2019

Enterprise Resource Planning Implementation in One Government Agency

Stephen N. Strayer
Walden University

Walden University

College of Management and Technology

This is to certify that the doctoral study by

Stephen N. Strayer

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Ronald Black, Committee Chairperson, Doctor of Business Administration Faculty

Dr. Alexandre Lazo, Committee Member, Doctor of Business Administration Faculty

Dr. Ify Diala, University Reviewer, Doctor of Business Administration Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

Enterprise Resource Planning Implementation in One Government Agency

by

Stephen N. Strayer

MA, Webster University, 1998

BS, Southern Illinois University, 1996

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

June 2020

Abstract

Ineffective enterprise resource planning (ERP) implementation strategies can have a negative impact on competitive business advantage. Business leaders who struggle to maintain global operations and audit readiness are at high risk of failure. Grounded in the general systems theory, the purpose of this qualitative single case study was to explore the strategies business leaders used to promote an awareness of the effects of performance on competitive advantage. The participants comprised of 22 business leaders on a military base in the state of Washington who effectively used ERP systems to increase global operations, audit readiness, and maximize competitive advantage. Data were collected from semistructured interviews, observer-as-participant observations, and company documents. Yin's five step process was used to analyze the data. Four themes emerged: crucial ERP project planning, ERP system implementation strategies, senior business leader support, and ineffective strategies affecting ERP system performance. Based on the findings of this study, a key recommendation is business leaders should tailor their ERP system implementation strategies to include a cost-benefit analysis for hiring professional ERP systems trainers. The implications for positive social change include the potential to provide business leaders with an in-depth understanding of ERP system implementation strategies to tailor their specific implementation strategies effectively and support their employees' economic stability.

Enterprise Resource Planning Implementation in One Government Agency

by

Stephen N. Strayer

MA, Webster University, 1998

BS, Southern Illinois University, 1996

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

August 2020

Dedication

I dedicate this project to my dad for believing in me when I told him I was attempting this monumental project. To my sons, Stephen and Nicolas, for understanding why I could not spend as much time with you as I would have liked. Finally, to my wife for inspiring me and helping me focus on necessary project requirements when I was approaching burnout. Thank you all!

Acknowledgments

I would like to acknowledge Dr. Freda Turner and the faculty of Walden University for their continued assistance and mentoring throughout this process. Additionally, I would like to acknowledge my cousins, Dr. Donna Simmons and the late Dr. Fred Strayer, for the numerous conversations on what to expect when striving for a terminal degree. To Dr. Jeff Flesher, from one strategic missile guy to another, for inspiring me at the beginning of my academic pursuits. To Dr. Jerry Brandon, my boss at Seagle's Saloon, for being an exceptional example of whom I would like to emulate in the future and for encouraging me to take that first college class. Finally, I would like to acknowledge Mr. Don McCuiston, my high school English teacher, for giving me one more chance, which ultimately provided the foundation for my success.

Table of Contents

List of Tables

Section 1: Foundation of the Study

Government business leaders have identified weaknesses in business-related tasks, including financial management, general ledger accounting, and supply chain management (Khan, 2010b). Based on the identified weaknesses, business leaders have found business system modernization critical for changing cumbersome business processes, addressing high-risk areas, and providing more precise and dependable financial data (Khan, 2011a). Business leaders selected an enterprise resource planning (ERP) system, a commericial off the shelf software package, to modernize business processes, integrating fundamental processes through a shared database (Kaur & Mishra, 2017; Turki et al., 2019). The focus of this study was the strategies that indicate successful ERP system implementation project in one government agency. The implementation factors included pre- and postimplementation training, employee acceptance, business effectiveness, and data sharing.

The motivation for implementing ERP systems originated from competitor pressure, supply chain partner or customer requests, system upgrades, or legacy systems replacement (Lucke et al., 2019). Business problems and an inability to combine business needs with technological system imperatives are the leading causes of ERP system implementation failures (Sørheller, Høvik, Hustad, & Vassilakopoulou, 2018). Business leaders need to understand the necessary strategies for successful ERP system implementation to gain the requisite knowledge of ERP system operations and capabilities. An ERP system could result in increased efficiency for the company and its

customers, providing the advantages of improving transparency data sharing, and information management (Córdova & Gutiérrez, 2018).

Background of the Problem

ERP systems provide business leaders with an information technology solution for increased productivity and operational efficiency, resulting in a greater competitive advantage (Pasban & Nojedeh, 2016). ERP systems require business process changes, including meticulous planning, execution, and management, to minimize the inherent risks during the implementation process (Aversano, Guardabascio, & Tortorella, 2017). Furthermore, an ERP system can provide near real-time data on manufacturing, supply chain management, financial management, human resource management, and customer relationship management through a single database (Townsend et al., 2018).

Workers at the U.S. Department of Defense (DoD), one of the largest and most complex organizations in the world, face challenges in resolving financial functions, business operations, and network problems (Khan, 2011b). DoD members consider ERP systems critical for addressing flaws in financial management and resolving weaknesses in the high-risk areas of business system modernization and supply chain management (Khan, 2011b). The relationship between an ERP system and end users indicates a need for continued ERP system development with integrated accounting functions after the system goes live (Özcan, Mondragon, & Harindranath, 2018). ERP system design is an ongoing sociometrical process performed over time (Schwade & Schubert, 2016).

Problem Statement

Business leaders depend on advanced information technology systems to achieve a competitive advantage, finding that the benefits of an ERP system outweigh the inherent implementation risks (Guaragni, Schmidt, & Paetzold, 2016). Some ERP system implementation projects have cost overruns as substantial as $8 billion and schedule delays up to 12.5 years (Khan, 2013). The general business problem was that approximately 70% of ERP systems do not fulfill corporate objectives within 3 years of implementation (Kunath & Winkler, 2019). The specific business problem was that some business leaders lack strategies for successful ERP system implementation.

Purpose Statement

The purpose of this qualitative single case study was to determine the strategies business leaders used for successful ERP system implementation. The sample was 22 business leaders from a large government agency located in Washington state. Business leaders agreed to take part in semistructured interviews with open-ended questions; participants needed at least 2 years of ERP system experience.

The study has the potential for social change by providing business leaders and members of the business community with an in-depth understanding of ERP system implementation strategies. Business leaders and employers who successfully implement ERP systems achieve and sustain a competitive advantage, thus attaining higher profits. Greater company success leads to job stability for employees, financial security for their families, and positive effects on the local economy.

Nature of the Study

There are three research methods: qualitative, quantitative, and mixed methods (Shi, Sun, Teng, & Hu, 2019). Qualitative methodology is appropriate for exploring participants' experiences of a phenomenon (Zehir, Cinar, & Sengül, 2016). I selected the qualitative approach to explore participants' experiences with the ERP system implementation phenomenon in one government agency, using interviews, observations, and document reviews for data collection. Quantitative and mixed methods approaches are suitable when examining a set of variables and their casual relationships or the numeric descriptions of trends, attitudes, or opinions (Hosseini, Ivanov, & Dolgui, 2019). Neither the quantitative nor mixed methods approach was appropriate for this study (Hansen et al., 2016) because I did not use numerical data to explore the problem in depth. To determine the strategies that business leaders used for successful ERP system implementation, I used the qualitative approach to explore the problem with rich textural data.

Qualitative research designs include case study, ethnography, and phenomenology. The case study design is a fundamental approach for exploring a single phenomenon through in-depth data collection methods of numerous types of evidence (Nazemi & Burkhardt, 2019). I selected the case study design as the best approach to explore ERP system implementation. Ethnography is the study of the customs of individual peoples and cultures based on facts learned through experiments and observations (Xue & Desment, 2019). The ethnography design was not appropriate for

this study because I did not explore cultural norms. The phenomenological design requires examining the lived experiences of people who have experienced a phenomenon (Chan, Ahrumugam, Scheithauer, Schultze-Krumbholz, & Ooi, 2020). Phenomenology was not appropriate for this study because I did not explore a unique phenomenon through participants' lived experiences; instead, I explored the strategies necessary for successful ERP system implementation.

Research Question

The research question for this study was: What strategies do some business leaders use for successful ERP system implementation? I developed the following open-ended interview questions to find an answer to the research question.

Interview Questions

1. What planning practices did you undertake before the actual implementation?
2. What obstacles did you or your team members identify during post-ERP system implementation?
3. How did your professional workload differ during post-ERP system implementation?
4. How skeptical were you of the ERP system after implementation?
5. How much training did you receive before ERP implementation?
6. How did production, efficiency, and value change after ERP system implementation?

7. Did post-ERP system implementation changes influence interdepartmental information sharing?
8. How beneficial has the ERP system been to your government agency?
9. What else can you add about the strategies that indicate successful ERP system implementation in a government agency?

Conceptual Framework

Von Bertalanffy's (1972) general systems theory served as the study's conceptual framework. The general systems theory is the construct of a general core of methods and ideas for defining a concept beyond multidisciplinary meaning (Velte, Wilfahrt, Müller, & Steinhilper, 2017). The general systems theory shows the realities of the system while indicating global and complete representations (Abollado & Shehab, 2018). I used the general systems theory to discover the ERP system implementation strategies that business leaders use.

With the general systems theory framework as a foundation, I explored the study's issues, obstacles, and results throughout each stage of the ERP system implementation process. An additional benefit of the general systems theory is that it provides organizational members with the flexibility to enact change, producing individual group structure and the evolution of group interactions (Shaw, 2012). Social and technical systems are codependent and have an impact on a technological system, causing a possible change in the function of the social system (Whyte, 1997).

Definition of Terms

Business processes: Processes used for decision-making, sales, marketing, manufacturing, operations, logistics, finance, product development, and human resources with effects on DOD audibility (Khan, 2012). Top-level supervisors, first-line supervisors, ERP end-users, and customers receive added value from these processes (Boiko, Shendryk, & Boiko, 2019).

Business-related tasks: General ledger accounting tasks and supply chain management tasks (Khan, 2010a).

Competitive advantage: Customizations derived from demonstrated nonstandard business processes that result in business enhancements (Rauch, 2019), including advantages from accounting methods and ERP systems practices for efficient IT integration strategies (Marhdi, Nassar, & Almsafir, 2019).

Commercial off-the-shelf (COTS) systems: Systems designed for the integration of core functions of an enterprise around a unified database, regardless of business type (Turki et al., 2019).

Crosscutting: Occurs during mapping between a source and a target when a source element is scattered over target elements, and in at least one of these target elements, source elements are tangled (Sangeetha & Chandrasekar, 2019).

End-user: One who uses a product or service for a specific purpose (Barricelli, Cassano, Fogli, & Piccinno, 2019).

General ledger: Accounts that indicate the financial responsibilities follow U.S. Treasury guidelines for financial statement preparation (Frontz, 2012).

Metrics: Tools for assessing the quality of computer-based software system attributes (Papamichail, Diamantopoulos, & Symenonidis, 2019) used to discriminate between vulnerable and nonvulnerable components and predict vulnerabilities (Setiawan, Rasjid, & Effendi, 2018).

