologies and frameworks helps to enhance the credibility of one's study (Denzin & Lincoln, 2005). Credibility in qualitative research is established when participants or reviewers of a study recognize experiences by reviewing the findings and can interpret the truth of the data (Cope, 2014; Lincoln & Guba, 1985). In the current Delphi study, I identified ERP manufacturing consultants as the expert

panel to validate the credibility of the study. To ensure credibility, the findings of the study should be aligned with reality (Shenton, 2004). Since ERP manufacturing consultants have been found to be integral to the success of an ERP implementation (Ravasan & Mansouri, 2016; Rezania & Ouedraogo, 2013), I chose this group as the expert panel given these resources are working directly with the client throughout the entire implementation lifecycle. The potential loss of objectivity can lead to credibility and trustworthiness concerns (Thomas & Magilvy, 2011). To ensure credibility and alleviate researcher bias, I created a reflexive journal and ensured data saturation in the study.

Transferability

Transferability can be used to describe how the knowledge generated in the study can be applied to similar groups or settings (Cope, 2014). To demonstrate transferability, I attempted to establish a well-described study for the findings to be immediately put into practice at any phase of an ERP implementation. By using thick description of the critical success factors in the survey (Hasson & Keeney, 2011), my goal was to ensure the transferability of the Delphi research. By selecting ERP manufacturing consultants from a number of ERP providers, the results of the study may be transferable across all ERP platforms and implementation methodologies. With transferability, the results may be applied to other situations or contexts (Collier-Reed, Ingerman, & Berglund, 2009; Langley, 1999). Although the study focused on ERP applications, the identified critical success factors may also be transferred outside of ERP applications. Outside of business enterprises, governments and academic institutions implement applications to enhance

their decision-making, management, and workflow capabilities. For these non-ERP requirements, these organizations can refer to the results of the current study to understand the critical success factors that can be exercised in their Learning Management Systems (LMS) or Customer Relationship Management (CRM) projects.

Dependability

Consistency in the problem statement, the purpose statement, and the research question improve the logic and transparency of research (Newman & Covrig, 2013). Due to the iterative nature of a Delphi study, continuous checks of the survey data and participant responses were performed throughout the study. Alignment of the methodology to the problem statement, the purpose statement, and the research question support dependability to ensure consistency and transparency (Newman & Covrig, 2013). In performing quality assurance throughout the study, my goal was to help the reader trust the research. I used an audit trail to assess the trustworthiness in each round of this Delphi study (Carcary, 2009). Throughout the study, I created an audit trail of my research notes during study construction, data gathering, data analysis, as well as the feedback received from participants during the field test and Round 1 of the study.

Confirmability

I used an audit trail and a reflexive journal to outline the lifecycle of the study to exercise confirmability. Using an audit trail in a Delphi study can validate confirmability (Hasson & Keeney, 2011). The continuous maintenance of notes containing the rationale for decisions through the use of an audit trail can enhance the credibility of study (Cope, 2014; Glaser & Strauss, 2012). By creating a reflexive journal, I was able to ensure

confirmability by documenting all steps and processes performed in the study. In Appendix F, I outline the reflexive journal I used to track my methodological development, the design process, my data collection experiences and overall observations. After composing the information in the reflexivity journal, the dissertation chair reviewed the data collection after each round of the Delphi study to ensure the data integrity was maintained.

Ethical Procedures

Permissions. I solicited participants for this study through pertinent groups on LinkedIn. I obtained permission from each LinkedIn group moderator to post the invitations for my study. After I received IRB approval, I asked each LinkedIn moderator to post the survey invitation and URL link to the group. Prior to collecting any data, consent was obtained from each participant.

Recruitment. No ethical concerns related to the recruitment of participants were known prior to conducting the study. Given the participants were anonymous, I notified the LinkedIn moderators when to submit additional invitations for subsequent rounds of the study (see Appendix G). The invitation for the subsequent rounds of the study included the premise of the study and the informed consent and survey link, along with a statement that noted the surveys after Round 1were only open to participants that participated in the previous round.

Informed consent. Once the participants agreed to participate in the study and clicked on the link within the LinkedIn group, the participants were presented with an informed consent form as outlined in Appendix H. I attempted to make the informed

consent form easy to understand to allow each participant to assess the risks and benefits before agreeing to participate. The informed consent outlined the purpose, goals, the nature of the study, the estimated time to complete the study, and the expectations of the study. The document included a statement that encouraged the participants to contact me with any questions about the study. The informed consent also outlined that participation in the study was voluntary and that the participants could withdraw at any time by not submitting the survey or participating in subsequent rounds.

The participants were provided with the phone numbers and email addresses of the researcher, the dissertation chair, and the IRB at Walden University. The document indicated that participants may contact the dissertation chair or Walden University's IRB if they had any concerns regarding the study. The participants were notified that they would not compensated for participating in this study. Although there were no physical risks or threats in participating in this study, there were minimal risks that did not exceed a level that a participant may encounter during normal daily activities or in routine completion of psychological tests. The potential benefit to this study is to build upon the body of knowledge of the ERP consulting practice to better support clients in the United States. Also, I explained that the research could provide a good opportunity to experience how a Delphi study is conducted.

Once participants read the form and selected the link indicating agreement to consent to participate, they were directed to the screening questions. The participant was then prompted to check yes or no in response to each question to verify self-selection based on the criteria provided in the invitation. Participants that selected no for any of

the questions were thanked for their interest and were not able to access the survey. If they selected yes to all of the screening questions, they continued to Round 1 of the survey. Once a survey was submitted, data could not be withdrawn due to the inability to link a given participant to his or her survey data.

Anonymity

A number of safeguards were put into place to protect the anonymity of the study participants. The survey was administered through SurveyMonkey.com with the site set not to collect internet protocol (IP) addresses. SurveyMonkey.com uses data encryption for all of their servers, which are located in secured data centers across the United States (Awuah, 2015). Appendix I outlines the SurveyMonkey.com policies and procedures for protecting confidentiality, privacy, and use of the data.

To ensure the confidentiality of information, I encrypted all data files and saved them to an encrypted universal serial bus (USB) device that is stored in my locked home office only accessible to me. I followed this procedure during each round of data collection, data analysis, and reporting. The files and all associated data will be deleted after 5 years, as required by Walden University. After the 5-year period, I will reformat and destroy the USB drive to ensure data destruction.

Summary

In this chapter, I outlined the research method and rationale for choosing a modified Delphi study to identify the desirability and feasibility of critical success factors in ERP implementations in the United States. In Chapter 3, I also detailed the instrumentation for the study, the purposive sampling technique, the online recruitment

procedures, as well as the data collection and analysis plans. Finally, in this chapter, I concluded with a discussion of the issues with trustworthiness and the ethical procedures.

The modified Delphi method was selected for this study given its record as a good approach to anticipate long-term trends in technology (Adler & Ziglio, 1996; Linstone & Turoff, 2002). The study was composed of target sample size of 50 ERP manufacturing consultants I recruited from ERP manufacturing groups on LinkedIn. Participants for the study were selected based on meeting the selection criteria, and were verified through the screening questions that loaded following the receipt of informed consent.

Once I obtained the informed consent from each participant, he or she was directed to Round 1 of the survey. I used thematic analysis to categorize and sort the participants' responses between Round 1 and Round 2 of the study. In Round 2 the panelists rated the desirability and feasibility of the 10 top critical success factors identified in Round 1 using two separate 5-point Likert-type scales. The critical success factors with the highest ratings of desirability and feasibility in Round 2 were moved into Round 3, during which the ERP manufacturing consultants rated the remaining critical success factors for desirability and feasibility. Subsequent rounds of rating were not required as consensus was reached in Round 3.

Chapter 4 will include the details of the study, including the aggregated sample characteristics and the data analysis results. I will also outline how I ensured integrity throughout each round of the study. Chapter 5 will include a discussion of the results and their implications for theory, practice, and future research.

Chapter 4: Results

The purpose of this qualitative modified Delphi study was to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of CSFs in ERP implementations in the United States. The results of this study may reduce the gap between the CSFs identified in the literature and those applied in manufacturing environments. The answers to the research question and subquestions may fill the knowledge gap on CSFs for ERP implementations. The research question and subquestions were as follows:

RQ1: What is the level of consensus among ERP manufacturing consultants as to the feasibility and desirability of critical success factors for ERP implementations?

RQ1 Subquestion 1: What is the level of consensus among manufacturing consultants as to the feasibility of critical success factors for ERP implementations?

RQ1 Subquestion 2: What is the level of consensus among manufacturing consultants as to the desirability of critical success factors for ERP implementations?

Chapter 4 includes an overview of the field test of the instrument, the research setting, data collection and analysis procedures, and the characteristics of the sample. The chapter also includes a discussion of trustworthiness. In addition, I provide results of the analysis of the three survey rounds of data collected in this study. The Round 1 data were comprised of ratings of statements on a scale, and modifications were proposed by the expert panel. Data from Round 2 and Round 3 were collected via Likert-type surveys to refine participants' perceptions to the desirability and feasibility of CSFs in ERP

implementations in the United States. The chapter concludes with a summary of how the results addressed the research question and subquestions.

Research Setting

This study involved finding participants who had experience implementing ERP applications in SMEs in the United States. It was important to separate my knowledge and experience in implementing ERP applications in small and medium manufacturing environments from the study. Throughout each round of this study, I integrated several approaches to bracket my experience. During the data analysis in Round 1, I used Moustakas's (1994) method to isolate invariant constituents and coded all narrative data submitted by the study participants. No judgments were made as to what to include and remove during the coding process. In addition, I was objective in my data analysis and coding while creating new thematic categories for new CSFs identified by the study participants. I categorized and sorted the CSFs based on the participants' responses and not based on my empirical experience. Because the data were collected electronically, I was unable to assess any conditions or environments that may have influenced the participants' involvement in the study. Outside of the demographic questions and the participants' responses to the screening questions, no other personal information was collected for this study.

Demographics

I selected the participants for the study based on the following criteria: (a) at least 5 years of experience implementing ERP applications, (b) experience performing ERP implementations in the United States, (c) experience performing ERP implementations in

the industrial or manufacturing sector, and (d) experience performing ERP implementations for SMEs (i.e., firms that employ fewer than 500 employees). The ERP manufacturing consultants self-selected based on the criteria provided in the invitation and were prompted to check *yes* or *no* in response to each question. If they selected *no* for any of the questions, they were thanked for their interest and were not able to access the survey.

I also collected demographic data from the panel of experts. The demographic questions included (a) age range, (b) gender, (c) education level, (d) years of experience, (e) number of implementations completed in small and medium manufacturing environments (firms that employ fewer than 500 employees), and (f) geographic region. Gender and geographic region variables were measured on a nominal scale while age, highest education attained, years of experience, and the number of implementations completed were measured on an ordinal scale. Collecting demographic data allowed for the analysis of differences in responses based on criteria such as years of experience and the number of implementations completed. The collection of demographic data also provided information and insight for future research.

The following tables display aggregated demographic characteristics of the panelists. Table 3 indicates the age range of the panel of experts. The two major age groups, 45 to 54 and 55 to 64, indicate that individuals with years of experience in business management and leadership roles are typically those who lead ERP implementation projects in SMEs (Bronnenmayer et al., 2016a).

Table 3

Panelists' Age Range (N = 42)

Age	*N*	%
21 and under	0	0.00
22 to 34	2	4.76
35 to 44	6	14.29
45 to 54	15	35.71
55 to 64	16	38.10
65 and over	3	7.14

The second characteristic of the panel of experts I assessed was gender. The demographic data showed a disproportionately large percentage of male panelists compared to female panelists. These results may be a reflection of the gender gap in the manufacturing industry. Along with mining, construction, and agriculture, the manufacturing industry shows some of the highest levels of industrial segregation in the United States in terms of gender (Blau & Kahn, 2017).

Table 4

Panelists' Gender (N = 42)

Gender	*N*	%
Male	32	76.19
Female	10	23.81

The third panelist characteristic was years of experience. Regarding the years of experience of the panelists, more than two thirds of the panelists had more than 10 years

of ERP implementation experience. The data indicated that the expert panel had extensive ERP implementation experience and represented a tenured group of manufacturing consultants.

Table 5

Panelists' Years of Experience (N = 42)

Years	*N*	%
5 to 10 years	8	19.05
11 to 15 years	22	52.38
16 to 20 years	4	9.52
21 years or more	8	19.05

The fourth panelist characteristic was highest education level. More than 80% (34) of the participants held a master's degree. One reason may be due to the financial, operational, and technological acumen required to implement an ERP solution successfully. As Jensen (2006) noted, consultants are continually furthering their education to share their knowledge with clients during ERP implementations and organizational change initiatives.

Table 6

Panelists' Highest Education Level (N = 42)

Education	*N*	%
High school diploma	0	0.00
Bachelor's degree	8	19.05
Master's degree	34	80.95
Doctoral degree	0	0.00

The fifth panelist characteristic was the number of implementations the participants completed in SMEs. Due to the nature of some of the screening questions that required the participants to have at least 5 years of experience implementing ERP solutions, roughly 85% of the participants had performed at least six implementations in SMEs.

Table 7

Participants' Implementations Completed in Small and Medium Manufacturing Environments (N = 42)

Number of implementations	*n*	%
1 to 5	6	14.29
6 to 10	18	42.86
11 to 15	7	16.67
16 to 20	6	14.29
20 or more	5	11.90

The sixth panelist characteristic was the participants' geographic region. With the highest percentage of panelists implementing ERP solutions in the Midwest, the data

show that manufacturing organizations in this region of the United States are still investing in their operations, although researchers have noted declines in production in the industrial Midwest (Hannigan, Cano-Kollmann, & Mudambi, 2015; Low & Brown, 2017).