SAP: Systems, applications, and products in data processing, a German multinational software corporation, headquartered in Walldorf, Baden-Württemberg, Germany (Kodhelaj, Chituc, Beunders, & Janseen, 2019).

Scattering: The mapping between a source and a target when the target element correlates with more than one source element (Sangeetha & Chandrasekar, 2019).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions are the elements of a study that a researcher assumes to be true but cannot or does not verify during the study (Dai, Peng, & Li, 2017). The first assumption was that general systems theory was the most efficient approach for exploring ERP system implementation strategies. The second assumption was that the strategies required for successful ERP system implementation occurred in a variety of ERP system implementation projects and resulted in generalized benefits throughout government agencies.

The third assumption was that open-ended interview questions and observer-as-participant observations were the most effective instruments for determining the strategies that I sought in this study. I further assumed that participants in this study answered interview questions and performed observations honestly and to the best of their abilities. The final assumption was that the results of the study provided the necessary data for successful ERP system implementation in other government agencies.

Limitations

Limitations are constraints on the study's results that are beyond the researcher's control, including the results a researcher does not attempt to control (Chang & Kwon, 2018). The first limitation of this qualitative study was that because of purposeful, nonrandom sampling, the results were not applicable beyond the study's participants. I was limited in my ability to generalize the findings because they did not include data from all business leaders utilizing ERP systems.

The second limitation was the honesty and thoroughness of the participants' responses. Some participants felt nervous discussing ERP processes; as such, I was unable to ensure that responses were accurate and complete. This limitation may have had an impact on achieving data saturation to the point that additional questioning provided no further unique data (Rubin & Rubin, 2012). The third limitation was the number of business leaders who were available as participants. The purposeful sample of 22 business leaders from a U.S. military base in the state of Washington, may have limited the generalizability of the study results.

The final potential limitation was the effect on the data analysis process due to personal bias. Hussain, Melewar, Priporas, Foroudi, and Dennis (2020) discussed the perceived credibility of data as the level to which personal bias is absent from research influences. As such, I made every effort to minimize or eliminate personal bias from my study by developing a data analysis strategy before participant selection and data collection.

Delimitations

Delimitations are the elements within the researcher's control (Schmid et al., 2016). I limited the sample to 22 business leaders from a U.S. military base in the state of Washington, who had ERP system experience in one government agency. Each participant had a minimum of 2 years of ERP system experience. I excluded business leaders from participation who did not meet the study's ERP system experience requirement.

Significance of the Study

The significance of this study is the possible impact of a better understanding of how critical strategies indicate the success of ERP system implementation. ERP systems could affect virtually every business function, including accounting and finance, human resources, and supply chain management (Mahendrawathi, Zayin, & Pamungkas, 2017; Namugenyi, Nimmagadda, & Reiners, 2019; Sørheller et al., 2018). ERP systems provide business leaders with near real-time data from geographically dispersed operations so they can enhance their decision-making practices.

The cost of implementing an ERP system ranges from millions to billions of dollars, yet the majority of ERP system projects do not provide the expected benefits within 3 years of implementation (Hustad, Haddara, & Kalvenes, 2016). By understanding the strategies of successful ERP system implementation projects, business leaders can avoid wasting valuable financial resources and time. A successful ERP system implementation project results in employees' improved morale and acceptance of future technological innovations.

Contribution to Business Practice

ERP system project performance is a holistic concept with numerous aspects and indicators (Faller & Höftman, 2018). ERP system program capabilities have significant gaps identified via numerous ERP system design weaknesses and business processes that require manual workarounds to perform daily operations (Khan, 2012; Kunath & Winkler, 2019; Liew, 2019). Process workarounds reduce end user proficiency in many ERP system operations, resulting in decreased efficiency and effectiveness. Sallah and Janczewski (2019) found that inadequate training and policy expertise cause employees to struggle with daily operations.

The conceptual information of business processes is the emphasis on supply chain management. Further contributors improve system-specific functionalities and support hands-on implementation through computerized and physically managed business flows (Haddara & Moen, 2017). For international corporations, the competitive landscape of a

global economy becomes more intricate, forceful, and vague (Favotto, Kollman, & Bernhagen, 2016).

A leadership void emerges when acts of leadership are absent from acts of following (Gençer & Samur, 2016). Incompatibilities in structure, decision-making procedures, and implemented management processes present barriers to organizational success (Abollado & Shehab, 2018). This study showed the pre-ERP system strategies that business leaders should incorporate for successful implementation. The findings of this research provide benefits to society by indicating the strategies used to streamline ERP system implementation processes in government agencies. Streamlined ERP system implementation processes can result in efficient implementation projects and substantial cost savings.

Implications for Social Change

Budget-conscious business leaders cut costs and incorporate practices to increase operational effectiveness and efficiency for an increased competitive advantage. ERP systems provide business leaders with easy and quick access to the relevant and near real-time data required for effective decision-making and management control (Ribeiro da Silva, Shinohara, Pinheiro de Lima, Angelis, & Machado, 2019). A successful ERP implementation project could result in a successful ERP system.

Successful ERP systems provide business leaders with the data required for strategic decisions, thereby bridging cultural barriers in a global environment. Operating in a global environment requires business leaders to bridge cultural differences. Meng,

Yan, and Liu (2016) argued that a person's culture has a profound impact on patterns of interaction.

People who collaborate in different roles encourage a climate of information transfer among organizations (Nurhas, Aditya, Geisler, & Pawlowski, 2019). An ERP implementation project provides business leaders with the required data to effectively address different business functions in a global environment to achieve a competitive advantage. With a greater competitive advantage, business leaders foster workplace stability. A stable work environment may lead to social change by providing workers with more confidence to purchase items locally, and employees who purchase locally may strengthen the local economy.

A Review of the Professional and Academic Literature

I examined articles and documents on ERP systems and their effects on organizational business functions from online libraries, local libraries, vendor websites, Formatted: APA Level 2 official government websites, and peer-reviewed journals. The literature review topics supporting the research question included general systems theory, pre-ERP system implementation, ERP system implementation, and post-ERP system implementation. Throughout the literature review, I compare data on critical ERP system implementation as recognized by business leaders.

Documentation

I centered the literature search on ERP systems and found 261 relevant sources. The sources included 253 (96.9%) peer-reviewed journal articles and official government

reports, with 94% published within the last 5 years. Scholarly databases included ScienceDirect, ABI/INFORM Complete, Business Source Complete, SAGE Premier, and Emerald Management. Filters allowed me to review only sources from 2016 onward, with Ulrichsweb used to identify peer-reviewed articles.

I searched the official website of the U.S. Government Accountability Office and, through Freedom of Information Act requests, the Commander Operational Test and the Evaluation Force official websites for official government reports. In addition, I searched the SAP software solutions official website for vendor reports on ERP implementation strategies in U.S. government agencies. Keywords searched were *enterprise resource planning, ERP, ERP implementation, metrics AND software evaluation, financial management, supply chain management, critical success AND critical failure factors, general systems theory, innovation,* and *integration*.

The purpose of this qualitative single case study was to explore the strategies business leaders used for successful ERP system implementation. The results of this study presented critical success factors (CSFs) and critical failure factors, including metric development and usage. I used information from multiple authors to support the conceptual framework and research question. The documents reviewed provided me with insight into the concerns and possible techniques used during ERP system implementation. I focused on the techniques that indicated the potential advantages and risks of ERP system implementation projects in U.S. government agencies.

Rejected Theories

Resource-based view theory. The foundation of the resource-based view theory is that employee performance, when correctly incentivized, will increase when employees possess the required knowledge and skills to properly perform a function (Van der Laan & Aurisicchio, 2019). An employer's ability to capitalize on internal resources while minimizing competition and internal weaknesses serves as the foundation of the resource-based view theory (Kohtamäki, Parida, Oghazi, Gebauer, & Baines, 2019). Utilizing the resource-based view theory to validate a firm's performance and competitive advantage requires a thorough understanding of internal resources (Ruivo, Rodrigues, Johansson, Oliverira, & Rebelo, 2016). The focus of this study was not on utilizing internal resources; as such, the resource-based view theory was unsuitable for this study.

Organizational information processing theory. The focus of organizational information processing theory is a manager's decision-making processes amid higher uncertainty levels (Roßmann, Canzaniello, von der Gracht, & Hartmann, 2018). This theory indicates that the difference between information needs and information capacity has direct effects on organizational performance (Kaur, Gupta, Singh, & Perano, 2019). A critical element of organizational information processing theory is a manager's information capacity and clarity (Dubey et al., 2019). As my focus was not on information capacity or clarity, the organizational information processing theory was unsuitable for this study.

Uncertainty theory. Uncertainty theory presents uncertain measures, uncertain variables, and uncertain distribution (Wang, Zang, Zhai, & Qiu, 2017). Uncertainty theory is appropriate when researchers lack historical data (Wang et al., 2017), thus providing a suitable foundation for the improbability of demand (Zeng, Kang, Wen, & Zio, 2018). Uncertainty theory is an appropriate mathematical tool when utilizing individual information and experimental data (Wang et al., 2017); however, the theory does not provide the flexibility of the general systems theory. Furthermore, the focus of my study was not on uncertain variables and experimental data. For this reason, uncertainty theory, although considered, was ultimately inappropriate for this study.

General Systems Theory

The principles of the general systems theory provided me with the flexibility to investigate dynamic relationships between system components. Exploring the relationships between system components provides business leaders with better perceptions of ERP systems (AboAbdo, Aldhoiena, & Al-Amrib, 2019; Bhattacharya, 2017). General systems theory is a model of reality's universal features, a way of observing things previously unnoticed or avoided in a methodological maxim (Von Bertalanffy, 1972). General systems theory was appropriate for the conceptual framework of this study.

The goal of the general systems theory in business is to develop an objective and logical decision-making context by accepting system performance as the effect of interactions between components (Vityaev & Demin, 2018). The general systems theory

was applicable in this study because business leaders struggled to integrate ERP system end users into a larger system. This effort was consistent with the general systems theory approach, including the different agents that functioned within a greater component (De Florio, 2017; Von Bertalanffy, 1972).

Due to increased technological complexity, business leaders may not understand the need for increased self-stabilization functions to ensure continued operation (Roundy, Bradshaw, & Brockman, 2018). Johansson, Karlsonnon, Laine, and Wiksell (2016) contended that the growing complexity of new technology has an impact on acceptance from the workforce. Thaker and Nagori (2018) argued that the different facets of a problem indicate the number of variables involved in specifying a state of the problem, in which the number of possibilities is commensurate with the problem's complexity. During the ERP system implementation project, business leaders attempted to improve operational efficiencies by integrating end users into the ERP system.

The general systems theory is applicable to any system, regardless of the properties of the system or elements involved (Von Bertalanffy, 2008). Consequently, business leaders' understanding of organizational performance increases through the exploration of various aspects of the ERP system. Maghrabie, Beauregard, and Schiffauerova (2019) supported the concept that general systems theory provides guidelines for analyzing conventional elements. Researchers created a map of interactions based on the results from studies conducted with the general systems theory.