Table 8

Participants' Geographic Region (N = 42)

Region	*n*	%
Northeast	11	26.19
Midwest	13	30.95
Southeast	6	14.29
Southwest	4	9.52
West	8	19.05

Data Collection

Walden University granted approval for this study (09-17-18-0643463). Due to the data collection occurring electronically rather than at an onsite location, I was unable to assess any personal or environmental factors that may have influenced participants' responses to the survey questions. Apart from the agreement that each participant met the eligibility requirements to participate in the study with the acceptance of the informed consent, no other personal information was collected for this study.

Participation Overview

Fifty-seven ERP manufacturing consultants who satisfied the selection criteria agreed to participate in the study by accepting the procedures outlined in the informed

consent form. Of the 57 ERP manufacturing consultants who participated in Round 1, 51 participants provided usable surveys. Of the 51 consultants who participated in Round 1, 42 participated in all three rounds. Table 9 shows the completion rate for each round of the study. Given the participants were anonymous, I could not engage in any special follow-up with the participants that dropped out of the study. Although no indications suggested that the participants dropped out due to any concerns with the study, assumptions could be made that they did not enter the LinkedIn group during the second round data collection.

Table 9

Survey Response Rate for Each Round

Round	Surveys returned n	Completed surveys N	Completion rate %	Attrition rate %
1	57	51	89.47	N/A
2	48	47	97.92	92.16
3	44	42	95.45	82.35

Location, Frequency, and Duration of Data Collection

Data collection took place between September 17, 2018 and October 31, 2018. The three data collection instruments used in this Delphi study were distributed through SurveyMonkey.com, a secure online survey provider. The exchange of all three survey invitations were distributed to LinkedIn moderators to post to their respective LinkedIn groups. Although I allocated a week period to allow sufficient time for data analysis, I was able to analyze the data within a day due to the analysis tools within

SurveyMonkey.com and SPSS to calculate descriptive statistics for the rating data. Table 10 outlines the data collection timeline for this study.

Table 10

Data Collection Timeline

Activity	Start Date	End Date
Round 1 administration	09/17/18	10/01/18
Analysis of Round 1 data	10/01/18	10/02/18
Round 2 administration	10/02/18	10/16/18
Analysis of Round 2 data	10/16/18	10/17/18
Round 3 administration	10/17/18	10/31/18
Analysis of Round 3 data	11/02/18	11/03/18

Round 1. Round 1 data collection occurred between September 17, 2018 and October 1, 2018. Of the 57 surveys returned, only 51 surveys were usable due to incomplete information. Of the 51 usable surveys, the expert panel proposed 18 modifications to the critical success factors at the end of the Round 1 survey. As noted in Chapter 3, I performed a field test of the Round 1 survey to receive feedback on the clarity and relevance of the questions. One of the experts stated they had to read the survey objective twice before understanding how to answer the survey questions. With this feedback, I rephrased the objective to make it more understandable to the expert panel before Round 1 began. Regarding the definitions for the study, one of the experts stated that they were somewhat unclear of the local vendor partnership metric. To resolve this issue, I added additional definitions to this metric to ensure the participants fully understood the critical success factor when taking the survey.

Round 2. Round 2 data collection of the study began immediately after analyzing and coding Round 1 data and extended from October 2, 2018 to October 16, 2018. The expert panel rated the top 10 most desirable critical success factors from Round 1 using two separate 5-point Likert-type scales: desirability and feasibility. In Round 2, the critical success factors with the top two percentages (rating of 4 or 5) with 75% or higher on both the desirability and feasibility scales were to be moved to Round 3. Eight out of the 10 critical success factors were the basis for the rating index in Round 3.

Round 3. In the third round that spanned from October 17, 2018 to October 31, 2018, the expert panel rated the critical success factors carried over from the second round against the same two 5-point Likert-type scales used in Round 2. The goal was to build the level of consensus among the panelists as to the desirability and feasibility of critical success factors for ERP implementations.

Data Recording Procedures

I distributed all three surveys to the participants using SurveyMonkey.com. I compiled the data from each round into a master password-protected Microsoft Excel spreadsheet. Once Round 1 concluded, I exported the data into Microsoft Excel and separated the non-narrative and narrative data into separate tabs. At the conclusion of Round 2 and Round 3, I exported the data out of SurveyMonkey.com and transferred the data to the master Excel spreadsheet.

Variations in Data Collection

A few differences existed between the data collection plan outlined in Chapter 3 and the actual data collection performed for this study. As stated in Chapter 3, in Round

2, the critical success factors with the top two percentages (rating of 4 or 5) with 75% or higher and with a median score of 3.5 or higher on both the desirability and feasibility scales were to be moved to Round 3. Given the 10 critical success factors would move to Round 3 with both measures, I removed the median score as the second measure of consensus, resulting in eight critical success factors moving to Round 3.

Data Analysis

Participants in this modified Delphi study completed three separate surveys over a 1.5-month period. The iterative 3-round Delphi approach led to a large amount of data to analyze. With the tools SurveyMonkey.com and SPSS provide, I was able to analyze the data quickly. I used thematic analysis to categorize and sort the participants' responses in Round 1 of the study. I initiated the process by creating a separate tab on my master Excel spreadsheet to separate the responses and modifications. In reviewing the narrative data, I began to code the data to start developing a list of potential categories.

I used the open coding method to categorize and sort the new proposed critical success factors. To scan for frequencies of phrases or themes, I used the Textalyser application (http://textalyser.net) to analyze the participant's responses. Out of the 18 responses, five common themes were identified: (a) rewards and recognition, (b) realistic project scope, (c) extensive testing and sign-off (d) defined roles and responsibilities, and (e) extensive end-user training. Due to the high frequencies of the rated critical success factors in the survey, the suggested critical success factors were not moved to Round 2.

Unlike Round 1, Rounds 2 and 3 did not include thematic analysis. Instead, numeric rating data were analyzed with SPSS to determine frequencies, the median, and

internal consistency reliability of the scales. Aligned with my study design, I used percentage agreement to measure the consensus of the data in Round 2. The same measure of consensus of 75% was applied to Round 3. Upon completing Round 2, Cronbach's alpha was used to test the internal consistency reliability of the multipoint Likert scale. In this round, the value of 0.8 exceeded the acceptable reliability coefficient of 0.7 (Nunnally, 1967; Wijkstra et al., 1994). Cronbach's alpha measure indicated that overall, the Round 2 survey items were 80% reliable for rating the desirability and feasibility of the critical success factors identified in the study. Because Cronbach's alpha does not measure consistency and stability over time, Cronbach's alpha was also used to test internal reliability in Round 3 (Godoe & Johansen, 2012).

In Round 3, the remaining eight critical success factors were analyzed. Referring back to the initial plan to include the median score with the percentage agreement, the median score became the tie-breaker for the research question and both subquestions. In reviewing Cronbach's alpha, similar to Round 2, overall the Round 3 items were 80% reliable for rating the desirability and feasibility of the critical success factors. See Table 11 for Cronbach's alpha by item for Rounds 2 and 3.

Table 11

Reliability of Instruments by Item

	Desirability		Feasibility	
Critical success factor	Round 2 Cronbach's alpha	Round 3 Cronbach's alpha	Round 2 Cronbach's alpha	Round 3 Cronbach's alpha
Cultural change readiness	0.809	0.875	0.801	0.862
Top management support and commitment	0.805	0.881	0.799	0.884
ERP fit with the organization	0.810	0.873	0.789	0.872
Business process reengineering	0.802	0.869	0.784	0.871
Quality management	0.805	0.874	0.797	0.876
Detailed data migration plan	0.782	0.873	0.771	0.860
Small internal team of the best employees	0.809	0.870	0.806	0.865
Open and transparent communication	0.793	0.873	0.783	0.877
Contingency plans	0.772		0.771	
User feedback usage	0.780		0.786	

Evidence of Trustworthiness

Credibility

There were no adjustments from the proposed credibility plan and the final credibility approach in this study. Although some participants provided more information regarding critical success factors than others in Round 1 of the study, the responses aligned with critical success factors and critical failure factors reviewed in the literature. Also, because I did not detect any instances of persons participating in any round of the study who did not participate in the previous round, I did not have trustworthiness concerns with the participants' responses (Thomas & Magilvy, 2011).

Transferability

With the goal of enabling practitioners and researchers to apply my findings outside of ERP implementations, I applied thick description of the critical success factors in the survey (Hasson & Keeney, 2011). Although the critical success factors in this study focused on ERP implementations, the critical success factors could also be applied to non-technical studies, such as business process improvement initiatives, organizational change initiatives, among many other project-based deployments. The methodology I presented in this chapter appears to be in sufficient detail that a researcher could conduct a study using the sampling approach, the instrument used, and my analysis technique.

Dependability

The research to uncover and validate the critical success factors in small and medium manufacturing environments involved continuous checks of the survey data and participant responses. By using an audit trail to assess the trustworthiness in each round of this Delphi study, my goal was to help the reader trust the research (Carcary, 2009). Also, after each round of my study, I shared my results with my dissertation chair. As an additional measure of dependability, I used Cronbach's alpha in Rounds 2 and 3 to examine the internal consistency reliability of multipoint scales (Heitner et al., 2013; Tavakol & Dennick, 2011). As described above, the Cronbach's alpha values exceeded the acceptable reliability coefficient of 0.7 (Nunnally, 1967; Wijkstra et al., 1994).

Confirmability

I used an audit trail and a reflexive journal to outline the lifecycle of the study to exercise confirmability. I used the reflexive journal to substantiate my confirmability and

to track changes and modifications throughout the study. By using these tools, I was able to interpret the data with minimal bias. Given my role in the research, my goal was to demonstrate the transparency of the data.

Study Results

The purpose of this study was to identify a consensus among an expert panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. The goal of this study was to reduce the scholar-practitioner gap regarding critical success factors identified in the literature versus those applied in manufacturing environments. To fill this gap, I looked to answer the following research question and subquestions:

RQ1: What is the level of consensus among ERP manufacturing consultants as to the desirability and feasibility of critical success factors for ERP implementations?

RQ1 Subquestion 1: What is the level of consensus among ERP manufacturing consultants as to the desirability of critical success factors for ERP implementations?

RQ1 Subquestion 2: What is the level of consensus among ERP manufacturing consultants as to the feasibility of critical success factors for ERP implementations?

The study included an extensive literature review as outlined in Chapter 2, and a qualitative modified Delphi study. The expert panel of ERP manufacturing consultants provided input based on their empirical experience that led to a clear understanding of the

critical success factors associated with successful implementations in small and medium manufacturing environments. The results of each of the three rounds of the Delphi study are as follows:

Round 1

The responses indicated that quality management and detailed data migration plan and readiness were the most desirable critical success factors followed by top management support and commitment. Appendix J shows the Round 1 non-narrative data results. In reviewing the data, given that 46 of the 51 panelists found top management support to be highly desirable, the one highly undesirable response for top management support and commitment appears to be a discrepant case. If this assumption is true, the panelists reached 100% consensus in regard to desirability on quality management, detailed data migration plan and readiness, and top management support.

Regarding the critical success factors with the lowest levels of desirability, local vendor's partnership and legacy systems support ranked the lowest out of all 22 critical success factors with no panelists rating local vendor's partnership as highly desirable. Additionally, although 18 panelists viewed base point analysis or benchmarking to be highly desirable, it was the third lowest ranking critical success factor in Round 1. Due to the frequencies of the critical success factors in the survey, the suggested critical success factors the participants suggested to add were not moved to Round 2. Of the 22 most desirable critical success factors rated in Round 1, the critical success factors moved to Round 2 were: (a) cultural change readiness, (b) top management support and commitment, (c) ERP fit with the organization, (d) business process reengineering, (e)

quality management, (f) detailed data migration plan, (g) small internal team of the best employees, (h) open and honest communication, (i) contingency plans, and (j) user feedback usage.

Round 2

Based on the results of the analysis of the Round 2 data, only the top two percentages of 75% or higher on both the desirability and feasibility scales were moved to Round 3. As in Round 1, top management support and commitment was the critical success factor with the highest consensus. When including feasibility in the survey, the consensus increased for the two factors of ERP fit in the organization and small internal team of the best employees. These two factors are directly connected to the top management support and commitment factor as leadership decisions directly affect the selection of the ERP application and the forming of the project teams for the implementation. Of the 10 critical success factors in this Round, two did not satisfy the consensus threshold: (a) contingency plans, and (b) user feedback usage. Table 12 outlines the results of Round 2.

Table 12

Round 2 Results

	Desirability		Feasibility	
Critical success factor	Top two responses %	Median	Top two responses %	Median
Cultural change readiness	95.74	5.00	87.23	4.00
Top management support and commitment	100.00	5.00	100.00	5.00
ERP fit with the organization	100.00	4.00	95.75	4.00
Business process reengineering	85.11	4.00	87.23	4.00
Quality management	91.49	5.00	97.87	4.00
Detailed data migration plan	89.36	5.00	87.23	5.00
Small internal team of the best employees	100.00	5.00	95.75	4.00
Open and transparent communication	78.12	4.00	85.11	4.00
Contingency plans	80.85	4.00	70.21	4.00
User feedback usage	85.11	4.00	72.34	4.00

Round 3

Of the eight critical success factors, all met the threshold for inclusion in the final list of critical success factors. Table 13 shows the results of Round 3. The consensus as to the desirability and feasibility of the top critical success factor of top management support and commitment remained the same throughout all rounds of the study. Also, similar to Round 2, ERP fit with the organization was of the highest rated critical success factors in Round 3.