The general systems theory is a scientific principle of completeness considered ambiguous, cluttered, and abstract (Von Bertalanffy, 2008).

A system consists of components connected by relationships, which results in a whole greater than the sum of its parts (Vityaev & Demin, 2018). General systems theory provides a formal approach for scientific disciplines; researchers who use mathematical models tend to limit research to expectations and precise boundaries (Velte et al., 2017). General systems theory is a combination of system complexity and the environment in which the system operates (Oesterreich & Teuteberg, 2018).

ERP System Preimplementation

An ERP system is a costly and risky endeavor that most large employers have accepted in one form or another. Within the last 10 years, ERP systems have gained popularity among business leaders for the increasingly complex organizational processes necessary to compete in a global environment (Kutin, Dolgov, Sedykh, & Ivashin, 2018). Some business leaders use IT innovations to streamline many business processes by addressing firm-level managerial and organizational issues. Streamlined innovations include communications, electronic commerce, database management, network, telecommunication configuration, hardware, enterprise architecture, and business applications (Müller, Buliga, & Voigt, 2018). To manage cost and schedule constraints, business leaders have developed a prioritized list of effective ERP modules used to support their organizational goals.

ERP systems originated as an IT management decision. Because some business leaders perceive ERP systems to be an IT function, they provide little top-level manager oversight or support during the implementation process. More than an IT function, ERP systems present an embedded alignment between a predetermined functional structure and organizational choices. When business leaders address IT engineering and business management concerns early in the development process, ERP systems may provide benefits to companies (Schwade & Schubert, 2016).

ERP systems are COTS programs, systems consisting of more than just software and hardware (Turki et al., 2019). Some COTS systems could result in changed business processes and improved business structure (Turki et al., 2019). Business leaders use COTS systems to purchase business systems with ready-made software and hardware without incurring research and development costs.

ERP systems provide business leaders the ability to collect near real-time data for improved visibility and increased task automation in the industries of health care, banking, government, and education (Jayakrishna, 2019). The broad acceptance of ERP systems may indicate a universal change in the modern business setting. An overwhelming majority of ERP systems are proprietary closed-source systems that require complex actions to complete customizations monthly (Roumani, Nwankpa, & Roumani, 2017).

ERP systems provide employees and customers with enhanced transparency, resulting in increased operational knowledge and information management (Córdova &

Gutiérrez, 2018). An ERP system is a means to integrate data and functionality, thus providing a solid foundation for an organization's global operations. The benefits of an ERP system include an increased competitive advantage via information sharing among various departments and customer order management (Córdova & Gutiérrez, 2018). Successful ERP system implementation requires acceptance between top-level business leaders. Financial management staff members may resist an ERP system due to limited flexibility compared to prior accounting systems (Schwade & Schubert, 2016).

The complexity of an ERP system operation may negatively affect organizational acceptance (Morquin & Ologeanu-Taddei, 2016). ERP systems are not inherently user-friendly and require end users to learn new business processes. Some employees may fail to understand the possible benefits of an ERP system, thus viewing new processes as additional work to accomplish the same task (Parthasarathy & Daneva, 2016).

Data precision and consistency within the ERP system may have positive effects on internal financial reporting controls; however, ERP systems are susceptible to deliberate system manipulations (Mahendrawathi et al., 2017). ERP system operations might lead to increased efficiency and effectiveness of internal business processes (Townsend et al., 2018). Some organizations with operating ERP systems have shown increased productivity, increased inventory turnover, and increased profit margins (Ruivo, Robrigues, Johansoon, Oliveira, & Rebelo, 2017).

ERP systems may have an adverse impact to return on equity (Pasban & Nojedeh, 2016). Agency-wide acceptance of new business processes is crucial for ERP system

success (Córdova & Gutiérrez, 2018). Training and open discussions with the workforce are one way for business leaders to gain agency-wide acceptance (Townsend et al., 2018). Business leaders use ERP systems' centralized database to integrate data throughout the organization, regardless of location (Mennenga, Cerdas, Thiede, & Herrmann, 2019; Ruivo et al., 2017).

Unlike traditional information systems, ERP systems have a COTS design. As such, business leaders find that ERP systems require extensive customization to maintain current business processes, often requiring business leaders to redesign their business processes to align with the ERP system (Jayakrishna, 2019). The lack of acceptance of standard ERP system processes results in failed ERP system implementation in some organizations (Parthasarathy & Daneva, 2016). Business leaders often contract the services of external consulting companies to assist in selecting the right ERP system, the proper application process, and the technical evaluation for the chosen solution (Townsend et al., 2018).

Understanding ERP system success is not the same as understanding ERP system implementation success. ERP system success is dependent on the increased efficiency and effectiveness of the ERP system according to the organization's business process performance. The success of an ERP system implementation project is dependent on meeting schedule requirements and budget constraints (Madanhire & Mbohwa, 2016).

An ERP system implementation project is a knowledge-intensive process that requires the understanding and skills of a broad range of people with diverse business and

IT capabilities. These capabilities have significant effects on managing the enterprise-wide information system (Junior, Oliveira, & Yanaze, 2019). Some business leaders lack the requisite business knowledge of decision-making methods but find that they can integrate value-added features and both functional and nonfunctional criteria to improve their decision-support environments (Namugenyi et al., 2019). Some business leaders expect their ERP systems to improve business performance and increase competitive advantage. The level of knowledge and skills required by ERP system end users is extensive and could result in workarounds, ultimately decreasing operational effectiveness and eventually causing adverse effects instead of the expected benefits (Schwade & Schubert, 2016).

ERP system developers choose the programming languages for their projects based on describing, suitability to the development task, speed, modeling, and natural language (Mefteh, Bouassida, & Ben-Abdallah, 2018). ERP system developers could be unable to produce 100% defect-free ERP system software (Ocampo, Hernández-Matías, & Vizán, 2017). Some business leaders recognize that the potential causes of ERP software defects are the direct result of changes to the scope of ERP system requirements after the contract award phase.

Governmental officials use the ERP system to standardize acquisitions, financial management, program management, maintenance, plant and wholesale supply, and workforce management. Khan (2010a) found that the ERP system costs approximately $71 billion or 50% of the government agency’s appropriated funds, excluding personnel

and salary resources. Government officials depend on successful ERP system implementation to solve longstanding weaknesses in business operations (Khan, 2010a). ERP systems can also provide business leaders with the most desirable decision-making functions through the secure integration of necessary business functions (Hajji, Pellerin, Ghargi, Léger, & Babin, 2016).

Business leaders can use ERP systems to improve business process integration and respond quickly to changes in the global business environment (Jituri, Fleck, & Ahmad, 2018). Six of nine ERP system implementation projects present schedule delays that range from 2 to 12 years (Khan, 2010b). Furthermore, Khan (2012) pointed out that government business leaders realize that such delays could require the funding of legacy system operation and longer maintenance than expected, resulting in increased costs up to $2 billion.

ERP competitive advantage. Achieving or sustaining a competitive advantage is a primary reason for business leaders to justify committing the extensive resources required for successful ERP system implementation (Marhdi et al., 2019). Business leaders realize that ERP systems alone do not show significant benefits in providing a competitive advantage or desirable economic and financial outcomes (Rauch, 2019). ERP systems may provide advantages in planning, decision-making, execution, and increased performance, leading to a competitive edge in meeting customer expectations.

Understanding the concept of competitive advantage is crucial for successful business leaders. Competitive advantage is the capability to generate a defensible position

through critical time management and innovation for enhanced decision-making and increased productivity (Gunasekaran, Subramanian, & Papadopoulos, 2017). Advances in information technology are critical for increasing the effectiveness and efficiency of traditional logistics and supply chain operations (Gunasekaran et al., 2017).

The innovative approaches, process improvements, and maintainable resources business leaders can use to support a sustainable competitive advantage are valuable, rare, unique, and non-substitutable (Sadiku-Dushi, Dana, & Ramadani, 2019). Improved performance requires innovation, dependability, and quality to maintain a competitive advantage (Tams, Thatcher, & Craig, 2018). Sørheller et al. (2018) suggested that many business leaders use ERP systems to employ standardized processes, incorporate best practices, and gain central oversight of highly detailed, readily available operational data. Business leaders analyze these functions to create organizational transparency.

Business leaders eager to develop a platform and strategy for their implementation process must consider the importance of strategies in other ERP system implementation projects (Slaman & Haddara, 2019). Success factors can facilitate or obstruct performance results, including gaining a competitive advantage. ERP system customer relationship modules may offer some benefits to firms but might not provide a significant advantage (Treber, Breig, Kentner, Häfner, & Lanza, 2019); similarly, individual IT capabilities are not always tied to competitive edge (Slaman & Haddara, 2019). Furthermore, Slaman and Haddara (2019) argued that, under certain

circumstances, the managerial efforts required to sustain high IT capability levels might result in a sustainable competitive advantage.

Knowledge transfer. Knowledge transfer is crucial for providing the near-real-time data business leaders need for their strategic decision-making processes. Business leaders must understand the benefits of an ERP system before starting an implementation project. Organizational learning and knowledge transfer are two of the most vital elements in building a strategic alliance between companies (Bellini, Aarseth, & Hosseini, 2016). Anticipating knowledge transfer activities requires significant time and resources; when the incremental costs outweigh the benefits and are no longer affordable, it is realistic to terminate existing programs (Cepeda-Carrion, Martelo-Landroguez, Leal-Rodríguez, & Leal-Millán, 2017). Communication barriers and tensions may arise between those responsible for interorganizational trust and knowledge sharing.

Negative attitudes toward learning and sharing between groups with different purposes and practices may present obstacles to success within or among organizations, shareholders, and customers (Akdoğan, Arslan, & Demirtas, 2016). Change in the network structure on the performance of knowledge transfer may diminish when subsequent agents exchange knowledge. Transfer performance is dependent on the proximity and trust between participants and includes the differences in their educational qualifications (Hung, 2017).

Intellectual capital is the ability to derive knowledge from executives, information systems, and networks. Strategic productivity is crucial for the growth and success of

companies operating in a globalized market (Superkar et al., 2019). Top-level business leaders must realize that positive, hardworking relationships could affect knowledge transfer and require mediation between mutual trust and project outcomes.

Business leaders who foster trust increase their overall stock of implementation knowledge, giving each customer the ability to determine if the project will result in agreed-upon objectives (Mayeh, Ramayah, & Mishra, 2016). Trust among business leaders, stakeholders, and clients is the foundation of knowledge sharing. Business leaders who lack confidence or who do not understand the requirements of knowledge sharing might lead major personnel to provide incorrect information or no information at all (Yang, 2016).

Process innovation. Process innovation provides business leaders with a better understanding of how and why business changes are going to occur (Kim & Ryu, 2017). Additionally, process innovation provides the means for business leaders to address operational concerns before starting the implementation process (Humlung & Haddara, 2019). In some government agencies, process innovation comprises the fundamental redesign of methods for performance improvements measured through cost, quality, service, and speed (Guo, Pan, Guo, Gu, & Kuusisto, 2019). Process innovation leads to lower production expenses, which can result in decreased product cost, regardless of quality (Kim & Ryu, 2017). Diverse business leaders can maintain higher reputations, attract a more talented workforce, and increase efficiencies through process innovation (Humlung & Haddara, 2019).

Business leaders in countries with small growth domestic production are likely to seek innovative management approaches and new technologies (Makri, Theodosiou, & Katsikea, 2017). Facilitating innovation requires business leaders to embrace planning software with appropriate methods and techniques (Niewöhner et al., 2019). Business leaders who develop process innovation and redesign service strategies and tactics by leveraging IT capabilities improve customer service (Celtekligil & Adiguzel, 2019).

Intrinsically transcending a department's process innovation is an indication of the acceptance of novel or enhanced product and service delivery procedures to customers (Sklyar, Kowalkowski, Tronvoll, & Sörhammar, 2019). Although advanced levels of novelty require increased learning competencies, most business leaders establish process innovations by transforming and exploiting resources. In contrast, Johansson, Raddats, and Witell (2019) suggested that increased reliance on a business's main clients should have no impact on primary innovation development. IT professionals who research the question of why may provide a comprehensive solution to customers' needs (García, Romero, & Raventós, 2016).

Employee innovation is essential for success (Sklyar et al., 2019). Top-level business leaders rely on extensive dialogue with IT experts and end users to continuously innovate. The principal drivers to change may provide business leaders with enhanced value through shared risk with providers, transformed business processes, and vendors who sustain excellence (Makri et al., 2017).

Risk interdependencies. Business leaders must understand risk interdependencies to determine if the benefits of ERP system implementation are worth dedicating the necessary resources (Lugert, Völker, & Winkler, 2018). Analyzing interdependencies requires a detailed description of a selected event (Scherz, Zunk, Passer, & Kreiner, 2018). A detailed description may include the location, conditions and constraints, sales, technical and organizational systems, and operating factors (Bachrach & Mullins, 2019). A risk interdependency matrix shows the analysis of risk relationships.

Some risks have more impact on an organization than others. Risks may result in the malfunction of an entire system or cause other radical or incremental hazards (Amankwah-Amoah, 2017). Legacy systems or systems from other vendors can present significantly greater risks when integrated with ERP system modules (Lugert et al., 2018). Risk is a broad term for different aspects of a project and consists of standard deviation, overrun budgets, missed deadlines, or the consumption of more than the maximum designated resources needed to commit to a project (Muriana & Vizzini, 2017).

Researchers should focus their interdependency analysis on the causes and the consequences of failure (Bloomfield, Popov, Salako, Stankovic, & Wright, 2017). As risk interdependencies grow, it is essential to develop historical simulation techniques to provide efficient interdependency estimates (Scherz et al., 2018). Incorrect commands or inappropriate decisions having negative effects on safe operations are additional risks (Qazi, Quigley, Dickson, & Ekici, 2017).

Risk assessment. Risk assessment is vital for business leaders to determine if the benefits of ERP system implementation outweigh the costs (Longhurst et al., 2019). Increased system complexity requires researchers to facilitate the holistic appreciation of risk evaluation (Erkoyuncu et al., 2019). A comprehensive decision support system can provide professionals with a critical understanding of project vulnerabilities. Due to the size, complexity, and high failure rate of ERP system projects, implementation team members must conduct a tactical risk assessment to prevent undesirable results otherwise not discovered until the problem arises (Özcan et al., 2018). Although rarely applied to complex IT projects, including ERP system implementation, risk assessment processes are means for business leaders to determine potential threats.

Project managers usually underestimate risk factor interdependencies or inadequately identify crucial project impacts in the early stages of the implementation process (Longhurst et al., 2019). The complexity of an ERP system implementation project and the associated risks could result in the inefficient utilization of resources by implementation team members within competitive environments (Osnes, Olsen, Vassilakopoulou, & Hustad, 2018). Osnes et al. (2018) also discussed the associated risks, including organizational, technical skill, project management, systems, user, and technology risks.

Business leaders use risk measures to define the preferential order among financial positions, accounting for the tradeoffs between value magnitude and variables with the likelihood to change over time (Tegeltija, Oehmen, & Kozin, 2017). Risk

assessment processes provide business leaders with a method for gathering and evaluating data (Witkowski, 2017). Globalized risks include material, financial, and information risks (Witkowski, 2017). Some political and cultural practices are unreliable and indeterminate, which can result in globalized risks and increased supply chain vulnerability (Rivera & Kashiwagi, 2016).

The results of a risk assessment analysis may show the possible severity and probability of occurrence, but it is harder to apply to ERP system projects than traditional IT projects (Osnes et al., 2018). Risk assessments provide business leaders with early hazard identification and are crucial for mitigating potential threats and ensuring reliable and accurate project planning information (Rivera & Kashiwagi, 2016). Different risk management actions provide a common view of risk through unrestrained effects directly related to work in the environment of the unbiased world (Shafqat, Welo, Oehmen, Willumsen, & Wied, 2019).

Business leaders may use risk management techniques to control closely interrelated ERP system project risks (Dewi, 2019). Shafqat et al. (2019) indicated that each modification might result in policy change and requires proactive risk management practices for adequate performance. With a risk classification of 30 factors, ERP systems cannot remain static after implementation.

Risk assessment is the systematic process of collecting and analyzing data to determine the probability of risk (Osnes et al., 2018). Experts employ standard risk assessment methods to reduce unplanned outcomes. The standard risk evaluation

processes are event tree analysis, fault tree analysis, and failure mode and effects analysis (Islam & Nepal, 2016).

Global integration. Business leaders can use the process of global integration to implement and track corporate policies and processes in a global environment (Boddewyn, 2016). Business leaders must analyze the processes and procedures of global integration before ERP system implementation to validate the benefits and costs of an ERP system. An essential driving force for global integration in Western multinational firms is leveraging preexisting intangible resources. Business leaders cannot gain a competitive advantage by exclusively pursuing a global integration strategy; rather, they use certain global integration strategies to emphasize premium positioning (Cao, Navare, & Jin, 2018).

Business leaders of multinational enterprises can minimize duplication to create a source of competitive advantage by generating efficiencies and assisting the specialization of individual units through substantial interchange (Gellweiler, 2017). The globalization of production networks is a key factor in the integration of emerging economies into the global economy. Kordos and Vojtovic (2016) identified a variety of arrangements, including progressively active global participation from firms in developing economies with an emphasis on evolution, progress, and subsequent internationalization.

Global value chain integration is the sharing of information among geographically dispersed subsidiaries. Sharing information provides business leaders with a world

market advantage and results in improved market performance by giving multinational corporations the global integration benefits of uniform sourcing (Zhang, Zhan, Xu, & Kumar, 2020). Global integration, the process of determining growth orientation, is challenging and rare in modern business practices.

Global integration is a primary goal in countries with developing economies (Kordos & Vojtovic, 2016). Business leaders with distinct advantages of size and managerial capability have better research, development practices, and marketing skills; as a result, they often choose global over regional integration strategies (Lenkenhoff et al., 2018). Global integration mechanisms require control from headquarters and interunit coordination to regulate and manage the activities of multinational corporations (Boddewyn, 2016).

ERP System Implementation

ERP system implementation may present business leaders with considerable financial risk. The potential advantages of ERP systems include increased competitive advantage, inventory reduction, improved order management, reduced long-term IT costs, and improved customer responsiveness through global data sharing (Fernandez, Zainol, & Ahmad, 2017). These potential business process gains can provide business leaders with the justification to invest large sums of money for ERP system implementation projects.

Due to the complexity of an ERP system, improper implementation projects can present business leaders with considerable problems. ERP system implementation

projects require sophisticated decision-making, top-level management support to reduce internal resistance, and hiring a knowledgeable and experienced consulting firm (Wang et al., 2017). ERP systems provide one system both centrally managed and locally executed (Donelson, n.d.). ERP system implementation changes do not always result in organizational benefits, with the potential for adverse effects on internal and external factors that indicate the quality of business processes (Fuchs, Oks, & Franke, 2019).

To compete in a rapidly changing global business environment, some business leaders choose to implement expensive and complicated ERP systems (Acar, Tarim, Zaim, Zaim, & Delen, 2017; Lucke et al., 2019). Acar et al. (2017) identified anticipated benefits of ERP systems to include automated business processes, timely access to management information, and improved supply chain management. ERP systems provide a single database with shared common data that is both interoperable and integrated (Dortch, 2011). At different stages of ERP system implementation, business leaders need to identify and measure the anticipated benefits by developing objectives for improved process efficiency through complete package adoption or business process reengineering (Lucke et al., 2019).

Delivering advanced IT projects such as ERP systems is difficult and often unsuccessful. The skills required for project implementation and the decision-making approach provide a direct relationship among ERP system business capabilities (Osnes et al., 2018). ERP system implementation problems frequently occur due to complex cross-

module integration requirements, cultural differences, and communication issues among managing directors (Osnes et al., 2018).

ERP system end users require staff commitments to offset significant changes in business processes, employee skills, and measurement systems (Kunath & Winkler, 2019). The expertise of an organization's IT professionals has a direct influence on the success of an ERP system implementation project. Hustad et al. (2016) found that more than 50% of all ERP system projects do not provide the anticipated benefits within 3 years of system implementation.

Many ERP system projects are only partially successful or abandoned before completion. Few business leaders characterize ERP system projects as meeting expectations (Osnes et al., 2018). Furthermore, some project managers perceive risk management processes to be extra cost and work (Osnes et al., 2018). One method to protect both schedule and budget is to remove risk management from the implementation process.

More than 50% of business leaders evaluate their ERP system projects as unsatisfactory for process improvements or for providing the expected business value (Osnes et al., 2018). Business leaders who desire successful ERP system implementation cannot rely on best practices alone but must ensure that end users in their companies and consulting firms have essential knowledge and skills (Wang et al., 2017). When effectively managed ERP systems can provide business leaders with significant benefits,

including improved supply chain management processes and improved financial visibility.

The difference between ERP system implementation in large enterprises and small- or medium-sized enterprises is that the value-chain modules often indicate managerial problems. The problems include a substantial time investment that may result in significant schedule delays in 90% of projects (Fuchs et al., 2019). The business leader decision-making paradigm can result in business proficiencies gained through ERP systems with the support of IT governance.

Osnes et al. (2018) argued that top-level business leaders must back up policies, with 69% having developed defined strategies and 54% having implemented risk mitigation processes. Business leaders can divide ERP system implementation into major phases to complete a variety of tasks simultaneously. Business leaders could also incorporate some assessments to validate and control project success, although business operations may need reengineering (Sallah & Janczewski, 2019).