Table 13

Round 3 Results

	Desirability		Feasibility	
Critical success factor	Top two responses %	Median	Top two responses %	Median
Cultural change readiness	95.24	5.00	85.71	4.00
Top management support and commitment	100.00	5.00	100.00	5.00
ERP fit with the organization	100.00	4.00	100.00	4.00
Business process reengineering	85.71	4.00	85.71	4.00
Quality management	90.47	5.00	97.61	4.00
Detailed data migration plan	88.10	5.00	85.71	5.00
Small internal team of the best employees	95.24	5.00	95.24	4.00
Open and transparent communication	78.57	4.00	83.33	4.00

Consensus of responses for Research Subquestion 1. Research Subquestion 1 pertained to the level of desirability of critical success factors in ERP implementations. The original cutoff for consensus was set at 75% based on the literature (Diamond et al., 2014; Fox et al., 2016; Paoloni et al., 2017); however, because there was a high level of consensus for all eight critical success factors, I increased the cutoff to 90%. As shown in Table 13, the panelists reached 90% consensus on the level of desirability of the following five critical success factors: (a) cultural change readiness, (b) top management support and commitment, (c) ERP fit with the organization, (d) quality management, and (e) a small internal team of the best employees. The panelists reached 100% consensus on desirability for both top management support and commitment and ERP fit with the

organization. Top management support and commitment had the highest median of 5.00, resulting in the factor with the highest level of consensus on desirability.

Consensus of responses for Research Subquestion 2. Research Subquestion 2 pertained to the level of feasibility of critical success factors in ERP implementations. As with desirability, the panelists reached 100% consensus on feasibility for both top management support and commitment and ERP fit with the organization. The median score was 5.00 for top management support and commitment, indicating this factor had the highest level of consensus for feasibility. Consistent with the approach used for desiraability, I increased the cutoff for consensus on feasibility to 90%. As depicted in Table 13, the panelists reached 90% consensus on feasibility of the following four critical success factors: (a) top management support and commitment, (b) ERP fit with the organization, (c) quality management, and (d) a small internal team of the best employees.

Consensus of responses for the Primary Research Question. The primary research question pertained to the level of desirability and feasibility of critical success factors in ERP implementations. Table 13 depicts the four critical success factors on which the expert panelists reached 90% consensus on the levels of desirability and feasibility: (a) top management support and commitment, (b) ERP fit with the organization, (c) quality management, and (d) a small internal team of the best employees. Top management support and commitment was the critical success factor with the highest consensus for desirability and feasibility, followed closely by ERP fit

with the organization. In Chapter 5, I will discuss these critical success factors and their importance to successful ERP implementations.

Summary

The three rounds of this qualitative modified Delphi study were the result of an effort to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. The panel of ERP manufacturing consultants rated items for desirability and feasibility during the three rounds of the study and were asked to provide their expert opinions to reach consensus.

Chapter 4 included the details of the study based on the research approach and methodology outlined in previous chapters. I explained the data collection methods used in the field test and the main study along with the aggregated sample characteristics and the data analysis results. Additionally, I outlined how I ensured integrity throughout each round of the study. The purpose of this qualitative modified Delphi study was to identify a consensus among an expert panel of 42 ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. Chapter 5 includes an interpretation of the study, the limitations, the recommendations for future research, and the contributions of this study to social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative modified Delphi study was to identify a consensus among an expert panel of ERP manufacturing consultants as to the desirability and feasibility of CSFs in ERP implementations in the United States. The study included three rounds of surveys conducted with 42 participants possessing extensive experience implementing ERP applications in SMEs in the United States. I collected data using Likert-type surveys. The data were analyzed using computer assisted analysis (via SurveyMonkey.com, SPSS, and a Textalyser application [http://textalyser.net]). The CSFs with the highest consensus on the levels of desirability and feasibility were top management support and commitment, ERP fit with the organization, quality management, and a small internal team of the best employees. Top management support and commitment had the highest consensus, followed closely by ERP fit with the organization.

Chapter 5 includes a review of the study findings compared to the peer-reviewed literature discussed in Chapter 2. The comparison focuses on manufacturing consultants' ratings of the desirability and feasibility of CSFs in ERP implementations within SMEs. The sections within Chapter 5 include (a) the interpretations of the findings, (b) limitations of the study, (c) recommendations for future research, (d) the implications for positive social change, and (e) the conclusions for the study.

Interpretation of Findings

I analyzed the results of the study through the lens of the critical success factor framework (Rubin & Seeling, 1967). This study was framed around a primary research

question: What is the level of consensus among ERP manufacturing consultants as to the desirability and feasibility of critical success factors for ERP implementations? The CSFs with the highest consensus on the levels of desirability and feasibility were top management support and commitment, ERP fit with the organization, quality management, and a small internal team of the best employees. Top management support and commitment had the highest consensus, followed closely by ERP fit with the organization.

As outlined in Chapter 4, the expert panel reached 100% consensus that leadership support and commitment and ERP fit with the organization were the highest rated critical success factors among the eight that were rated in Round 3 and the original 22 reviewed in this study regarding to desirability and feasibility. In this section, I will review the alignment of the study results to the body of pertinent research literature.

Top Management Support and Commitment

In reviewing the final results, the responses from the expert panel of manufacturing consultants were aligned with the body of literature. Leadership support is a CSF on which many researchers have reached a consensus (Aldholay, Isaac, Abdullah, & Ramayah, 2018; Loonam, Kumar, Mitra, & Abd Razak, 2018; Shao et al., 2016). The panel of ERP manufacturing experts found it desirable and feasible to have top management support and commitment to successfully implement a solution in SMEs. In defining top management support and commitment as the company-wide support of empowered decision makers, leaders should not view an ERP implementation as a technology project; rather, they should view it as a strategic company initiative.

Although the study results converge with the body of literature, researchers have differing views on leadership approaches to implement during times of organizational change.

Although cultural change readiness met the minimum level of desirability, this CSF did not meet the minimum feasibility criteria in the final round; however, cultural change readiness was also aligned with top management support and commitment. Leaders may need to assess the risks associated with large organizational changes as well as undertake a cultural assessment before embarking on a large project. Because the level of change involved in an ERP implementation, some leaders encounter resistance from their workforce, which may require a change in leadership approach (Elkhani et al., 2014; Mitra & Mishra, 2016). Leadership effectiveness increases the probability of an organization to change (Aarons, Ehrhart, Farahnak, & Hurlburt, 2015). Researchers have stated that there is not a "one-size-fits-all" change management approach (Hamstra, Yperen, Wisse, & Sassenberg, 2013; Wang & Zhu, 2010). Although many researchers have argued for transformational leadership as the preferred approach over transactional leadership (García-Morales et al., 2012; Grant, 2012), transactional leadership still has its place in organizational environments.

In some business environments, employees will be empowered by the transformational leadership characteristics the project provides through the means of decision-making opportunities (Elkhani et al., 2014), while other employee populations will look to be rewarded for participating in the change initiative (Joia et al., 2014). Cullinane, Bosak, Flood, and Demerouti (2017) stated that standardized, lean practices

could lead to reduced job enrichment and engagement among employees. Maas et al. (2014) argued against Cullinane et al.'s finding by indicating that reduced job enrichment and engagement could be mitigated by engaging employees in the implementation of these business process reengineering and lean initiatives. Validating Maas et al.'s finding, Chow (2018) found that employees are empowered and motivated to make a positive impact on the organization, leading to increased innovation and creativity in the workplace.

Small Internal Team of the Best Employees

In creating cross-functional teams of the organization's best employees, leaders can harness the innovative thoughts of the employee base to build ideas organically and create a knowledge-sharing environment. The literature indicates that having a servant leadership style can enable leaders to help employees contribute to the overall organizational vision (Flynn et al., 2015). Researchers have found that servant leaders are more empathetic and incorporate EI, which enables them to enhance their leadership competencies by promoting the strengths of others (Kennedy, 2012). In tying the small internal team of the organization's best employees with open and transparent communication, employee decision-making can be increased by developing communication channels of information (Huang, 2016). In providing these small teams with tools to be successful, leaders can assist their employees in making decisions that benefit all parties, including the organization by displaying open, honest communication.

When composing a group of the organization's best employees, leaders could also assess the leadership competencies of each group member. Shared leadership enables

team members to express their different abilities and opinion in a decision-making process, enabling different decision-making styles to be demonstrated by individuals (Bergman, Rentsch, Small, Davenport, & Bergman, 2012). By instituting shared leadership practices, leaders of organizations can increase the trust, collaboration, and autonomy among team members, even after a project or initiative is complete (Ulhøi & Müller, 2014).

ERP Fit With the Organization

Technology has enabled increased communication and visibility among organizations, resulting in a shift in managerial approaches to remain competitive in their respective markets. Current study findings align with the literature. In a survey of 169 IT leaders regarding users' resistance to enterprise applications, Joia et al. (2014) concluded that leaders could mitigate this resistance by ensuring that the applications are well designed, are easy to use, and have simple interfaces. To ensure ERP fit within an organization, leaders and software providers have incorporated collective intelligence by creating new functionality within the new ERP application (Kim & Altmann, 2013). This collaborative approach has led to increased user satisfaction and adoption of the new technology.

When culture is perceived as organizational core values, assumptions, and interpretations, the link between employees and culture is apparent (Borgogni, Russo, & Latham, 2010). Leaders may introduce strategies and goals, but followers refine and make the strategies relevant. Leaders who can adapt this form of thinking will attribute organizational success to positive group norms and will form normative ties with

employees (Harms & Crede, 2010). In the body of research literature, although the leadership approaches have been successfully implemented in a variety of environments, the selected approach depends upon the objective.

Trust, an often-overlooked component to successfully implement change, is a critical factor among all stakeholders. For effective relationships to be created, nurtured, and propagated, trust must be distributed within the organization to build team spirit by demonstrating open and transparent communication throughout the project lifecycle (Le Pennec & Raufflet, 2016). Leaders should foster an atmosphere in which trust and respect thrive and innovation flourishes in building a learning organization which is necessary for sustainable development (Kareem, 2016). To make a positive impact on the corporation's environment and community, leaders of organizations must first assess the key variables for success before acting upon the organizational change initiative.

Quality Management and a Detailed Migration Plan

The current study findings converge with the literature. To address the issue that technological fit alone will lead to a competitive advantage for leaders of organizations, Goodhue and Thompson (1995) created a task-technology fit (TTF) model to ensure a positive influence on individual performance. Goodhue and Thompson created an instrument to measure eight factors: (a) data quality, (b) locatability, (c) authorization, (d) compatibility, (e) timeliness, (f) reliability, (g) ease of training, and (h) relationship. The current study findings about the critical success factors of detailed data migration plan and quality management fit into the data quality factor Goodhue and Thompson measured.

Tripathi and Jigeesh (2015) used the TTF model to evaluate the fit and adoption of a cloud computing solution in an organization, concluding that if leaders of organizations institute a detailed data migration plan that includes audits throughout the data cleansing and conversion process, users of the organization could incur a high level of data quality in the business application, resulting in an increase in productivity. Although the TTF model has been modified or used in conjunction with other models such as technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT) model (Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Davis, & Davis, 2003; Zigurs & Buckland, 1998), researchers continue to use the TTF model in studies to measure system fit, usage, and performance in the workplace.

Of the eight critical success factors rated for desirability and feasibility in the final round, only two focused on the technological aspect: ERP fit with the organization and a detailed migration plan. Given the remaining six factors—cultural change readiness, ERP fit with the organization, business process reengineering, quality management, a small team of the best employees, and open and transparent communication—focused on people or process, the current study findings could have a positive influence on social change by applying these critical success factors to any organizational change initiative.

Limitations of the Study

The study had several potential limitations. Due to the iterative nature of Delphi studies, attrition is always a risk (Gray, 2016; McMillan et al., 2016). Although there were no indications that the panelists dropped out of the study due to its duration, the voluntary nature of the study limited understanding the reasons panelists dropped out of

subsequent rounds of the study. Another limitation of the study was the original consensus threshold, which was set at 75% based on the literature (Diamond et al., 2014; Fox et al., 2016; Paoloni et al., 2017). The high level of consensus for the eight critical success factors in Round 3 led to increasing the cutoff to 90% for desirability and feasibility to determine which critical success factors were the most desirable and feasible among the panelists.

The purposive sampling technique was also a limitation of this study. Although the panelists met my selection criteria, the selection of ERP manufacturing consultants could have been too narrow of a scope. Given individuals such as project managers may have previous consulting experience, the blending of the consulting and project manager roles in the study may have provided a different perspective, resulting in the identification of new critical success factors in Round 1. Additionally, the self-selected expert panel of ERP manufacturing consultants in the United States did not include ERP manufacturing consultants from any other geographical area. Selecting ERP manufacturing consultants from other geographical areas may have produced different results due to varying cultures, work environments, and leadership styles. García-Sánchez and Pérez-Bernal (2007) found that in countries such as China and Mexico, leaders do not use decision support systems such as ERP applications; rather, leaders follow their cultural traditions of experience and intuition to make business decisions. With leaders in some countries facing difficulty implementing western technologies due to technological infrastructure or the skill level of the employee base, Avison and

Malaurent (2007) cautioned consultants and software vendors to be aware of cultural differences in other countries.

Another limitation to the study was that I used an established list of 22 consolidated critical success factors to conduct my survey. Although I allowed the expert panel of ERP manufacturing consultants to provide additional factors not outlined in the survey, there was the potential risk of influence given I provided the panelists with a list of critical success factors. Given the comments were not mandatory, the comments may not have reflected the thoughts of the panelists in the study. The methods used in this study should be transferrable not only in ERP implementations, but for non-ERP projects as well such as LMSs or CRM applications.

Recommendations

Modifications to Methodology and Design

The Delphi study was limited by the experience and expertise of the panelists. The study is also limited by the application of a modified qualitative Delphi approach. This limitation could be addressed by implementing a quantitative or mixed methods Delphi approach, or a design different from Delphi. A quantitative or mixed methods approach for the current Delphi study could expand the scope of the panel to a more heterogeneous group, such as project managers, end users, and the organization's implementation teams. This approach may provide additional insight to the cultural or organizational challenges different groups face throughout the implementation lifecycle.

Changes to the Theory and Model

In the literature, Christensen and Raynor (2003) identified three purposes of theories: (a) to pinpoint causation, (b) to move toward predictability, and (c) to assist in analyzing successes and failures. Prior qualitative research has generated theories pertinent to organizational environments (Turner, 2014). In reviewing the literature, the common theory cited among ERP critical success factors is DeLone and McLean's (1992, 2003) information systems (IS) success model (Mwayongo & Omar, 2017; Siricha & Theuri, 2016). The DeLone and McLean IS success model is the most adopted and most cited theory in information systems research (Mudzana & Maharaj, 2015; Zouine & Fenies, 2015). DeLone and McLean (2003) provided an update to their original model to respond to the change and progression that occurred across the IS landscape after the publication of their seminal work. Researchers have updated the DeLone and McLean (2003) model with various modifications to fit different information systems' environments and cultures. Along with DeLone and McLean's update to the model, other commonly cited studies focused on the respecification and extension of the DeLone and McLean (1992) success model (Seddon, 1997; Seddon & Kiew, 1996). Although researchers who refuted the original model aimed to provide more theoretically sound studies, the DeLone and McLean model (1992) continues to outperform the modified models (Mudzana & Maharaj, 2015; Petter & McLean, 2009; Rai, Lang, & Welker, 2002; Stocker & Müller, 2016).

In addition to the various theories that have been used to measure ERP the success of ERP implementations in small and medium environments, many models were

identified. Models such as petri nets, decision trees, fuzzy cognitive maps, and causal models have been used to measure critical success factors by modelling the interrelations with people, processes, and technology (Gajic et al., 2014), but the balanced scorecard model was the most cited model in the literature (Fu, Chang, Ku, Chang, & Huang, 2014; Gajic et al., 2014; Shen et al., 2016; Uwizeyemungu & Raymond, 2009). Although it is used to monitor financial and business processes, the balanced scorecard model could be used in ERP implementations to align the vision, objectives, and measures of an organization throughout an ERP implementation lifecycle (Shen et al., 2016). First introduced by Kaplan and Norton (1996), the scorecard model could also be used in ERP implementations to define the multi-dimensional features and potential effects throughout the entire project lifecycle. Shen et al. (2016) concluded that because the primary objective for a balanced scorecard is transform the visions of leaders of an organization into strategies and measures, using the balanced scorecard as a tool to build strategic processes, objectives, and measures takes a slightly different approach as successfully implementing ERP applications.

Focus on Small and Medium Enterprises in different Industries

Because small and medium enterprises make up a large portion of the employer firms in the United States, an additional analysis that focuses on this population may be required given their constraints compared to large enterprises. As outlined in Chapter 1, small and medium enterprises may face greater challenges in adopting technology as compared to large enterprises (Ghobakhloo et al., 2012). Because most ERP research has been focused on large enterprises (Conteh & Akhtar, 2015; Maas et al., 2014; Mo & He,

2015), studies that focus on small and medium enterprises outside of the manufacturing industry may benefit other organizations. Given leaders of firms will most likely take part in only a few ERP implementations during their career, reviewing the results of firms regardless of industry may assist in alleviating potential issues that may arise during an implementation.

Research That Builds on this Study's Findings

Recommendations for leadership. The current study supported and expanded upon the literature on the critical success factors in ERP implementations in small and medium manufacturing enterprises. Researchers concluded when top management works closely with ERP users, the communication between business groups is enhanced, and conflict resolution becomes attainable (Maditinos et al., 2012). Iveroth (2016) stated that leaders of organizations should invest at least 50% of the budget of a technology project for establishing future state processes, training, education, and communication. To remain competitive in the market, firms must provide open, transparent communication and structures to spawn innovation (Chenhall, Kallunki, & Silvola, 2011). By maintaining close relationships internally as well as externally, all stakeholders involved will be able to assist in the innovation of the products and services of a technology and professional services organization.

Expert panelists in this study identified leadership competencies needed to successfully implement these applications. During ERP implementations, personnel within organizations require process changes, leadership, and change management (Conceição & Altman, 2011). During this process, leaders should build learning

organizations. Learning organizations are organizations with individuals who focus on: (a) a shared vision, (b) systems thinking, (c) mental models, (d) team learning, and (e) personal mastery (Senge, 1990). In creating learning organizations during times of change, employees are empowered to learn, creating a larger probability for employees to embrace change (Benson, 2016). Additionally, learning organizations enable stakeholders to remain current on technological advances, providing benefits to both the individual and the organization (Lozano, 2014). Using these characteristics during times of change within an organization may provide immense benefits by harnessing innovative and creative ideas that can be implemented in new organizational processes and procedures.

Recommendations for researchers. As the implementation base for ERP integrations such as blockchain technology continue to grow, the critical success factors outlined in this study may require reassessment for small and medium manufacturing enterprises. With this study focusing on internal commitment, collaboration, accountability, and trust, additional research may be required to assess the validity of existing critical success factors when an organization includes additional business partners and applications into the implementation. With this decentralized decision making (DDM) model, the critical success factors identified in this study move outside of an organization's four walls (Marques, Agostinho, Zacharewicz, & Jardim-Gonçalves, 2017). With ERP blockchain integrations, transactions are visible to all network participants, increasing the auditability, trust, and increasing the confidence in the data (Gromovs & Lammi, 2017; Li et al., 2018). As time and volume make the blockchain

ledger more secure, more users within organizations may begin to transact immediate contracts, orders, and payments, essentially eliminating payment terms and increasing cash flow (Dai & Vasarhelyi, 2017; Wang, Wu, Wang, & Shou, 2017). Similar to the introduction of cloud computing, 3-D printing, Industry 4.0, and IoT, it comes down to education and knowledge sharing of blockchain capabilities before it is universally adopted.

Implications

Significance to Social Change

In conducting this study, I was able to identify a consensus among a panel of ERP manufacturing consultants of critical success factors both scholars and practitioners can implement in a number of environments. Putting the critical success factors into practice in ERP implementations could lead to the development of increased team collaboration, education, or other continuous improvement initiatives through: (a) leadership training for all executives within an organization; (b) an established change management plan for all large organizational changes; (c) unbiased education to understand the requirements and expectations to successfully implement an ERP solution; and, (d) an established internal project management office (PMO) to track the status, cost, and quality of all organizational initiatives.

Although very little research has been performed on the topic, ERP applications can enable leaders to improve their triple bottom line (TBL). By providing visibility throughout a firm’s global supply chain, these applications can track the usage of raw materials and ensure all the firm's facilities are remaining environmentally responsible

(Turner, 2014). For the people perspective of the TBL, researchers have found that the implementation phase of ERP applications have led to empowerment, job enrichment, and innovative behavior (Krog & Govender, 2015b; Maas et al., 2014). Finally, given ERP applications integrate the operational and financial functions of an organization, research has shown that 80% of the Fortune 500 companies have implemented these solutions for improved decision-making and higher profitability (Maas et al., 2014). By leveraging ERP applications, leaders can promote positive social change by providing additional job opportunities and higher wages due to increased efficiencies.

While I focused on ERP implementations in small and medium manufacturing environments in this study, the results can have a positive impact on social change in other industries such as healthcare, hospitality, and education. Although the applications in these industries have different functions and serve different purposes, the critical success factors outlined in this study could also be applied to hospitality management systems, healthcare management systems, and learning management systems. Also, because the industries previously mentioned operate in different environments and cultures than manufacturers, the unconventional view of software implementations as it pertains to small and medium manufacturing could also lead to positive social change by viewing the software implementation through a different lens.

Significance to Theory

A review of the literature in Chapter 2 uncovered the goal of researchers to identify critical success factors is to provide benefits and create a sustainable competitive advantage for leaders of organizations. The literature also outlines the benefits of

identifying and managing critical success factors throughout the ERP implementation lifecycle (Ram & Corkindale, 2014). Similar to the iterative approach of a Delphi study, given technology is continually evolving and improving, and every iteration of critical success factor benefits the body of knowledge.

Significance to Practice

When embarking on a large endeavor such as an ERP implementation, leaders of organizations may encounter resistance when implementing change. These leaders should recognize ways employees could embrace change to mitigate the risk of failed implementations (Bordia, Restubog, Jimmieson, & Irmer, 2011). With some organizations expanding across the country and the world, firms also experience differing environmental cultures. Latta (2009) outlined the importance of identifying subcultures within an organization's system where resistance may arise. To validate this finding, an American manufacturer that expanded to Spain uncovered that out of the top five challenges within the new facility, employee resistance to change was tied for first along with the lack of technical knowledge of the employee base (Gil, Ruiz, Escrivá, Font, & Manyes, 2017). During times of change, employees look back on previous experiences, and poor change management history (PCMH) can influence employee perceptions of organizational change (Bordia et al., 2011). With this finding, leaders must look outside of conventional leadership methods to alleviate the risk of resistance. By becoming proactive in the identification of resistance, the adoption of change can uncover the advantages among stakeholders within the organization.

Trust is a critical factor among all stakeholders, yet it is often overlooked when implementing change. For effective relationships to be created, nurtured, and propagated, trust must be distributed within the organization to build team spirit (Gillespie & Mann, 2004). Leaders should foster an atmosphere in which trust and respect thrive and innovation flourishes in building a learning organization which is necessary for sustainable development (Kareem, 2016). To make a positive influence on the corporation's environment and community, leaders of organizations much first assess the key variables for success before acting upon the organizational change initiative.

Regardless of the approach, providing transparency at the departmental level to gain buy-in to implement change at that level and will encourage input from lower level personnel during the change initiative (Sikdar & Payyazhi, 2014). Once the change is rolled out at the organizational level, leaders can create a holistic, organic environment that leads to innovative actions and decision-making (Sikdar & Payyazhi, 2014). When cultural change is perceived as an organization's core values, assumptions, and interpretations, the link between employees and culture is apparent (Borgogni et al., 2010). Leaders may introduce strategies and goals, but followers refine these strategies and make them relevant. Furthermore, leaders who can adapt this form of thinking will undoubtedly attribute organizational success to positive group norms and will form normative ties with employees (Harms & Crede, 2010). In reviewing the literature, although the leadership approaches have been successfully implemented in a variety of environments, the selected approach depends upon the objective.

Conclusions

In Chapter 1, I introduced the general problem that ERP implementation failures continue to occur at a high rate in the manufacturing industry and the specific problem of the desirability and feasibility of conventional ERP implementation critical success factors may require reassessment among small and medium manufacturers (Alharthi et al., 2017; Hughes et al., 2016; Maas et al., 2014; Ram & Corkindale, 2014; Turner et al., 2016). The goal of this modified Delphi study was to reach a consensus among a group of experts as to the desirability and feasibility of critical success factors in ERP implementations in the United States. Of the original 22 critical success factors in Round 1, the panel of experts reached 90% consensus on the level of desirability and feasibility on four critical success factors: (a) top management support and commitment, (b) ERP fit with the organization, (c) quality management, and (d) a small internal team of the best employees. Top management support and commitment had the highest consensus, followed closely by ERP fit with the organization.

Answers to this study's research questions led to a number of conclusions as outlined in the interpretations section of this chapter. Leaders typically refer to their cognitive abilities to make decisions, and ERP applications could assist them in making those decisions typically performed with the lack of information. Although many users utilize Excel spreadsheets and disparate systems, by installing a system that brings all data into one centralized application, leaders, teams, and departments would be able to collaborate, share data, and make better-informed decisions.

The results of the study are important to the fields of leadership and enterprise applications as the findings build on the body of knowledge for both disciplines. Regardless of the size of the organization knowledge sharing, is important both upstream and downstream. Leaders can benefit from this study to applying the new knowledge from this study within their organizations during times of change. Practitioners in the ERP industry can benefit from this study's findings by applying approaches outlined during ERP implementations to mitigate risk during these engagements.

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Appendix A: Permission to Post Study Invitation in LinkedIn Groups

Dear LinkedIn moderator,

I am a doctoral student conducting a research study among ERP manufacturing consultants on the critical success factors in ERP implementations in small and medium enterprises in the United States. I would like to ask your permission to post a message to your group to invite participants to join my study for each round of the surveys. If you agree, could you please acknowledge this message? Also, if you agree, I will provide you with invitations that will include information about the research purpose as well as the SurveyMonkey link to access the survey. Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge.

Regards,
Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 12:47 AM

View Justin's profile
Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 12:47 AM

You are both members of **Netsuite Users Group** on LinkedIn

Ross, I am a doctoral student conducting a research study among ERP manufacturing consultants on the critical success factors in ERP implementations in small and medium enterprises in the United States. I would like to ask your permission to post my survey to your group to invite participants to join my study. If you agree, could you please acknowledge this message? Also, if you agree, I will provide you with an invitation that will include detailed information about the research purpose as well as the SurveyMonkey link to access the survey. Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge. '

Regards, Justin Goldston, CSCP, LSSGB, PSM, PLS

Ross Leahy sent the following message at 1:10 AM

View Ross' profile
Ross Leahy

Ross Leahy 1:10 AM

Fine by me

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 1:12 AM

View Justin's profile
Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 1:12 AM
Thanks, Ross. I will be in touch in the coming months.

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 1:24 AM

View Justin's profile
Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 1:24 AM
You are both members of **Microsoft Dynamics 365 (9000+)** on LinkedIn
Patrick, I am a doctoral student conducting a research study among ERP manufacturing consultants on the critical success factors in ERP implementations in small and medium enterprises in the United States. I would like to ask your permission to post my survey to your group to invite participants to join my study. If you agree, could you please acknowledge this message? Also, if you agree, I will provide you with an invitation that will include detailed information about the research purpose as well as the SurveyMonkey link to access the survey. Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge. Regards, Justin Goldston, CSCP, LSSGB, PSM, PLS

Patrick Bovens sent the following message at 12:28 PM

View Patrick's profile
Patrick Bovens

Patrick Bovens 12:28 PM
Hi Justin, No problem at all. Feel free to post your survey and do what you need to do to get the results in.

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 1:16 PM

View Justin's profile
Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 1:16 PM
Thanks, Patrick. I will be in touch in the coming months.