Critical Success Factors

One advantage of the general systems theory is that researchers can solve cases with comparatively small amounts of distinct data to develop variable CSFs. Cui, Chan, Zhou, Dai, and Lim (2019) suggested that CSFs consist of strategic alignment, project management, information technology, performance management, top-level manager support, and culture. Key factors with effects on ERP system implementation include restricting the efforts of external sources, involving system vendors, hiring

implementation consultants, and appointing knowledgeable project managers (Townsend et al., 2018).

Successful process management requires business leaders to meet the original scope and long-term goals as well as acknowledge that predetermined CSFs often fail in different organizational environments (Jayawickrama, Liu, & Smith, 2016). Business leaders should rely on the expertise of ERP system consultants and best practices while understanding neither guarantee success of ERP system implementation or ERP system performance. Ensuring effective ERP system implementation requires developing a positive relationship with ERP system implementation partners and facilitating knowledge sharing among team members (Wang et al., 2017).

The difference between traditional information systems and an ERP system is the integrated and streamlined data-sharing function (Wang et al., 2017). Business leaders can use streamlined data-sharing and sophisticated decision-making processes to increase competitive advantage and solve complex business problems. The standardized methods required for successful ERP system implementation may cause business leaders to adopt a different business approach. Critical factors affecting ERP system implementation include resistance to change, cultural issues, training, testing, and project management (Li, Chang, & Yen, 2017).

ERP system implementation is a complex, burdensome, and expensive endeavor requiring a detailed understanding of the critical features of organizational structure (Hustad et al., 2016). An effective implementation plan requires support from top-level

business leaders, first-line supervisors, and ERP system end users who possess diverse business knowledge and capabilities (Li et al., 2017). Xiao, Xiaoping, et al. (2019) suggested that an ERP system implementation plan should consist of operational procedures and methods for project performance evaluation.

The quality of an open-source project is dependent on the active development of a product integration plan. Birollo and Teerikangas (2019) explained that product integration must include professional and product services, training, and documentation, including performance evaluation standards for assigning absolute scores, weights, and thresholds to each criterion. ERP systems may have a considerable impact on management performance. Successful management performance requires top-level manager support, corporate vision, an adequate consulting firm and software supplier, a motivated staff, and enough training and education programs (Baykasoğlu & Gölcük, 2017).

Business Leaders can use CSFs to determine the information required to achieve their goals in an increasingly complex business environment. To achieve their implementation goals, business leaders must identify the attributes of project quality and scope, establish schedules, and accurately forecast budgets (Davis, 2017). Five of the more common CSFs are organizational management, product quality, supplier technology, technical and policy environment, and information center coordination and support (Ansyori, Qodarsih, & Soewito, 2018).

Identifying strategies could result in significant improvements to business leader performance in high-tech industries (Baykasoğlu & Gölcük, 2017). System integration is necessary for CSFs to ensure satisfactory performance because successful implementation does not always indicate improved performance outcomes (Jayawickrama et al., 2016). Li et al. (2017) found other common CSFs to be active communication practices, minimum software customization, legacy system management, and performance evaluation.

Critical Failure Factors

ERP systems are complex and costly processes, and many ERP system implementation projects do not provide the promised benefits (Issa, Hatiboglu, Bildstein, & Bauemhansi, 2018). On average, ERP systems go 178% over budget, and fail to meet their original schedules by 230% (Cui et al., 2019). Composed of an enterprise-wide database, ERP systems with standardized processes provide real-time data recall but often fail due to inappropriate ERP system module selection (Darmaningrat, Muqtadiroh, & Bukit, 2019).

No single ERP system software package can meet all a company's functional or special business needs (Aversano et al., 2017). Unethical project management has both unforeseen and direct costs that frequently result from a lack of commitment and communication (Günther, Mehrizi, Huysman, & Feldberg, 2017). ERP systems fail when business leaders cannot align company goals with technological constraints, provide effective change management, or gain acceptance from supervisors (Atieh et al., 2016).

The most common critical failure factors consist of inadequate top-level manager support, undefined strategic goals, and poor project management (Cui et al., 2019). Issa et al. (2018) recognized that additional factors, including cost overruns and project delays, can result from scope creep, causing causes increased customization and unrealistic expectations. A failure may include the total cancellation of an ERP system project, a substantial schedule delays for go-live, or excessive cost overruns that may lead many business leaders to seek alternative business operating systems (Lugert et al., 2018).

ERP system implementation requires unique, technically sophisticated managerial choices and may require business leaders to adjust their proven processes to fit with the new ERP system software processes (Aversano et al., 2017). Many factors can cause ERP system implementation failures. Power struggles, which can manifest into conflict and resistance, are responsible for 75% of ERP system implementation projects that fail to provide the established benefits (Xiao, Wu, Xie, & Hu, 2019). Additionally, Xiao, Wu, et al. (2019) suggested that users failing to do their jobs, damaging employer-owned property, failing to communicate implementation information, and threatening to resign cause end users and first-level supervisors to resist ERP system implementation processes. Such resistance may result in conflicts with ERP system consultants and top-level business leaders.

Software Evaluation

Business leaders must invest in software process improvements to reduce budget limitations (Lopes & Zancul, 2019). One of the limitations of existing approaches in

component-based software engineering metrics is the lack of consistent measures for evaluating component quality. Formulation, collection, validation, and applications may produce additional limitations in software quality evaluation (Papamichail et al., 2019).

Environmental conditions and computer system status may have negative effects on software performance. The increased complexity and criticality of software applications in business operations requires the design of effective feedback control loops to monitor software behavior (Jiang, Klein, & Chang, 2019). Varghese, Raimond, and Lovesum (2019) argued that software architects could use the performance evaluation of real-time software systems to improve product performance through proper selection, customization, and component integration during all phases of development.

Some business leaders might struggle to evaluate system software stability due to recent developments in software maintenance (Upadhyay, 2016). Software evolution is an essential aspect of software engineering (Jamil et al., 2019), indicating how software changes may provide solutions for design challenges or problems. Budget restrictions and high effectiveness requirements are foundational for many types of evaluation studies.

Sales, Augusto, and Barbalho (2017) discovered critical failures through the program execution of test cases. Muqtadiroh, Astuti, Darmaningrat, and Aprillian (2017) determined that quality software evaluations include functionality, reliability, usability, efficiency, portability, and maintainability. Software evaluation criteria and evaluation techniques are functional, scientific, quality, cost and benefit, and opinion (Pires & Cavaco, 2018). Furthermore, García-Valls, Escribano-Barreno, and García-Muñoz (2019)

suggested that a critical advantage of software evaluation is that it indicates the overall quality of the software engineering entity, which consists of various indicators.

Decision-makers can use software evaluation techniques to capture user requirements (Rustambekovich, Gulyamov, Usmanova, & Mirzaev, 2017). Business leaders can use software assessment methods to control the execution of case-based reasoning that may result in software selection. The lack of threshold values could restrict the practical use of metrics to evaluate component-based software systems. Some concepts either overlap or are not defined, resulting in obstructed software implementation and different results from the same data (Papamichail et al., 2019).

ERP Software Metrics

An important metric for evaluating system performance is the steady-state availability metric, which is identical to the steady-state probability metric in that the system is operational (Sönmez, 2019a). Software architects use classification techniques to build predictors based on the value of the software parameters. The vulnerable information previously used to predict faulty software components is a measure of some property of a piece of software calculated at different granularity levels (Setiawan et al., 2018).

Interface and specification limitations are inherent in computer-based software metrics. These limitations may be the result of a lack of reliable methods and processes, vagueness in definitions, a lack of mathematical properties, and the failure to validate data (Papamichail et al., 2019). When comparing performance metrics, business leaders

should know that the time needed for a quality score calculation is a crucial parameter in which the primary criterion correlates to the individual results (Pietrantuono, 2020).

Metrics are a bottom-up philosophy with a hierarchy of information consisting of numerical, ordinal, categorical, or text attributes used to add to facts or selections through tools or user-set annotations (Papatheocharous et al., 2018). Business leaders must understand the architectural differences to comprehend metrics. The outcomes of different metric tools produce varying results from the same data (Papamichail et al., 2019). Users apply software metrics to assess predefined goals in which cohesion metrics show the relationship among elements that indicate the software's structural quality (Arvanitou, Ampatzoglou, Chatzigeorgiou, Galster, & Avgeriou, 2017).

Expert opinions and frequent metric reporting can show the development of specific metrics that indicate the need for evidence (Crispim, Fernandez, & Rego, 2020). Crispim et al. (2020) maintained that some software metrics are more relevant than others. Some metrics provide representative values that are dependent on the functionality and are used to categorize and measure the degree to which they comply with the requirements. Regardless of the size, type, or application, the value of the metrics correlates to the property assessment but cannot replace software specialists' judgment (Sönmez, 2019b).

Metrics indicate modularity through assessments of tangling, scattering, and crosscutting (Sangeetha & Chandrasekar, 2019). Likewise, Kaiya (2018) argued that process metrics utilize changes in software history because of differing metrics on

prerelease software compared to post-release software. The software requirement thresholds are vital for understanding how experts use metrics values in product and software services assessments (Sönmez, 2019b).

Whereas classification determination requires more than an individual metric, software metrics provide prediction results for different products (Poecze, Ebster, & Strauss, 2018). Process changes can cause parameters to shift, resulting in decreased classification accuracy and differences in acceptable production limits (Parhizkar & Comuzzi, 2017). Crispim et al. (2020) identified that the effectiveness of metrics is dependent on the availability of measurable data attained with enough prediction.

Improving software quality is a direct result of predicting fault location and failure data collection through improved metrics that require different programming languages (Kaiya, 2018). Software developers have successfully predicted post release software defects with complexity metrics (Setiawan et al., 2018). Reference values indicate software metrics by providing measurement, evaluation, control, and improvement of software products and processes (Sönmez, 2019b).

Developers use metric granularity and associated assessments to analyze derived data and facilitate decision-making (Crispim et al., 2020). The granularity of fault prediction is instrumental in metric selection for identifying more post release failures than static code metrics (Kaiya, 2018). A significant percentage of software developers argue that the structural software metrics approach differs in the granularity level and

object-oriented metrics, which include data from code level and higher-level units (Papamichail et al., 2019).

Dependent and independent variables correlate with fault data and software metrics, respectively (Parhizkar & Comuzzi, 2017). A software fault prediction model includes dependent and independent variables. Miller, Yukish, Hoskins, Bennett, and Little (2019) pointed out that experts who use metrics utilize recognized testing techniques to refine and validate software-testing theories on fault prediction. Reliability metrics and rigid mathematical deductions facilitate incorporating the classification of failures, including information gained through an ERP system end user perspective (Alfieri, Cordella, Sanfelix, & Dodd, 2018).

Systems Integration

System integration combines decision-support elements with human-centric decision-making processes for different types of resources and capabilities (Aydiner, Tatoglu, Bayraktar, & Zaim, 2019). Users with varying perspectives during design and system integration might mitigate design problems, with the primary mission used to functionally assemble components and parts to satisfy users' needs (Parthasarathy & Daneva, 2016). Turki et al. (2019) suggested that system integration consists of software and systems engineering, program and change management, development testing and evaluation, and training development.