Justin Goldston, CSCP, LSSGB, PSM, PLS 1:47 AM
You are both members of **Acumatica ERP Software User Group** on LinkedIn
Gabriel, I am a doctoral student conducting a research study among ERP manufacturing consultants on the critical success factors in ERP implementations in small and medium enterprises in the United States. I would like to ask your permission to post my survey to your group to invite participants to join my study. If you agree, could you please

acknowledge this message? Also, if you agree, I will provide you with an invitation that will include detailed information about the research purpose as well as the SurveyMonkey link to access the survey. Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge. Regards, Justin Goldston, CSCP, LSSGB, PSM, PLS

Gabriel Michaud sent the following message at 7:29 AM

View Gabriel's profile
Gabriel Michaud

Gabriel Michaud
Hi Justin, thanks for reaching out. You are welcome to post your survey to the group! Gabriel

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 1:17 PM

View Justin's profile
Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS
Thanks, Gabriel. I will be in touch in the coming months.

> Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 12:36 AM
>
> **View Justin's profile**
>
> **Justin Goldston, CSCP, LSSGB, PSM, PLS**
>
> **Justin Goldston, CSCP, LSSGB, PSM, PLS** 12:36 AM
>
> You are both members of **SAP Network GLOBAL for SAP Jobs, Opportunities, News and Knowledge** on LinkedIn
>
> Ehab, I am a doctoral student conducting a research study among ERP manufacturing consultants on the critical success factors in ERP implementations in small and medium enterprises in the United States. I would like to ask your permission to post my survey to your group to invite participants to join my study. If you agree, could you please acknowledge this message? Also, if you agree, I will provide you with an invitation that will include detailed information about the research purpose as well as the SurveyMonkey link to access the survey. Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge. Regards, Justin Goldston, CSCP, LSSGB, PSM, PLS
>
> SATURDAY Ehab Elagaty sent the following message at 2:39 AM
>
> **View Ehab's profile**

Ehab Elagaty

Ehab Elagaty 2:39 AM

Hi Justin, Sure, you are welcome to post in the group. On the other hand, let me know if there is an incentive for participants and I may consider to post it for you as an announcement. Regards Ehab

Ehab Elagaty

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following messages at 10:14 AM

View Justin's profile

Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 10:14 AM

Ehab, Thank you for your response. There will no incentive for participants and I will be reaching out to you in the coming months to ask you to post the survey.

View Justin's profile

Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 10:16 AM

I will say the incentive is to receive the results of the study to expand their knowledge of the critical success factor framework in ERP implementations.

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 12:43 AM

View Justin's profile

Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 12:43 AM

You are both members of **Dynamics AX ERP Professionals Group [16.000+]** on LinkedIn

Marcos, I am a doctoral student conducting a research study among ERP manufacturing consultants on the critical success factors in ERP implementations in small and medium enterprises in the United States. I would like to ask your permission to post my survey to your group to invite participants to join my study. If you agree, could you please acknowledge this message? Also, if you agree, I will provide you with an invitation that

will include detailed information about the research purpose as well as the SurveyMonkey link to access the survey. Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge. Regards, Justin Goldston, CSCP, LSSGB, PSM, PLS

Marcos Tito de Pardo Marques sent the following message at 6:09 AM

View Marcos Tito de Pardo's profile

Marcos Tito de Pardo Marques

Marcos Tito de Pardo Marques 6:09 AM

OK. Please send me the link.

WEDNESDAY Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 12:35 AM

View Justin's profile

Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 12:35 AM

You are both members of **SAP Network GLOBAL for SAP Jobs, Opportunities, News and Knowledge** on LinkedIn

Wouter, I am a doctoral student conducting a research study among ERP manufacturing consultants on the critical success factors in ERP implementations in small and medium enterprises in the United States. I would like to ask your permission to post my survey to your group to invite participants to join my study. If you agree, could you please acknowledge this message? Also, if you agree, I will provide you with an invitation that will include detailed information about the research purpose as well as the SurveyMonkey link to access the survey. Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge. Regards, Justin Goldston, CSCP, LSSGB, PSM, PLS

TODAY Wouter van Heddeghem sent the following message at 3:15 AM

View Wouter's profile

Wouter van Heddeghem

Wouter van Heddeghem 3:15 AM

Hi Justin, Sure. Please send me the link and I can share it. Kind regards, Wouter

Wouter van Heddeghem

Justin Goldston, CSCP, LSSGB, PSM, PLS sent the following message at 6:28 AM

View Justin's profile

Justin Goldston, CSCP, LSSGB, PSM, PLS

Justin Goldston, CSCP, LSSGB, PSM, PLS 6:28 AM

Thanks, Wouter. I will be in touch in the coming months.

Appendix B: LinkedIn Group Messaging

Round 1 LinkedIn Group Messaging

Dear ERP manufacturing consultant,

You have been invited to take part in a research study about critical success factors in Enterprise Resource Planning (ERP) implementations in the United States. This study is being conducted by Justin Goldston, who is a doctoral student at Walden University. You may already know the researcher as a Senior Management Consultant, but this study is separate from that role.

The purpose of this Delphi study is to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. The study will involve at least three rounds of data collection and analysis.

To be eligible for the study, you should meet the following criteria:

(a) have at least five years of experience implementing ERP applications

(b) perform ERP implementations in the United States

(c) perform ERP implementations in the industrial or manufacturing sector

(d) perform ERP implementations for small and medium enterprises (firms that employ fewer than 500 employees).

If you would like to participate in the study, please select the following link: https://www.surveymonkey.com/r/erpcriticalsuccessfactors1

You may ask any questions you have now by contacting the researcher via [e-mail address redacted] or [telephone number redacted].

Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge.

Appendix C: Survey Screening Questions

*1. Do you have at least five years of experience implementing ERP applications?

- Yes
- No

*2. Have you performed ERP implementations in the United States?

- Yes
- No

*3. Have you performed ERP implementations in the industrial or manufacturing sector?

- Yes
- No

*4. Have you performed ERP implementations for small and medium enterprises (firms that employ fewer than 500 employees)?

- Yes
- No

Appendix D: Round 1 Survey Questions

Critical Success Factors in Enterprise Resource Planning Implementation in U.S. Manufacturing

«

Please rate each critical success factor as it pertains to the desirability of its application in ERP implementations using the following scale.

The definition of each point on the scale is as follows:

1-Highly undesirable: Will have a major negative impact to the implementation.

2-Undesirable: Will have a negative impact to the implementation with little positive to no positive effect.

3-Neutral: Will have no impact on the implementation.

4-Desirable: Will have a minimal positive impact to the implementation with little negative effect.

5-Highly desirable: Will have a positive impact to the implementation with no negative effect.

	1-Highly undesirable	2-Undesirable	3-Neutral	4-Desirable	5-Highly desirable
1. Cultural change readiness (CCR) - Cultural and structural changes; cultural readiness; social aspects	1	2	3	4	5
2. Top management support and commitment (TMSC) - Company-wide support; empowered decision makers; stakeholder commitment; supportive IT infrastructure; top management support	1	2	3	4	5

3. Knowledge capacity production network (KCPN) - Network relationships; knowledge capacity; detailed planning; client consultation	1	2	3	4	5
4. Minimum customization (MC) - Minimum customization	1	2	3	4	5
5. Legacy systems support (LSS) - Legacy systems	1	2	3	4	5
6. ERP fit with the organization (EFO) - ERP package selection; alignment of ERP with business requirement	1	2	3	4	5
7. Local vendors partnership (LVP) - Software vendor; partnership with local vendors	1	2	3	4	5
8. Detailed cost (DC) - Cost of ERP implementation	1	2	3	4	5
9. Business process re-engineering (BPR) - Business process re-engineering; country specific business process; consultant's expertise	1	2	3	4	5
10. Quality management (QM) - Data integration; data accuracy; quality management	1	2	3	4	5
11. Risk management (RM) - Risk management	1	2	3	4	5
12. Detailed data migration plan (DMP) - Data migration plan	1	2	3	4	5
13. Measurable goals (MG) - Comprehensiveness of implementation strategy; clear and measurable goals; coordinated analysis	1	2	3	4	5
14. Small internal team of best employees (STBE) - Cross-functional employees in the team; best people in the team; multi-functional project team; ERP teamwork; multi-functional project team; small internal team	1	2	3	4	5
15. Open and transparent communication (OTC) - Interdepartmental communication; open information and communication policy	1	2	3	4	5
16. Base point analysis (BPA) - Process discipline; benchmarking	1	2	3	4	5
17. Morale maintenance (MM) - Morale of the implementation team; celebrating small wins	1	2	3	4	5
18. Contingency plans (CP) - Co-ordinated analysis; contingency plans	1	2	3	4	5
19. ERP success documentation (ESD) - Document ERP success	1	2	3	4	5
20. User feedback usage (UFU) - User feedback; harmonized modeling; optimization opportunities	1	2	3	4	5

21. Maximum potential usage (MPU) - Effective use of ERP application	1	2	3	4	5
22. Results measurement (RM) - Results measurement; focused performance measures; performance evaluation; post-implementation audit	1	2	3	4	5

Demographic Questions

23. Please state your age range:

- 21 and under
- 22 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 and over

24. Please indicate your gender:

25. What is the highest level of education completed?

- High School
- Bachelor's Degree
- Master's Degree
- Doctoral Degree

26. Years of experience implementing ERP applications in small and medium manufacturing environments?

- 5 to 10 years
- 11 to 15 years
- 16 to 20 years
- 21 years or more

27. Number of implementations completed in small and medium manufacturing environments?

- (●) 1 to 5
- ( ) 6 to 10
- ( ) 11 to 15
- ( ) 16 to 20
- ( ) 20 or more

28. Geographic region?

- ( ) Northeast
- ( ) Midwest
- ( ) Southeast
- ( ) Southwest
- ( ) West

Appendix E: Field Test Survey Questions

Critical Success Factors in Enterprise Resource Planning Implementation in U.S. Manufacturing

1. Please provide any suggestions or comments regarding the clarity or relevance of terms and definitions identified in the survey.

2. Please outline any areas where the survey instructions or the questions can be improved.

Appendix F: Reflexive Journal

11-21-17
Set up notifications in Google Scholar to receive notifications for journal articles regarding Delphi studies that use critical success factors in small and medium manufacturing organizations.

12-29-17
Reduced anticipated sample size of expert panel from 75 to 50 after working with my dissertation chair and concluding that 75 participants would extend the research timeline.

1-12-18
In performing the literature review, I identified that a 75% threshold will be used to establish consensus in Round 2 and Round 3.

2-5-18
Changed conceptual framework from the DeLone and McLean Information Systems Success Model to the Critical Success Factor Framework after review and feedback from my second dissertation committee member.

3-27-18
To ensure internal consistency and reliability of the instrument, I incorporated Cronbach's alpha through the use of SPSS.

4-23-18
To test for face and content validity, I switched from a pilot study to a field test.

5-17-18
Modified review process to only send my dissertation chair my thoughts and revisions based on her feedback instead of revising entire sections and/or chapters.

7-26-18
I made the following changes per IRB feedback:

- I added a note to the LinkedIn invitation and to the informed consent form stating that subsequent rounds are only open to participants that participated in previous rounds.
- I added a note to the informed consent form stating that the results of the study will be sent to the LinkedIn moderator of the group to post for review.
- I removed research jargon from all participant-facing documents (i.e. qualitative modified Delphi study)
- I added inclusion criteria to the informed consent form.
- I added the time period for each round of the study to the invitation and the informed consent form.

- I added the following statement to the Voluntary Nature of the Study section to the informed consent form: “If you have a relationship with the researcher and decide to decline or discontinue participation in the study, your relationship with the researcher will not be negatively impacted.”
- I added the following statement to the informed consent form: “You may keep or print a copy of this consent form for future reference.”

8-10-18
I made the following changes per IRB feedback:

- I created separate LinkedIn invitations for each round of the Delphi study.

9-15-18
I made an adjustment in my demographic ordinal variable analysis to use frequency counts and percentages and the mode instead of median, mode, and range.

10-1-18
I sent my Round 1 survey data and Round 2 survey to Dr. Heitner to review and audit.

10-16-18
I sent my Round 2 survey data to Dr. Heitner and made an adjustment to remove the median score as the second measure of consensus resulting in eight critical success factors moving to Round 3.

11-28-18
Because there was high consensus for all eight critical success factors in Round 3, I increased the cutoff to 90% to answer the primary research question and subquestions.

Appendix G: LinkedIn Group Messaging for Subsequent Rounds

Dear ERP manufacturing consultant,

You have been invited to take part in the second round of a research study about critical success factors in Enterprise Resource Planning (ERP) implementations in the United States. The second round is only open to participants that participated in Round 1 of the study. This study is being conducted by Justin Goldston, who is a doctoral student at Walden University. You may already know the researcher as a Senior Management Consultant, but this study is separate from that role.

The purpose of this Delphi study is to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. The study will involve at least three rounds of data collection and analysis.

To be eligible for the study, you should meet the following criteria:

(a) have at least five years of experience implementing ERP applications

(b) perform ERP implementations in the United States

(c) perform ERP implementations in the industrial or manufacturing sector

(d) perform ERP implementations for small and medium enterprises (firms that employ fewer than 500 employees).

If you would like to participate in the study, please select the following link: https://www.surveymonkey.com/r/erpcriticalsuccessfactors2

You may ask any questions you have now by contacting the researcher via [e-mail address redacted] or [telephone number redacted].

Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge.

Dear ERP manufacturing consultant,

You have been invited to take part in the third round of a research study about critical success factors in Enterprise Resource Planning (ERP) implementations in the United States. The third round is only open to participants that participated in Round 2 of the study. This study is being conducted by Justin Goldston, who is a doctoral student at Walden University. You may already know the researcher as a Senior Management Consultant, but this study is separate from that role.

The purpose of this Delphi study is to identify a consensus among a panel of ERP manufacturing consultants as to the desirability and feasibility of critical success factors in ERP implementations in the United States. The study will involve at least three rounds of data collection and analysis.