Service computing provides integration of real-time information with enterprise databases and business processes (Kawaguchi, 2019). Automating information flows and

synchronizing information exchange procedures commonly defined and imposed by buyers, the operational linkages result in smooth processes that provide improved efficiency through integrated information systems (Tseng, Lim, & Wu, 2019). The cost of electronic integration is relatively small when supporting the expectation of greater data flows.

The data flow may affect supply chain management and provide support for critical business processes, such as products and services as well as increased value for customers, organizations, and vendors (Sarkar, Omair, & Kim, 2020). Large data flows and complex interface gaps can present a higher risk factor (Parthasarathy & Daneva, 2016). Gallab, Bouloiz, Alaoui, and Tkiouat (2019) maintained that risk assessment consists of identification, analysis, and prioritization, whereas risk control includes planning and monitoring.

ERP System Postimplementation

A successful ERP system implementation project is not a guarantee of ERP system success. Dallasega, Rauch, and Linder (2018) identified that, in some companies, client satisfaction and ERP system benefits are more important than completing the ERP system implementation on schedule. Top-level manager support during ERP system postimplementation is necessary to achieve the full benefits and align the ERP system with competitive strategies (Madanhire & Mbohwa, 2016; Rezvani, Khosravi, & Dong, 2017).

The efficient use of an ERP system during the postimplementation phase provides a full range of organizational benefits (Haddara & Moen, 2017). Ruivo et al. (2017) argued that, despite reported ERP implementation problems, money expended on ERP systems is an operating cost versus an investment. Furthermore, Ruivo et al. believed that ERP systems could provide actual cost savings in the future. For agencies to achieve the expected benefits, business leaders must set clear goals and objectives during the ERP system implementation process (Dallasega et al., 2018).

Postimplementation learning correlates to ERP system usage with decision support, work integration, and customer service (Haddara & Moen, 2017). Haddara and Moen (2017) indicated that effectively sharing knowledge among ERP system end users occurs in the postimplementation phase and results in increased efficiency. ERP system end users who are proficient with computer systems tend to appreciate and understand their roles after ERP system implementation and to report higher satisfaction levels and improved workflow (Sasidharan, 2019). Haddara and Moen indicated that education and training provide the comprehensive understanding needed for sustainable ERP system postimplementation success.

Summary of the Literature Review

The literature review consisted of information from peer-reviewed and government articles on the conceptual framework, pre-ERP system implementation, ERP system implementation, and post-ERP system implementation. The rationale behind this

review was to provide a foundation of knowledge business leaders might use for ERP system implementation. Information on ERP system implementation was limited.

Throughout the review, I identified the common experiences of strategic alignment, project management, information technology, performance management, top-level management support, and culture among business leaders who successfully achieved ERP system implementation. Many ERP system implementation projects were unsuccessful because business leaders failed to provide adequate top-level manager support, define strategic goals, and effectively manage the project.

The findings from the literature review present the topics of pre-ERP system implementation, ERP system implementation, and post-ERP system implementation based on the conceptual framework. The pre-ERP system implementation literature could provide business leaders with the insight required to conduct the necessary research for developing a detailed plan before embarking on such a complex endeavor. Business leaders might derive insight into project management from the ERP system implementation literature. The post-ERP system implementation literature could help business leaders understand ERP system implementation is an ongoing process that requires consistent system maintenance and updates.

Significant gaps in the literature were apparent between the strategies of a private agency and those of a public agency. As shown by the literature, many of the strategies identified were similar, yet business leaders utilized different approaches to achieve equivalent benefits. A distinct correlation in the timeliness of identifying strategies

dependent upon the expended resources appeared in the literature review. Further research could indicate if business leaders understand the main concepts needed to identify strategies in an ERP system implementation project.

Transition and Summary

Section 1 included a discussion of the study's background, purpose, research problem, and significance, as well as a review of the professional and academic literature. An in-depth consideration of the literature provided the data required to indicate the magnitude of the research problem. Additionally, the literature review provided support for the study's nature, the conceptual framework, and the qualitative research methodology used to investigate ERP system implementation factors.

Section 2 presents the added components for the study, a restatement of the purpose of the study, and insight into the benefits of investigating the business problem. Section 2 also includes discussions of the target population, sample identification, and data collection methods. Section 3 provides the results of the research methodology and research design.

Section 2: The Project

Section 2 includes an explanation for this research study beginning with the restated purpose statement. The section also includes the role of the researcher in the data collection process and any relationships with the topic, participants, or area. Section 2 has detailed information on the population and sampling, sample size, ethical research measures, and data collection instruments, techniques, organization, and analysis. Also included in this section are the reliability and validity criteria.

Purpose Statement

The purpose of this qualitative single case study was to determine the strategies business leaders used for successful ERP system implementation. The sample for this study was 22 business leaders from a U.S. military base in the state of Washington. These business leaders, all of whom had at least 2 years of experience working with an ERP system, agreed to take part in semistructured interviews and observer-as-participant observations.

Business leaders and business community members could use the in-depth data of ERP system implementation strategies from this study to effect social change. Successful ERP implementation results in some business leaders achieving and sustaining a competitive advantage and earning higher profits. Greater company success provides employees and their families with job stability, which could result in a healthy local economy.

Role of the Researcher

The role of the researcher is to manage the study from a scholarly inquiry perspective (Wahab, Rahmat, Yusof, & Mohamed, 2016). As the researcher, I ensured objective and concise data interpretation. I analyzed and interpreted data from different points of view and perspectives. I collected data from semistructured interviews, observer-as-participant observations, and literature reviews.

My relationship with the participants at the government agency did not obstruct my impartiality during data collection and data analysis. I worked for the government agency of study, where I routinely utilized different ERP system modules. Specific modules included personnel management, warehouse management, inventory management, financial management, and acquisition management. I developed and maintained working relationships with business leaders, regularly assisting them with various work-related issues.

Ethical considerations and the Belmont Report protocol are critical for ensuring respect for persons, justice, and beneficence (Williams & Anderson, 2018). Published in 1979 by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, the Belmont Report provides the ethical standards for conducting research on human subjects in the United States (Faucett & Davis, 2016). Using the risk-benefit criteria, the researcher must place the needs and safety of the participants above the needs of the study. I treated every participant with respect and

dignity. Participants only answered the questions they felt comfortable in answering. Every participant was free to withdraw from the study at any time for any reason.

I evaluated the capability of respondents while they answered questions to mitigate participant bias. Participants answered each interview question. Participants represented a purposeful sample and met the established criteria. I randomly selected each participant based on the established criteria and utilized an interview protocol (see Appendix A) and an observation protocol (see Appendix B) to mitigate researcher bias. Before conducting the interview and observation, I assessed my beliefs about the effectiveness of ERP system implementation in one government agency. I compared the self-assessment to the final analysis and ensured that my previous beliefs did not alter the findings.

According to Yin (2011), interviews are an accepted data collection method in the case study research design. Yin recommended that researchers compare answers to alternative sources whenever possible. I developed an interview protocol (see Appendix A) to conduct each interview. The interview processes consisted of actions taken before the interview, actions taken during the interview, and actions taken at the end of the interview.

Interview preparation entailed presenting a professional neutral appearance, arranging for and setting up an appropriate interview location, ensuring that recording devices were operational, arriving punctually, and retrieving the signed informed consent form from the participant. I brought the recording device, notebooks, and pens necessary

for conducting each interview. Actions taken during the interview process included introducing and explaining the interview's purpose, asking nine open-ended questions (see Appendix C), being conscious of body language, and listening patiently to the responses. Upon completion of the interview, I provided each participant with the opportunity to ask follow-up questions, after which I thanked them for their time and participation.

According to Alola, Bekun, and Sarkodie (2019), researchers use observation protocols for observation success. An observation protocol presents the procedures for conducting an observer-as-participant observation. The observation protocol (see Appendix B) consisted of actions taken before the observation, actions taken during the observation, and actions taken at the end of the observation.

Observer preparation consisted of maintaining a professional, neutral appearance, ensuring that recording devices were operational, arriving punctually, and retrieving the signed informed consent form from each participant. Actions taken during the observation included introducing and explaining the observation purpose, utilizing the observation checklist (see Appendix D), being conscious of body language, listening patiently, and observing the processes. Upon completion of the observations, I thanked individuals for their time and participation. Additionally, I provided participants with opportunities to ask any follow-up questions. Before leaving, I gathered any items used during the observation process.

Participants

The 22 participants were business leaders from a U.S. military base in the state of Washington. Participant interactions provided data business leaders can use to improve current ERP system implementation practices. After I received approval from the Walden University Institutional Review Board (IRB) to conduct my study, I gained permission from the government agency to access the desired participants. The internal IRB process required me to obtain permission from the government agency's commanding officer to conduct a study on government employees.

Trust and respect are essential for establishing a working relationship (Akrout & Diallo, 2017). A commitment to trust is the means to strengthen a working relationship, and a participant may desire to cooperate due to a strong working relationship. Explaining the purpose of the research, outlining the security requirements, and fostering respect may increase participant satisfaction with an existing working relationship (Foroudi, Gupta, Sivarajah, & Broderick, 2018).

Research Method

The qualitative approach was the appropriate research method for this study because my focus was to collect rich, descriptive data that provide actual and minute descriptions of behaviors and participants' perspectives of the investigated phenomenon (Comer-Warner et al., 2020; Wahab et al., 2016). Quantitative methodology was not appropriate for this study because I did not focus on a set of variables and their causal relationships or numeric descriptions of trends, attitudes, or opinions (Aduhay, Nigatie, &

Kocalchuk, 2018; Hosseini et al., 2019; Rycroft, Hamilton, Haas, & Linkov, 2019). As such, the mixed methods approach was also inappropriate because I did not combine quantitative methods with qualitative methods (Mura, Longo, & Zanni, 2020).

Research Design

The qualitative case study approach was appropriate for this study. A researcher uses the case study design to conduct an in-depth study of a given situation (Nazemi & Burkhardt, 2019). The purpose of a single case study is to explore real-life situations or systems over time through the collection of rich textural data (Yin, 2013). Researchers who study one organization, group, or individual gain an understanding of perspectives and actions while limiting the scope of the studied phenomenon or strategies (Marshall & Rossman, 2016).

Researchers use the phenomenological approach to obtain a deeper understanding of any given phenomenon through the lived experiences of each participant (Chan et al., 2020). Disadvantages of the phenomenological design include the difficulty of detecting or preventing researcher bias and the risk that data subjectivity could cause researchers to struggle with establishing reliability and validity (Ambrose, Goodchild, & O'Flaherty, 2017). I did not select the phenomenological design because my study's focus was on ERP system implementation strategies and not participants' lived experiences.

Researchers use the ethnography design to observe members of a target population in their natural, real-world setting instead of a lab or focus group (Xue & Desment, 2019). The ethnography design is a time-intensive method and usually requires

years in which the researcher is part of the cultural group (Lempiälä, Apajalahti, Haukkala, & Lovio, 2019). I did not study a specific culture or community, nor was I part of a cultural group. As such, I did not select the ethnographic approach.