To be eligible for the study, you should meet the following criteria:

(a) have at least five years of experience implementing ERP applications

(b) perform ERP implementations in the United States

(c) perform ERP implementations in the industrial or manufacturing sector

(d) perform ERP implementations for small and medium enterprises (firms that employ fewer than 500 employees).

If you would like to participate in the study, please select the following link: https://www.surveymonkey.com/r/erpcriticalsuccessfactors3

You may ask any questions you have now by contacting the researcher via [e-mail address redacted] or [telephone number redacted].

Thank you for your consideration, and I look forward to your response in building on the ERP body of knowledge.

Appendix H: SurveyMonkey.com Privacy Policy

personal data in response to lawful requests by public authorities, including to meet national security or law enforcement requirements.

Please contact SurveyMonkey as described in the "Questions?" section below if you have any concerns or complaints of any nature. If you have an unresolved privacy or data use concern that we have not addressed satisfactorily, please contact our U.S.-based third party dispute resolution provider, (free of charge) at https://feedback-form.truste.com/watchdog/request.

Under certain conditions, more fully described on the Privacy Shield website https://www.privacyshield.gov/article?id=How-to-Submit-a-Complaint, you may invoke binding arbitration when other dispute resolution procedures have been exhausted.

U.S. – Swiss Safe Harbor. SurveyMonkey Inc. (and its subsidiary company, Infinity Box Inc.) complies with the US-Swiss Safe Harbor Framework developed by the U.S. Department of Commerce regarding the collection, use and retention of personal information received in the U.S. from Switzerland. SurveyMonkey Inc. has certified that it adheres to the U.S.-Swiss Safe Harbor Privacy Principles with respect to such information. SurveyMonkey may process some data from individuals or companies in Switzerland via other compliance mechanisms, including data processing agreements based on the EU Standard Contractual Clauses. To learn more about the Safe Harbor program, and to view our certification, please visit https://safeharbor.export.gov/swisslist.aspx.

Questions? For questions regarding our privacy policy or practices, contact SurveyMonkey by mail at One Curiosity Way, San Mateo, CA 94403, USA, or electronically through this form.

Key Privacy Points: The Stuff You Really Care About

IF YOU CREATE SURVEYS:

- **Your survey data is owned by you.** Not only that, but SurveyMonkey treats your surveys as if they were private (except if you have made the surveys available via a public link). We don't sell them to anyone and we don't use the survey responses you collect for purposes unrelated to you or our services, except in a limited set of circumstances (e.g. if we are compelled by a subpoena, or if you've given us permission to do so).
- **We safeguard respondents' email addresses.** To make it easier for you to invite people to take your surveys via email, you may upload lists of email addresses, in which case SurveyMonkey acts as a mere custodian of that data. We don't sell these email addresses and we use them only as directed by you and in accordance with this policy. The same goes for any email addresses collected by your surveys.
- **We hold your data securely.** Read our Security Statement for more information.
- **Survey data is stored on servers located in the United States.** More information about this is available if you are located in Canada or Europe. SurveyMonkey will process your survey data on your behalf and under your instructions (including the ones agreed to in this privacy policy).

IF YOU ANSWER SURVEYS:

- **Surveys are administered by survey creators.** Survey creators conduct tens of thousands of surveys each day using our services. We host the surveys on our websites and collect the responses that you submit to the survey creator. If you have any questions about a survey you are taking, please contact the survey creator directly as SurveyMonkey is not responsible for the content of that survey or your responses to it. The survey creator is usually the same person that invited you to take the survey and sometimes they have their own privacy policy.
- **Are your responses anonymous?** This depends on how the survey creator has configured the survey. Contact them to find out, or click here to read more about respondent anonymity.
- **We don't sell your responses to third parties.** SurveyMonkey doesn't sell or share your survey responses with third party advertisers or marketers (although the survey creator might, so check with them). SurveyMonkey merely acts as a custodian on behalf of the survey creator who controls your data, except as further described in this privacy policy with regard to public surveys.
- If you think a survey violates our Terms of Use or may be engaging in illegal activity, click here to report it.

Survey Creators & Survey Respondents

SurveyMonkey is used by **survey creators** (people who create and conduct surveys online) and **survey respondents** (people who answer those surveys). The information we receive from survey creators and survey respondents and how we handle it differs, so we have split this privacy policy into two parts. Click on the one that applies to you:

Privacy for Survey Creators
Privacy for Survey Respondents

PRIVACY FOR SURVEY CREATORS

1. What information does SurveyMonkey collect?

When you use SurveyMonkey, we collect information relating to you and your use of our services from a variety of sources. These are listed below. The sections afterward describe what we do with this information.

Information we collect directly from you

- **Registration information.** You need a SurveyMonkey account before you can create surveys on SurveyMonkey. When you register for an account, we collect your username, password and email address. If you choose to register by using a third party account (such as your Google or Facebook account), please see "Information from third parties" below.
- **Billing information.** If you make a payment to SurveyMonkey, we require you to provide your billing details, such as a name, address, email address and financial information corresponding to your selected method of payment (e.g. a credit card number and expiration date or a bank account number). If you provide a billing address, we will regard that as the location of the account holder.
- **Account settings.** You can set various preferences and personal details on pages like your account settings page. For example, your default language, timezone and communication preferences (e.g. opting in or out of receiving marketing emails from SurveyMonkey).
- **Address book information.** We allow you to import email addresses into an Address Book and associate email addresses with email invitation collectors so you can easily invite people to take your surveys via email. We don't use these email addresses for our own purposes or email them except at your direction.
- **Survey data.** We store your survey data (questions and responses) for you.

- **Other data you intentionally share.** We may collect your personal information or data if you submit it to us in other contexts. For example, if you provide us with a testimonial, or participate in a SurveyMonkey contest.

★ **We don't share or abuse your respondents' email addresses.** Rest assured, SurveyMonkey will not email your survey respondents or people in your Address Book except at your direction. We definitely don't sell those email addresses to any third parties.

Information we collect about you indirectly or passively when you interact with us

- **Usage data.** We collect usage data about you whenever you interact with our services. This may include which webpages you visit, what you click on, when you performed those actions, and so on. Additionally, like most websites today, our web servers keep log files that record data each time a device accesses those servers. The log files contain data about the nature of each access, including originating IP addresses, internet service providers, the files viewed on our site (e.g., HTML pages, graphics, etc.), operating system versions, and timestamps.
- **Device data.** We collect data from the device and application you use to access our services, such as your IP address, operating system version, device type, system and performance information, and browser type. We may also infer your geographic location based on your IP address.
- **Referral data.** If you arrive at a SurveyMonkey website from an external source (such as a link on another website or in an email), we record information about the source that referred you to us.
- **Information from third parties.** We may collect your personal information or data from third parties if you give permission to those third parties to share your information with us. For example, you have the option of registering and signing into SurveyMonkey with your Facebook account details. If you do this, the authentication of your logon details is handled by Facebook and we only collect information about your Facebook account that you expressly agree to share with us at the time you give permission for your SurveyMonkey account to be linked to your Facebook account.
- **Information from page tags.** We use third party tracking services that employ cookies and page tags (also known as web beacons) to collect aggregated and anonymized data about visitors to our websites. This data includes usage and user statistics. Emails sent by SurveyMonkey or by users through our services may include page tags that allow the sender to collect information about who opened those emails and clicked on links in them. We do this to allow the email sender to measure the performance of their email messaging and to learn how to improve email deliverability and open rates.

2. How does SurveyMonkey use the information we collect?

★ **We treat your survey questions and responses as information that is private to you (except if you have made your survey questions and responses available via a public link).** We know that, in many cases, you want to keep your survey questions and responses (which we collectively refer to as "survey data") private. Unless you decide to share your survey questions and/or responses with the public (such as by making the survey questions and responses available via a public link), we do not use your survey data other than as described in this privacy policy or unless we have your express consent. We do not sell your survey data to third parties without your permission.

Generally, we use the information we collect from you in connection with providing our services to you and, on your behalf, to your survey respondents. For example, specific ways we use this information are listed below. (See the next section of this privacy policy to see who we share your information with.) However, this privacy policy is not intended to restrict our use of survey questions or responses that you have chosen to make available online through a public link.

- **To provide you with our services.**
  - This includes providing you with customer support, which requires us to access your information to assist you (such as with survey design and creation or technical troubleshooting).
  - ★Certain features of our services use the content of your survey questions and responses and your account information in additional ways. Feature descriptions will clearly identify where this is the case. You can avoid the use of your survey data in this way by simply choosing not to use such features. For example, by using our Question Bank feature, to add questions to your surveys, you also permit us to aggregate the responses you receive to those

questions with responses received by other Question Bank users who have used the same questions. We may then report statistics about the aggregated (and de-identified) data sent to you and other survey creators.

- If you choose to link your SurveyMonkey account to a third party account (such as your Google or Facebook account), we may use the information you allow us to collect from those third parties to provide you with additional features, services, and personalized content.

- In order to provide you with useful options to use the services together with social media and other applications, we may give you the option to export information to, and collect information from, third party applications and websites, including platforms such as Salesforce and Marketo and social networking sites such as Facebook. When exporting and collecting such information, you may be disclosing your information to the individuals or organizations responsible for operating and maintaining such third party applications and sites, and your information may be accessible by others visiting or using those applications or sites. We do not own or operate the applications or websites that you connect with, and you should review the privacy policies and statements of such websites to ensure you are comfortable with the ways in which they use the information you share with them.

- **To manage our services.** We internally use your information, including certain survey data, for the following limited purposes:

  - ★ **To monitor, maintain, and improve our services and features.** We internally perform statistical and other analysis on information we collect (including usage data, device data, referral data, question and response data and information from page tags) to analyze and measure user behavior and trends, to understand how people use our services, and to monitor, troubleshoot and improve our services, including to help us evaluate or devise new features. We may use your information for internal purposes designed to keep our services secure and operational, such as for troubleshooting and testing purposes, and for service improvement, marketing, research and development purposes.

  - **To enforce our Terms of Use.**

  - **To prevent potentially illegal activities.**

  - **To screen for and prevent undesirable or abusive activity.** For example, we have automated systems that screen content for phishing activities, spam, and fraud.

- ★ **To create new services, features or content.** We may use your survey data and survey metadata (that is, data about the characteristics of a survey) for our internal purposes to create and provide new services, features or content. In relation to survey metadata, we may look at statistics like response rates, question and answer word counts, and the average number of questions in a survey and publish interesting observations about these for informational or marketing purposes. When we do this, neither individual survey creators nor survey respondents will be identified or identifiable unless we have obtained their permission.

- **To facilitate account creation and the logon process.** If you choose to link your SurveyMonkey account to a third party account (such as your Google or Facebook account), we use the information you allowed us to collect from those third parties to facilitate the account creation and login process. For more information, click here.

- **To contact you about your service or account.** We occasionally send you communications of a transactional nature (e.g. service-related announcements, billing-related matters, changes to our services or policies, a welcome email when you first register). You can't opt out of these communications since they are required to provide our services to you.

- **To contact you for marketing purposes.** We will only do this if you have consented to our contacting you for this purpose. For example, during the account registration process we will ask for your permission to use your information to contact you for promotional purposes. You may opt out of these communications at any time by clicking on the "unsubscribe" link in them, or changing the relevant setting on your My Account page.

- **To respond to legal requests and prevent harm.** If we receive a subpoena or other legal request, we may need to inspect the data we hold to determine how to respond.

3. With whom do we share or disclose your information?

★ **We don't sell your survey data, unless you expressly permit us to!**

★ **When might we disclose your survey data to third parties?** Only for a limited number of reasons. We share your information with our service providers who help us to provide our services to you. We contractually bind these service providers to keep your information confidential and to use it only for the purpose of providing their services. For example, we use payment processors who help us to process credit card transactions. By using our services, you authorize SurveyMonkey to sub-contract in this manner on your behalf.In rare circumstances, we may share information if required by law, or in a corporate restructuring or acquisition context (see below for more details).

- **Sharing your surveys with the public.** You are able to control who can take your survey by changing your collector settings. For example, surveys can be made completely public (and indexable by search engines), password protected, or distributed to a restricted list of people. You can also choose to share your survey responses instantly or at a public location.

We recognize that you have entrusted us with safeguarding the privacy of your information. Because that trust is very important to us, the only time we will disclose or share your personal information or survey data with a third party is when we have done one of three things, in accordance with applicable law: (a) given you notice, such as in this privacy policy; (b) obtained your express consent, such as through an opt-in checkbox; or (c) de-identified or aggregated the information so that individuals or other entities cannot reasonably be identified by it. Where required by law, we will obtain your express consent prior to disclosing or sharing any personal information.

We may disclose:

- **Your information to our service providers.** We use service providers who help us to provide you with our services. We give relevant persons working for some of these providers access to your information, but only to the extent necessary for them to perform their services for us. We also implement reasonable contractual and technical protections to ensure the confidentiality of your personal information and data is maintained, used only for the provision of their services to us, and handled in accordance with this privacy policy. Examples of service providers include payment processors, hosting services, email service providers, and web traffic analytics tools.
- **Your account details to your billing contact.** If your details (as the account holder) are different to the billing contact listed for your account, we may disclose your identity and account details to the billing contact upon their request (we also will usually attempt to notify you of such requests). By using our services and agreeing to this privacy policy, you consent to this disclosure.
- **Your email address to your organization.** If the email address under which you've registered your account belongs to or is controlled by an organization, we may disclose that email address to that organization in order to help it understand who associated with that organization uses SurveyMonkey, and to assist the organization with its enterprise accounts. (Please do not use a work email address for our services unless you are authorized to do so, and are therefore comfortable with this disclosure.)
- **Aggregated or de-identified information to third parties to improve or promote our services.** No individuals can reasonably be identified or linked to any part of the information we share with third parties to improve or promote our services.
- **The presence of a cookie to advertise our services.** We may ask advertising networks and exchanges to display ads promoting our services on other websites. We may ask them to deliver those ads based on the presence of a cookie, but in doing so will not share any other personal information with the advertiser. Our advertising network partners may use cookies and page tags or web beacons to collect certain non-personal information about your activities on this and other websites to provide you with targeted advertising based upon your interests. If you do not wish to have this information used for the purpose of serving you such targeted ads, you may opt-out at http://preferences-mgr.truste.com/ or, if you're located in the European Union, at http://www.youronlinechoices.eu. You will continue to receive generic ads.
- **Your information if required or permitted by law.** We may disclose your information as required or permitted by law, or when we believe that disclosure is necessary to protect our rights, protect your safety or the safety of others, and/or to comply with a judicial proceeding, court order, subpoena, or other legal process served on us.
- **Your information if there's a change in business ownership or structure.** If ownership of all or substantially all of our business changes, or we undertake a corporate reorganization (including a merger or consolidation) or any other action or transfer between SurveyMonkey entities, you expressly consent to SurveyMonkey transferring your information to the new owner or successor entity so that we can continue providing our services. If required, SurveyMonkey will notify the applicable data protection agency in each jurisdiction of such a transfer in accordance with the notification procedures under applicable data protection laws.
- **Information you expressly consent to be shared.** For example, we may expressly request your permission to provide your contact details to third parties for various purposes, including to allow those third parties to contact you for marketing purposes. (You may later revoke your permission, but if you wish to stop receiving communications from a third party to which we provided your information with your permission, you will need to contact that third party directly.)

4. What are your rights to your information?

You can:

- **Update your account details.** You can update your registration and other account information on your My Account page. Information is updated immediately.
- **Access and correct your personal information.** As an account holder, you may access and correct certain personal information that SurveyMonkey holds about you by visiting your My Account page. Some account holders and other individuals (including those whose information we receive under the EU-U.S. Privacy Shield and the U.S.-Swiss Safe Harbor) have certain legal rights to obtain information of whether we hold personal information about them, to access personal information we hold about them, and to obtain its correction, update, amendment or deletion in appropriate circumstances. For some information, these rights may be exercised through the My Account page mentioned above, and in all cases, requests to exercise these rights may be directed to our customer support team. These rights are subject to some exceptions, such as where giving you access would have an unreasonable impact on the privacy of other individuals. We will respond to your request to exercise these rights within a reasonable time and, where required by law or where we deem it otherwise appropriate and practicable to do so, we will honor your request.
- **Download/backup your survey data.** Depending on what subscription plan you have, we provide you with the ability to export, share and publish your survey data in a variety of formats. This allows you to create your own backups or conduct offline data analysis. See here for downloading instructions.
- **Delete your survey data.** Deleting survey data in the ways described on this page will not permanently delete survey data immediately. As long as you maintain an account with us, we may retain your deleted data for a limited time in case you delete something by accident and need to restore it (which you can request by contacting customer support). To the extent permitted by law, we will permanently delete your data if you request to cancel your account. However, if your data was previously made available to the public through a public link, additional copies of your data may remain available on the internet even after your account has been deleted.
- **Cancel your account.** To cancel and delete your account, please contact customer support. Deleting your account will cause all the survey data in the account to be permanently deleted from our systems within a reasonable time period, as permitted by law, and will disable your access to any other services that require a SurveyMonkey account. We will respond to any such request, and any appropriate request to access, correct, update or delete your personal information within the time period specified by law (if applicable) or without excessive delay. We will promptly fulfill requests to delete personal data unless the request is not technically feasible or such data is required to be retained by law (in which case we will block access to such data, if required by law).

★ **For how long do we retain your data?** We generally retain your data for as long as you have an account with us, or to comply with our legal obligations, resolve disputes, or enforce our agreements. Data that is deleted from our servers may remain as residual copies on offsite backup media for up to approximately 12 months afterward. We describe our retention practices in more detail in this FAQ

5. Security, cookies and other important information

★ **Changes to this privacy policy.** We may modify this privacy policy at any time, but if we do so, we will notify you by publishing the changes on this website. If we determine the changes are material, we will provide you with additional, prominent notice as is appropriate under the circumstances, such as via email or in another conspicuous manner reasonably designed to notify you.If, after being informed of these changes, you do not cancel your subscription and continue to use our services beyond the advance-notice period, you will be considered as having expressly consented to the changes in our privacy policy. If you disagree with the terms of this privacy policy or any updated privacy policy, you may close your account at any time.

- **Security.** Details about SurveyMonkey's security practices are available in our Security Statement. We are committed to handling your personal information and data with integrity and care. However, regardless of the security protections and precautions we undertake, there is always a risk that your personal data may be viewed and used by unauthorized third parties as a result of collecting and transmitting your data through the Internet. If you have any questions about the security of your personal information, contact customer support.
- **Data locations.** Our servers are based in the United States, so your personal information will be hosted and processed by us in the United States. Your personal information may also be processed in, or transferred or disclosed to, countries in which

SurveyMonkey subsidiaries and offices are located and in which our service providers are located or have servers. You can view where our offices are located on the Office Locations page.

- **Cookies.** We and our partners use cookies and similar technologies on our websites. Cookies are small bits of data we store on the device you use to access our services so we can recognize repeat users. Each cookie expires after a certain period of time, depending on what we use it for. We use cookies and similar technologies for several reasons:
  - **To make our site easier to use.** If you use the "Remember me" feature when you sign into your account, we may store your username in a cookie to make it quicker for you to sign in whenever you return to SurveyMonkey.
  - **For security reasons.** We use cookies to authenticate your identity, such as confirming whether you are currently logged into SurveyMonkey.
  - **To provide you with personalized content.** We may store user preferences, such as your default language, in cookies to personalize the content you see. We also use cookies to ensure that users can't retake certain surveys that they have already completed.
  - **To improve our services.** We use cookies to measure your usage of our websites and track referral data, as well as to occasionally display different versions of content to you. This information helps us to develop and improve our services and optimize the content we display to users.
  - **To advertise to you.** We, or our service providers and other third parties we work with, may place cookies when you visit our website and other websites or when you open emails that we send you, in order to provide you with more tailored marketing content (about our services or other services), and to evaluate whether this content is useful or effective. For instance, we may evaluate which ads are clicked on most often, and whether those clicks lead users to make better use of our tools, features and services. If you don't want to receive ads that are tailored to you based on your anonymous online activity, you may "opt out" of many of the companies that are involved in such tailoring by going to http://www.aboutads.info. Opting out in this way does not mean you will not receive any ads; it just means that you will not receive ads from such companies that have been tailored to you based on your activities and inferred preferences.
  - **Google Analytics.** In addition to the above, we have implemented on our websites and other services certain Google Analytics features that support Display Advertising, including re-targeting. Visitors to our websites may opt out of certain types of Google Analytics tracking, customize the Google Display Network ads by using the Google Ad Preferences Manager and learn more about how Google serves ads by viewing its Customer Ads Help Center. If you do not wish to participate in Google Analytics, you may also download the Google Analytics opt-out browser add-on.

  Click here for more details about our cookies. We don't believe cookies are sinister, but you can still choose to remove or disable cookies via your browser. Refer to your web browser's configuration documentation to learn how to do this. Please note that doing this may adversely impact your ability to use our services. Enabling cookies ensures a smoother experience when using our websites. To manage flash cookies, click here. By using our websites and agreeing to this privacy policy, you expressly consent to the use of cookies as described in this policy.

- **Blogs and Forums.** Our websites may offer publicly accessible blogs and community forums. You should be aware that any information you provide in these areas may be read, collected, and used by others who access them. We're not responsible for any personal information you choose to submit in these areas of our site. To request removal of your personal information from our blog or community forum, contact customer support. In some cases, we may not be able to fulfill your request and we will let you know why. Commenting systems on our blogs are managed by a third party application that may require you to register to post a comment. Please review that application's privacy policy to learn how the third party uses your information.
- **Online Tracking.** We currently do not process or comply with any web browser's "do not track" signal or other similar mechanism that indicates a request to disable online tracking of individual users who visit our websites or use our services (unless otherwise stated in a service-specific privacy statement).
- **Safety of Children and COPPA.** Our services are not intended for and may not permissibly be used by individuals under the age of 13. SurveyMonkey does not knowingly collect personal data from persons under 13 or allow them to register. If it comes to our attention that we have collected personal data from such a person, we may delete this information without notice. If you have reason to believe that this has occurred, please contact customer support.
- **English version controls.** Non-English translations of this privacy policy are provided for convenience. In the event of any ambiguity or conflict between translations, the English version is authoritative.

6. Additional information for European Union users

SurveyMonkey provides some of its services to users in the EU through SurveyMonkey Europe UC, located at 2 Shelbourne Buildings, Second Floor, Shelbourne Road, Dublin 4, Ireland.

- **"Personal data".** For users located in the EU, references to "personal information" in this policy are equivalent to what is commonly referred to as "personal data" in the EU.

- **About IP addresses.** Our servers record the incoming IP addresses of visitors to our websites (whether or not the visitor has a SurveyMonkey account) and store the IP addresses in log files. We use these log files for purposes such as system administration and maintenance, record keeping, tracking referring web sites, inferring your location, and security purposes (e.g. controlling abuse, spam and DDOS attacks). We also store IP addresses along with certain actions you take on our system. IP addresses are only linked to survey responses if a survey creator has configured a survey to collect IP addresses. By agreeing to this privacy policy, you expressly consent to SurveyMonkey using your IP address for the foregoing purposes. If you wish to opt out from the foregoing consent to use your IP address, you must cancel your account (if you have one) or not respond to a survey if requested to do so.

- **Data controller.** SurveyMonkey Europe UC, whose contact information is listed above, is the data controller for registration, billing and other account information that we collect from users in the EU. However, the data controller for survey data is the survey creator. The survey creator determines how their survey questions and responses are used and disclosed. SurveyMonkey only processes such survey data in accordance with the instructions and permissions (including those given under this privacy policy) selected by the survey creator when they create and administer their survey.

- **Accessing and correcting your personal data.** You have the right to access and correct the personal information that SurveyMonkey holds about you. This right may be exercised by visiting your account's My Account page or by contacting customer support.

- **Your responsibilities.** By using our services, you agree to comply with applicable data protection requirements when collecting and using your survey data, such as requirements to inform respondents about the specific uses and disclosures of their data.

*

Consents. By clicking "I Agree" or any other button indicating your acceptance of this privacy policy, you expressly consent to the following:

- You consent to the collection, use, disclosure and processing of your personal data in the manner described in this privacy policy, including our procedures relating to cookies, IP addresses and log files.

- Our servers are based in the United States, so your personal data will be primarily processed by us in the United States. You consent to the transfer and processing of your personal data in the United States by SurveyMonkey Inc. and in the data locations identified in Section 5 by our various affiliates and service providers.

- You consent and agree that we may transfer your data to data processors located in countries, including the United States, which do not have data protection laws that provide the same level of protection that exists in countries in the European Economic Area. Your consent is voluntary, and you may revoke your consent by opting out at any time. Please note that if you opt-out, we may no longer be able to provide you our services.

- You consent to us sharing your personal data with relevant persons working for service providers who assist us to provide our services.

- If you have enabled cookies on your web browser, you consent to our use of cookies as described in this privacy policy.

7. Additional information for Canadian users

- Please read this article for information about the U.S. Patriot Act and how it affects the personal information of Canadian users.

8. Additional information for Japanese users

- You agree that you are responsible for notifying the respondents of surveys that you create using our services about how SurveyMonkey may use the respondents' survey responses and personal data as described in this privacy policy and obtaining prior consent from respondents to disclose their personal data to SurveyMonkey.

9. Additional information for Brazilian users

- The personal information collected, stored, used and/or processed by SurveyMonkey, as described in this privacy policy, are collected, stored, used and/or processed in accordance with Brazilian Law No. 12,965/2014. By clicking "I Agree" or any other button indicating your acceptance of this privacy policy, you expressly consent to the collection, use, storage and processing of your personal information by SurveyMonkey as described.

10. Additional information for Australian users

- If you are dissatisfied with our handling of your complaint or do not agree with the resolution proposed by us, you may make a complaint to the Office of the Australian Information Commissioner (OAIC) by contacting the OAIC using the methods listed on their website at http://www.oaic.gov.au. Alternatively, you may request that we pass on the details of your complaint to the OAIC directly.

PRIVACY FOR SURVEY RESPONDENTS

1. What information does SurveyMonkey collect?

When you respond to surveys hosted by SurveyMonkey, we collect, on behalf and upon instructions (including the ones provided in this privacy policy) of survey creators, information relating to you and your use of our services from a variety of sources. These are listed below. The sections afterward describe what we do with this information.

Information we collect directly from you

- **Survey responses.** We collect and store the survey responses that you submit. The survey creator is responsible for this data and manages it. A survey may ask you to provide personal information or data. If you have any questions about a survey you are taking, please contact the survey creator directly as SurveyMonkey is not responsible for the content of that survey. The survey creator is usually the same person that invited you to take the survey and sometimes they have their own privacy policy.

  - **Are your survey responses anonymous?** You will need to ask the survey creator this as it depends on how they have chosen to configure their survey. We provide instructions on how a survey creator can ensure they collect responses anonymously. However, even if a survey creator has followed those steps, specific questions in the survey may still ask you for your personal information or data that could be used to identify you.

Information we collect about you from other sources

- **Usage data.** We collect usage data about you whenever you interact with our services. This may include which webpages you visit, what you click on, when you performed those actions, and so on. Additionally, as with most websites today, our web servers keep log files that record data each time a device accesses those servers. The log files contain data about the nature of each access, including originating IP addresses, internet service providers, the files viewed on our site (e.g., HTML pages, graphics, etc.), operating system versions, and timestamps. Note that we do not link this usage data to your survey responses.