Achieving data saturation is critical for qualitative data collection and analysis. Data saturation requires continued data collection until no new information is available from additional collection efforts (Fernández-Álvareza et al., 2017). As such, I continued the data collection process until no new or substantive themes emerged.

Population and Sampling

The population for this study were 36 business leaders with ERP system experience in one government agency. In qualitative research, participant characteristics and knowledge are the basis for selection (Gilgor, Bozkurt, & Russo, 2019). Purposeful sampling is a nonprobability sampling method (Hazen, Weigel, Ezell, Boehmke, & Bradley, 2017) appropriate when only a limited number of participants are available as the primary data source (Goldstein, Ick, Ratang, Hutajulu, & Blesia, 2016). The types of purposeful sampling are maximal variation, typical, theory or concept, homogeneous, critical, opportunistic, and snowball (Furlong, De Silva, Guthrie, & Considine, 2016).

The standard for a qualitative sample size is to interview participants until concepts repeat numerous times or to interview systematically and explore questions until data saturates (Turner-Bowker et al., 2018). The 22 participants selected for this study shared occupational characteristics and management levels in the organization's hierarchy. As such, the homogeneous sampling method was appropriate for this study. I

purposefully selected participants based on their knowledge and experience of ERP system implementation strategies.

Each participant was required to have 2 years of experience performing daily functions with an ERP system. The sample consisted of 22 business leaders from a U.S. military base in the state of Washington. Qualitative sample size is dependent on the scale of the phenomenon under study, sample size standards, and statistical objectives (Siregar, Puspokusumo, & Rahayu, 2017). Interview locations included local conference rooms, work areas, and off-base locations based on participants' preferences.

Researchers must carefully evaluate the outcomes of a study when using a relatively small sample size (Sharma & Misra, 2017). To ensure data saturation, I conducted checks to look for reoccurring themes after every fourth interview. Once no new themes emerged, data saturation had occurred. In addition, I conducted member checks with participants during each interview to verify that I had correctly interpreted their responses.

The maximal variation sampling method was not appropriate because I did not focus my study on participants with different characteristics. The participants were familiar with the research topic, so the typical sampling method was not appropriate. The participants did not assist me with the development of a theory or concept, so the theory or concept sampling method was not apt. The focus of my study was not on a central phenomenon in dramatic terms, leading me to also reject critical sampling. Data collection had not begun, so the opportunistic sampling method was not appropriate.

Researchers use the snowball sampling method when they are not familiar with the topic, which was not the case in my study.

Ethical Research

I obtained written permission from the government agency head before soliciting employee participation. In addition, participants signed the informed consent form before their interviews (see Appendix C) and observations (see Appendix D). Each consent form included a brief introduction and an overview of the study, details on voluntary participation, and participants' right to withdraw at any point in the process. The withdrawal procedure was for participants to let me know they no longer wished to participate. If the participant chose to withdraw from the study, the interview or observation ended with any already-collected material subsequently destroyed. At this point, I would have thanked participants for their time, gathered any notebooks, papers, and forms, and departed the interview or observation area. Ultimately, no participants chose to withdraw from the study.

The incentive for participation was the knowledge that participants provided critical information business leaders could use to develop a successful ERP system implementation plan. Each participant received a copy of the results for their review and consideration. I did not provide participants with monetary compensation to avoid any moral interest conflicts.

Members of the Walden University IRB verified the data collection procedures and ensured that there were no violations of participants' human rights. The IRB

provided an approval number, which signaled my ability to begin data collection. The Walden University IRB approval number is 08-28-17-0351608.

The adequate ethical protection of each participant's identity started with a written notification, in which I assured participants of continued confidentiality during the study process and after publication. All data collected throughout this study were confidential to protect participants' identities and secured in a safe location. Additionally, I briefed each participant on the security requirements for the collected data, after which each participant agreed to continue.

The collected data will remain in a locked safe in a secure location for 5 years in accordance with Walden University guidelines. After 5 years, the primary method of destroying forms and notes will be to cross-shred each piece of paper. In addition, I will destroy any digital media devices with stored information and permanently erase applicable hard drives.

Once released, the findings provided no identifying information that connected a participant to any of the given responses. I used protocols to ensure participant anonymity. Confidentiality is essential for building trust. Throughout the study, I used an alphanumeric coding system of P001 to P012 to identify each interview participant (see Appendix A) and P013 to P022 for each observation participant (see Appendix D). I alone have access to participants' identities and their assigned codes.

Data Collection

This subsection presents an explanation of the data collection process for the study, including a description of the data collection instruments used. Also outlined in this section are data collection techniques, data collection organization, and the processes for assessing reliability and validity.

Instruments

As a qualitative researcher, I was the primary data collection instrument. The data collection instruments were open-ended interview questions (see Appendix C) and observer-as-participant observations (see Appendix D). I used a semistructured interview protocol (see Appendix A) to solicit creative responses with rich detail on the complex issue of ERP system implementation. Each interview lasted approximately 1 hour and occurred at the government agency, the participant's work area, or an area off base according to the participant's preference. The open-ended interview questions gave participants the opportunity to qualify and clarify their responses (Pickard & Roster, 2020).

I conducted each observation using the observation protocol (see Appendix D), recording the outcome of each observation in a notebook. The observer-as-participant observation process allowed me to capture information on what each participant did in a natural setting. Observer-as-participant observations can provide access to contextual factors indicating a moderate level of realism (Hodosi, Johansson, & Rusu, 2017). Each observer-as-participant observation gave me direct access to some of the strategies

business leaders used, including ease in performance, user efficiency, and the effectiveness of the ERP system implementation process. Observer-as-participant observations lasted approximately 45 minutes each, scheduled at times the participants desired.

I enhanced the reliability and validity of the data through transcript review and member checking with methodological triangulation. Reliability is the ability to achieve consistent results from each measurement and every deviation, whereas validity is the capacity of an instrument to measure what it is supposed to measure (Vilcu, Verzea, & Herghiligiu, 2018). I used a combination of open-ended interview questions, observer-as-participant observations, and a comprehensive document review for methodological triangulation.

Data Collection Technique

The data collection technique for this study included soliciting information from open-ended interview questions and observer-as-participant observations. I took handwritten notes, conducted semistructured interviews, and performed observer-as-participant observations in one government agency. To ensure accurate qualitative results, it is important that each participant answer the open-ended interview questions as thoroughly as possible (Williams, Nurse, & Creese, 2019). I followed an interview protocol (see Appendix A) to ensure my readiness for each interview session. I used the same interview questions (see Appendix C) and the interview protocol to ensure that each participant received the same information and responded to the same questions.

Furthermore, I conducted a member check after each interview question to ensure my understanding and interpretation of the participant's response was what they intended.

The advantages of open-ended interview questions are that they allow for an unlimited number of answers, the discovery of unanticipated findings, adequate answers to complex issues, and a broad range of possible themes from a single phenomenon (Susanto, Diani, & Hafidz, 2017). Labuschange, Grace, Rendell, Terrett, and Heinrichs (2019) noted that asking open-ended questions allows participants creativity, self-expression, and richness in detail. Participants can answer open-ended interview questions in detail and qualify and clarify their responses (Pickard & Roster, 2020).

Some disadvantages of open-ended interview questions include the time-consuming nature of interviewing, the potential for misinterpreting the questions, the level of detail differing somewhat with each participant, and the risk of participants feeling intimidated by the questions (Susanto et al., 2017). Labuschange et al. (2019) indicated that the responses to some open-ended interview questions might be irrelevant or useless, the items might be too general, and some participants might lose focus. Other drawbacks might be that statistical analysis is confusing, coding responses is difficult, and the time required by each participant varies depending on the thought and effort needed to answer each question (Pickard & Roster, 2020). I transcribed each interview and provided a transcribed copy to each participant for their review and feedback on any interpretation errors.

For each observation, I followed a set protocol (see Appendix B) to ensure similar observations for each participant. I utilized an observation checklist (see Appendix D) to guide the appropriate documentation of each observation. The observer-as-participant observation method allowed me to observe the phenomenon while spending a short time participating in the regular activity and informing each participant of the observation. The observation method was appropriate for this study because of the informed participant group and the limited time required to complete each observation.

Learning from observation is more natural than static examples that explicitly contain the solution (Liu, Fang, Zhou, Wang, & Wang, 2018). The focuses of each observation were the inventory management process, the requisition and acquisition process, the workforce management process, and the financial management process. I narrated each observation to analyze the comments and divide each observation into categories. The coding of observation data is consistent with data extracted from the narration, typically in a word or short phrase (Shida & Tsuda, 2017).

Researchers make observations on what participants do without relying on what participants say they do (Massen, Behrens, Martin, Stocker, & Brosnan, 2019). Hodosi et al. (2017) argued that observations provide an objective measurement of behavior, the mechanism to offset participants' weak verbal skills, and access to contextual factors operating in natural social settings for a moderate degree of realism. Blazquez and Domenech (2018) explained that observations are the best method for studying human

behavior and can provide direct access to social phenomena, comparison across time and locations, and improved precision of the research results.

The disadvantages of observations may include the possibility of observer bias, little interpretive validity, and restriction in the size of the observable population (Massen et al., 2019). Observations might be more expensive or time-consuming than questionnaires (Hodosi et al., 2017). Researchers cannot use observations to study opinions, past problems, and attitudes (Hodosi et al., 2017). Blazquez and Domenech (2018) identified vulnerabilities to be that observations alone cannot provide complete answers to any problem, there is a risk of researcher overidentification with the studied group, and observations do not increase the understanding of why people behave the way they do.

Researchers conduct member checking to validate the interview responses for accuracy (Liao & Hitchcock, 2018). I used member checking with each participant to verify the accuracy and understanding of each interview question response either during or after the interview. I provided interview transcripts and the final study so each participant could ensure the accuracy of my interpretation. Observation participants reviewed narrated transcripts of their observations so they could provide their review and feedback.

Data Organization Techniques

Data organization and accessibility coding are crucial for researchers to achieve their goals (Schöpfel, Prost, & Rebouillat, 2017). Researchers use data organization

methods to capture the primary points of their research and maximize their abilities to locate and share their resources (Mendonça, Andrade, Endo, & Lima, 2019). Data organization is essential in research and is particularly meaningful for qualitative business studies (Schmitt, Mladenow, Strauss, & Schaffhauser-Linzatti, 2019).

I used NVivo 11 software to store and organize the data collected during the interview, observation process, and document review processes. The electronic organization system provided the flexibility to manipulate the data. I used the response codes and any key themes to facilitate data organization and allow for replication of the study.

I provided a clear view of the data security process to strengthen the participants' trust. Yeole, Kalbande, and Sharma (2019) pointed out that the three main areas of information security are confidentiality, integrity, and availability. Additionally, Shen, Su, Zheng, and Zhuang (2020) suggested that security and reliability may have effects on each other and recommended a joint review. Raw data storage will be for 5 years in a secure location.