- **Device data.** We collect data from the device and application you use to access our services, such as your IP address, operating system version, device type, system and performance information, and browser type. We may also infer your geographic location based on your IP address. Your IP address will be linked to your survey responses unless a survey creator has disabled IP address collection for the survey you respond to.

- **Referral data.** We record information about the source that referred you to a survey (e.g. a link on a website or in an email).

- **Information from page tags.** We use third party tracking services that employ cookies and page tags (also known as web beacons) to collect aggregated and anonymized data about visitors to our websites. This data includes usage and user statistics.

- **Your email address.** If a survey creator uses an email invitation collector to send you a survey invitation email, we collect your email address when the survey creator provides it to us. We don't use this to send you email except at the direction of a survey creator. The emails we send on behalf of a survey creator appear to come from that survey creator's email address. If you no longer want to be contacted by a survey creator, please contact the survey creator directly.

- **Providing survey responses is voluntary.** Remember, you can always choose not to provide an answer to any given survey question (especially those requesting your personal information or data). However, sometimes this will prevent you from completing a survey if the survey creator has marked that question as requiring an answer.

2. How does SurveyMonkey use the information we collect?

- **Your survey responses are owned and managed by the survey creator, and we treat that information as private to the survey creator, except if the survey creator has made the questions and responses available via a public link.** Please contact the survey creator directly to understand how they will use your survey responses. Some survey creators may provide you with a privacy policy or notice at the time you take their survey and we encourage you to review that to understand how the survey creator will handle your responses.**Please see the Survey Creator version of this privacy policy to understand how SurveyMonkey handles survey responses.** SurveyMonkey does not sell survey responses to third parties without the survey creator's permission and we do not use any contact details collected in our customers' surveys to contact survey respondents.

We also use the information we collect from you (including usage data, device data, referral data and information from page tags) to manage and improve our services, for research purposes, and for the various purposes described in the Survey Creator version of this privacy policy.

3. With whom do we share or disclose your information?

- **SurveyMonkey does not sell your survey responses unless you expressly permit us to!** We will share your survey responses with third parties only as described in this privacy policy.

We disclose:

- **Your survey responses to survey creators.** We host surveys for survey creators, but they are really the primary curator of survey data. Anything you expressly disclose in your survey responses will, naturally, be provided to them. Please contact the survey creator directly to understand how they might share your survey responses. Please see the Survey Creator version of this privacy policy to understand what SurveyMonkey tells survey creators about how we handle survey responses, and to whom SurveyMonkey may disclose survey responses.

4. What are your rights to your information?

- **Contact the survey creator to access and correct your responses and personal information.** Because we collect survey responses on behalf of survey creators, you will need to contact the survey creator if you have any questions about the survey, or if you want to access, update, or delete anything in your responses. We provide survey creators with tools to maintain the responses they collect through their surveys. You may request access to and correction of the personal information we hold about you by contacting customer support, but in most cases SurveyMonkey cannot provide you with this access since survey responses are the survey creator's private information (except if the survey creator has made the questions and responses available via a public link) and giving you access may have an unreasonable impact on the privacy of other individuals. We will respond to your request for access or correction within a reasonable time and, where reasonable and practicable to do so, we will provide access to your personal information in the manner requested by you.

- **Opt out of receiving surveys.** You may opt out of receiving email invitations to take surveys which are sent by survey creators via SurveyMonkey.

5. Security, cookies and other important information

- **Changes to this privacy policy.** We may modify this privacy policy at any time, but if we do so, we will notify you by publishing the changes on this website. If we determine the changes are material, we will provide you with additional, prominent notice as is appropriate under the circumstances, such as via email or in another conspicuous manner reasonably designed to notify you.If, after being informed of the changes, you continue to use our services beyond the advance-notice period, you will be considered as having expressly consented to the changes in our privacy policy. If you

disagree with the terms of this privacy policy or any updated privacy policy, you may close your account (if you have one) at any time or not respond to a survey.

- **Security.** Details about SurveyMonkey's security practices are available in our Security Statement. We are committed to handling your personal information and data with integrity and care. However, regardless of the security protections and precautions we undertake, there is always a risk that your personal data may be viewed and used by unauthorized third parties as a result of collecting and transmitting your data through the Internet. If you have any questions about the security of your personal information, contact customer support.

- **Data locations.** Our servers are based in the United States, so your personal information will be hosted and processed by us in the United States. Your personal information may also be processed in, or transferred or disclosed to, countries in which SurveyMonkey subsidiaries and offices are located and in which our service providers are located or have services. You can view where our offices are located on the Office Locations page.

- **Cookies.** We and our partners use cookies and similar technologies on our websites. Cookies are small bits of data we store on the device you use to access our services so we can recognize repeat users. Each cookie expires after a certain period of time, depending on what we use it for. We use cookies and similar technologies for several reasons:

  - **To make our site easier to use.** If you use the "Remember me" feature when you sign into your account, we may store your username in a cookie to make it quicker for you to sign in whenever you return to SurveyMonkey.

  - **For security reasons.** We use cookies to authenticate your identity, such as confirming whether you are currently logged into SurveyMonkey.

  - **To provide you with personalized content.** We may store user preferences, such as your default language, in cookies to personalize the content you see. We also use cookies to ensure that users can't retake certain surveys that they have already completed.

  - **To improve our services.** We use cookies to measure your usage of our websites and track referral data, as well as to occasionally display different versions of content to you. This information helps us to develop and improve our services and optimize the content we display to users.

  - **Google Analytics.** In addition to the above, we have implemented on our websites and other services certain Google Analytics features that support Display Advertising, including re-targeting. Visitors to our websites may opt out of certain types of Google Analytics tracking, customize the Google Display Network ads by using the Google Ad Preferences Manager and learn more about how Google serves ads by viewing its Customer Ads Help Center. If you do not wish to participate in Google Analytics, you may also download the Google Analytics opt-out browser add-on.

  Click here for more details about our cookies. We don't believe cookies are sinister, but you can still choose to remove or disable cookies via your browser. Refer to your web browser's configuration documentation to learn how to do this. Please note that doing this may adversely impact your ability to use our services. Enabling cookies ensures a smoother experience when using our websites. To manage flash cookies, click here. By using our websites and agreeing to this privacy policy, you expressly consent to the use of cookies as described in this policy.

- **Blogs and Forums.** Our websites may offer publicly accessible blogs and community forums. You should be aware that any information you provide in these areas may be read, collected, and used by others who access them. We're not responsible for any personal information you choose to submit in these areas of our site. To request removal of your personal information from our blog or community forum, contact customer support. In some cases, we may not be able to fulfill your request and we will let you know why. Commenting systems on our blogs are managed by a third party application that may require you to register to post a comment. Please review that application's privacy policy to learn how the third party uses your information.

- **Online Tracking.** We currently do not process or comply with any web browser's "do not track" signal or other similar mechanism that indicates a request to disable online tracking of individual users who visit our websites or use our services (unless otherwise stated in a service-specific privacy statement).

- **Social Media Features.** Our websites may include social media features or widgets, such as the Facebook Like button. Use of these features may allow them to collect your IP address, detect which page you are visiting on our site, and set a cookie to enable the feature to function properly. Your interactions with these features are governed by the privacy policy of the third party providing it.

- **Safety of Minors and COPPA.** Our services are not intended for and may not be used by minors. "Minors" are individuals under the age of majority in their place of residence (or under 13 in the United States). SurveyMonkey does not knowingly collect personal data from minors or allow them to register. If it comes to our attention that we have collected personal data from a minor, we may delete this information without notice. If you have reason to believe that this has occurred, please contact customer support.

- **English version controls.** Non-English translations of this privacy policy are provided for convenience. In the event of any ambiguity or conflict between translations, the English version is authoritative.

6. Additional information for European Union users

SurveyMonkey provides some of its services to users in the EU through SurveyMonkey Europe UC, located at 2 Shelbourne Buildings, Second Floor, Shelbourne Road, Dublin 4, Ireland.

- **"Personal data".** For users located in the EU, references to "personal information" in this policy are equivalent to what is commonly referred to as "personal data" in the EU.
- **About IP addresses.** Our servers record the incoming IP addresses of visitors to our websites (whether or not the visitor has a SurveyMonkey account) and store the IP addresses in log files. We use these log files for purposes such as system administration and maintenance, record keeping, tracking referring web sites, inferring your location, and security purposes (e.g. controlling abuse, spam and DDOS attacks). We also store IP addresses along with certain actions you take on our system. IP addresses are only linked to survey responses if a survey creator has configured a survey to collect IP addresses. By agreeing to this privacy policy, you expressly consent to SurveyMonkey using your IP address for the foregoing purposes. If you wish to opt out from the foregoing consent to use your IP address, you must cancel your account (if you have one) or not respond to a survey if requested to do so.
- **Data controller.** SurveyMonkey Europe UC, whose contact information is listed above, is the data controller for registration, billing and other account information that we collect from users in the EU. However, the data controller for survey data is the survey creator. The survey creator determines how their survey questions and responses are used and disclosed. SurveyMonkey only processes such survey data in accordance with the instructions and permissions (including those given under this privacy policy) selected by the survey creator when they create and administer their survey.
- **Accessing and correcting your personal data.** You have the right to access and correct the personal information that SurveyMonkey holds about you. This right may be exercised by contacting customer support.

★ **Consents. By clicking "I Agree" or any other button indicating your acceptance of this privacy policy, you expressly consent to the following:**

- You consent to the collection, use, disclosure and processing of your personal data in the manner described in this privacy policy, including our procedures relating to **cookies, IP addresses and log files**.
- Our servers are based in the United States, so your personal data will be primarily processed by us in the United States. You consent to the transfer and processing of your personal data in the United States by SurveyMonkey Inc. and in the data locations identified in Section 5 by our various affiliates and service providers.
- You consent and agree that we may transfer your data to data processors located in countries, including the United States, which do not have data protection laws that provide the same level of protection that exists in countries in the European Economic Area. Your consent is voluntary, and you may revoke your consent by opting out at any time. Please note that if you opt-out, we may no longer be able to provide you our services.
- You consent to us sharing your personal data with relevant persons working for service providers who assist us to provide our services.
- If you have enabled cookies on your web browser, you consent to our use of cookies as described in this privacy policy.

7. Additional information for Canadian users

- Please read this article for information about the U.S. Patriot Act and how it affects the personal information of Canadian users.

8. Additional information for Brazilian users

- The personal information collected, stored, used and/or processed by SurveyMonkey, as described in this privacy policy, are collected, stored, used and/or processed in accordance with Brazilian Law No. 12,965/2014. By clicking "I Agree" or any other button indicating your acceptance of this privacy policy, you expressly consent to the collection, use, storage and processing of your personal information by SurveyMonkey as described.

9. Additional information for Australian users

- The personal information collected by us on behalf of a survey creator may include sensitive information. We will only use sensitive information for the purpose of storing and processing it on behalf of the survey creator. Sensitive information is defined in the *Privacy Act 1988* (Cth) and includes information about you such as racial or ethnic origin, religious beliefs, political affiliation, sexual preferences and criminal records, as well as health and genetic information about you.

- If you are dissatisfied with our handling of your complaint or do not agree with the resolution proposed by us, you may make a complaint to the Office of the Australian Information Commissioner (OAIC) by contacting the OAIC using the methods listed on their website at http://www.oaic.gov.au. Alternatively, you may request that we pass on the details of your complaint to the OAIC directly.

Appendix I: Round 1 Nonnarrative Results Summary

Critical Success Factor	(1) Highly Undesirable *n* (%)	(2) Undesirable *n* (%)	(3) Neutral *n* (%)	(4) Desirable *n* (%)	(5) Highly Desirable *n* (%)	Top two responses (%)	Median
1. Cultural change readiness	0 (0.00)	2 (3.92)	3 (5.88)	17 (56.86)	29 (56.86)	90.19	5.00
2.Top management support and commitment	1 (1.96)	0 (0.00)	0 (0.00)	4 (7.84)	46 (90.20)	98.04	5.00
3. Knowledge capacity production network	1 (1.96)	2 (3.92)	13 (25.49)	26 (50.98)	9 (17.65)	68.63	4.00
4. Minimum customization	3 (5.88)	3 (5.88)	13 (25.49)	16 (31.37)	16 (31.37)	62.74	4.00
5. Legacy systems support	1 (1.96)	9 (17.65)	22 (43.14)	18 (35.29)	1 (1.96)	37.25	3.00
6. ERP fit with the organization	0 (0.00)	0 (0.00)	3 (5.88)	19 (37.25)	29 (56.86)	94.11	5.00
7. Local vendor’s partnership	3 (5.88)	5 (9.80)	24 (47.06)	19 (37.25)	0 (0.00)	37.25	3.00
8. Detailed cost	1 (1.96)	1 (1.96)	9 (17.65)	38 (74.51)	2 (3.92)	78.43	3.00
9. Business process re-engineering	0 (0.00)	0 (0.00)	2 (3.92)	22 (43.14)	27 (52.94)	96.08	5.00
10. Quality management	0 (0.00)	0 (0.00)	0 (0.00)	18 (35.29)	33 (64.71)	100.00	5.00
11. Risk Management	0 (0.00)	2 (3.92)	6 (11.96)	28 (54.90)	15 (29.41)	84.31	4.00

(continued)

12. Detailed data migration plan readiness	0 (0.00)	0 (0.00)	0 (0.00)	28 (54.90)	23 (45.10)	100.00	5.00
13. Measurable goals	0 (0.00)	2 (3.92)	11 (21.57)	24 (47.06)	14 (27.45)	74.51	4.00
14. Small internal team of the best employees	0 (0.00)	3 (5.88)	3 (5.88)	10 (19.61)	35 (68.63)	88.24	5.00
15. Open and transparent communication	0 (0.00)	0 (0.00)	3 (5.88)	23 (45.10)	25 (49.02)	94.12	5.00
16. Base point analysis	0 (0.00)	2 (3.92)	25 (49.02)	18 (35.29)	6 (11.76)	47.05	3.00
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