Data Analysis Technique

Conceptual plans may indicate how knowledge integration correlates to knowledge results, which may present conceptual ideas (Hong & Zang, 2017). The five stages of data analysis are gathering the data, grouping the data, placing the data into themes, assessing the data, and creating conclusions from the data analysis (Yin, 2011). The data analysis process comprises data collection, analysis of data on the topic or

subject, and justification of the topic or subject into themes or categories (Palacios Martinez, 2020). I analyzed the data to determine the level of differences between participants regarding the primary research question (Stone, Walentynowicz, Schneider, Junghaenel, & Wen, 2019).

The appropriate data analysis process for this study was the methodological triangulation method. Methodological triangulation entailed the assessment of interview data, observation data, and document review data. Sedova (2017) noted the importance of transcribing data for analysis. In addition, Hasan et al. (2016) suggested researchers create a codebook for assigning unique identifiers to the transcribed data. I transcribed each interview and developed a codebook to assign unique identifiers to the interview data, observation data, and document review data.

My logical and sequential data analysis process was document review, followed by interviews and observations. My strategy for data analysis was to enter notes from each document review into NVivo 11. I used a digital recording device to record each interview. The participants received transcripts of their interviews to review for inaccuracies and interpretation errors. The second step in the data analysis process was entering the verified interview data into NVivo 11, followed by the third step of entering the member-checked observation data into NVivo 11. The next step was separating the data into groups, regrouping the data into themes, assessing the data, and developing deductions using the five stages of data analysis.

The coding system for each participant in the semistructured interview process was alphanumeric identifiers (i.e., P001 through P012), as no further themes emerged following the 11th interview. The coding system for each participant in the observer-as-participant observation process was P013 through P022, as data saturation occurred. I compared the interview data and the observation data with the document review to identify key themes.

Researchers should validate their data to confirm that they used the correct data collection method and analysis method to fulfill the study's requirements (Rezaei-Yazdi & Buckingham, 2016). I entered the transcribed interview and observation data into NVivo 11 software for analysis, next using a codebook to track the unique identifiers I assigned to the transcribed data. I determined the categories and subcategories utilizing the findings from the interviews and document data, the developed codebook, and the results from the NVivo 11 software program. Moreover, I used the categories and subcategories to identify themes and trends.

Open-ended interview question responses and observer-as-participant observations provided the data set for analysis. I used concept mapping to organize each interview response and observation into a category and topic. Next, I utilized the categories to identify a combination of themes and trends to generate an understanding of an ERP system implementation project in one government agency. Furthermore, I correlated key topics and trends with the literature and the conceptual framework.

Once I completed the data collection and analysis, I conducted a comparison between the results of the analysis, the reviewed literature, and Von Bertalanffy's (1972) general systems theory. Von Bertalanffy argued for a full understanding of a phenomenon, indicating that one must investigate multiple parts and processes and the relationships between them. Vityaev and Demin (2018) utilized general systems theory to recognize the performance of the whole system by focusing on the interaction between components and relationships. I used the identified codes and themes to analyze the qualitative data to determine ERP system implementation strategies.

Reliability and Validity

Reliability

A qualitative researcher achieves reliability by minimizing errors and biases (Yin, 2013). Reliability is the degree of dependability in which a measuring process presents the same results numerous times (Connett & O'Halloran, 2018). Vilcu et al. (2018) argued that reliability is the extent to which an instrument provides consistent results from the measurement. Aulia, Tan, and Sriramula (2019) explained that reliability is dependent on the quality of the research measurement.

Dependability is a concept of reliability, safety, integrity, and maintainability (Abdulkhaleq et al., 2017; Kabashkin, 2019). To enhance dependability, I conducted member checks with each participant throughout the interview process to ensure clarity and understanding of each response. Additionally, participants received transcribed

copies of their responses to the open-ended interview questions, observer-as-participant observation notes, and the final study to review for accuracy and data interpretation.

Validity

Credibility. Some researchers (e.g., Baruch, May, & Yu, 2016; Liao & Hitchcock, 2018) consider credibility the most important criterion for ensuring an accurate representation of a participant's reality. Rabe, Osman, and Backok (2016) maintained that individuals' cultural background might indicate their subjective perception of credibility. In this study, I ensured credibility by providing participants with transcribed copies of their interview responses to review for accuracy and data interpretation. Moreover, I conducted methodological triangulation with interview questions, observations, and document reviews.

Transferability. Transferability is the gap between the original setting and the target setting researchers use to formulate the required processes for implementation in new environments (Linh et al., 2019). Schäffer et al. (2018) stated that the success of transferability between two environments is dependent on adequate communication. Jørgensen (2018) discussed that transferability requires the ability to replicate a study in a different environment. I provided ample descriptions in my study to allow future researchers to decide which methods to incorporate in their studies.

Confirmability. Baruch et al. (2016) and Jørgensen (2018) maintained that confirmability is the objectivity of the collected data. Davis (2019) described confirmability as the ability of the researcher to show how findings relate to the collected

data. To ensure confirmability, I conducted a critical self-assessment to disclose any potential biases and predispositions and validate the objectivity of the findings.

Data saturation. Data saturation occurs when continued data collection does not provide additional information (Fernández-Álvareza et al., 2017). Tran, Porcher, Tran, and Ravaud (2017) identified data saturation as the point when no new substantive themes emerge from additional collected data. Tob-Ogu, Kumar, and Cullen (2018) maintained that a thorough understanding of a phenomenon's complexity is critical for achieving data saturation. To achieve saturation, I continued collecting data until no new substantive themes emerged.

Transition and Summary

Section 2 included the purpose statement, the role of the researcher, the participants, the research method and design, the population and sampling, and ethical research. Additional topics included data collection instruments, data collection techniques, data organization techniques, data analysis, and the methods used to ensure reliability and validity in the study.

Section 3 contains the findings from the research study on ERP system implementation strategies. The section includes a description of the themes and traits identified during data analysis. I synthesize Sections 1, 2, and 3 with the literature review and the question and observation results. Section 3 also includes a discussion of how business leaders could apply the findings to professional practice. Finally, Section 3

contains a discussion of the implications for social change, potential for further study, and a study summary.

Section 3: Application to Professional Practice and Implications for Change

In Section 3, I provide a review and analysis of the data received from 22 participants and document reviews. The participants were business leaders from a U.S. military base in the state of Washington. Also, in Section 3 is an overview of the study, presentation of the findings, implications for social change, possibilities for further research, a brief description of data analysis and organization, and a presentation of the findings by themes. Section 3 ends with a summary and study conclusion.

Overview of Study

The purpose of this qualitative single case study was to determine the strategies business leaders used for successful ERP system implementation from a U.S. military base in the state of Washington. I identified a single case study as the most appropriate design for collecting in-depth and rich data of the phenomenon in its natural setting. The purposeful sample consisted of 22 participants from a population of 36 DoD civilian business leaders at the study site.

The data collection process involved semistructured interviews with open-ended questions, observer-as-participant observations, and document reviews. I used member checking and methodological triangulation of multiple data sources to ensure reliability and validity. After I completed the data collection process, I compiled the raw data and identified themes with a coding system. To identify emergent themes, I used NVivo11 software for data coding and analysis. Four themes relevant to the research question emerged from the data analysis: crucial ERP project planning, ERP system

implementation strategies, senior business leader support, and ineffective approaches with negative effects on ERP system implementation performance.

Presentation of the Findings

The study's research question was: What strategies do some business leaders use for successful ERP system implementation? Throughout this qualitative single case study, I concentrated on answering the research question. In the study, I used the responses and observations of 22 participants to achieve a better understanding of the required strategies for successful ERP system implementation. In addition, I performed a document review of the public records of the ERP system implementation process, lessons-learned from pre- and post-ERP system implementation phases, and other public records for methodological triangulation of the interview and observation data.

I conducted interviews in a location determined by each participant, including local conference rooms, individual work areas, and various off-base locations, all of which provided an acceptable level of privacy and comfort. Participants felt comfortable enough to provide detailed responses to the open-ended interview questions (see Appendix C). None of the interviews exceeded 60 minutes, and the observations did not exceed 40 minutes. The purposeful sample for this study consisted of 22 DoD business leaders from a U.S. military base in the state of Washington. Participants worked for the business and planning department, the installation support department, the operations department, or the strategic weapons management department. I imported the interview, observation, and document review data into NVivo11 for coding.

I developed themes from the data provided by 22 participants and publicly available organization records. Twelve subthemes emerged, which I grouped into four main themes (see Table 1). The four main themes were crucial ERP system project planning, ERP system implementation strategies, senior business leader support, and ineffective strategies with negative effects on ERP system implementation.

Table 1

Summary of Themes

Themes/subthemes	Number of sources	Number of coding references	Frequency of occurrence (%)
Theme 1: Crucial ERP project planning	14	68	
Preimplementation process	9	16	23.53
ERP system benefits	20	32	47.06
Communication	10	20	29.41
Theme 2: ERP system implementation strategies	15	62	
ERP acceptance	7	29	46.77
Consultants	4	12	19.35
Workarounds	5	21	33.87
Theme 3: Senior business leader support	19	68	
Business operation changes	14	35	51.47
ERP obstacles	11	22	32.35
Management support	13	11	16.18
Theme 4: Ineffective strategies effecting ERP performance	20	102	
Changes in efficiency	15	45	44.12
Increased workload	8	14	13.73
Training shortfalls	15	43	42.16

Note. n = frequency of themes.

Theme 1: Crucial ERP Project Planning

ERP system project planning was the first theme. ERP system project planning consisted of the preimplementation process, ERP system benefits, and communication. Based on the participants' responses to Interview Questions 1, 2, 3, and 5, I determined that business leaders must conduct ERP system project planning to implement an ERP system successfully. P001 stated, "One of my main functions during the preimplementation phase consisted of making sure the end-user processes were accurate." P007 revealed, "A major portion of my time was focused on preimplementation processes." P012 shared that "building flow charts of transactional data processes for the different transactions" was key for understanding ERP system functions.

The statements from P001, P007, and P012 were consistent with the Donelson (n.d.) report showing that ERP systems provided one centrally managed and locally executed system. The findings from this study indicated how vital ERP system project planning is for business leaders during the ERP system implementation phase. I determined that ERP system project planning is critical for business leaders to implement an ERP system successfully. Such planning provides business leaders with enhanced visibility of their business performance.

Hustad et al. (2016) pointed out that business leaders must disseminate the project plan, potential benefits, and the purpose of a new IT system to end users. ERP systems provide a single database with shared common data that are both interoperable and

integrated (Kenyon-Ely, 2011). P012 explained the importance of creating a "plan of actions and milestones for planned activities with timelines and a systematic review of all related materials." Communication of the anticipated benefits and processes is crucial at all organizational levels to increase the odds of successful implementation. Parthasarathy and Daneva (2016) argued that customization has a significant impact on the efficiency of a commercial ERP system package. Accordingly, the findings from this study are consistent with those of Parthasarathy and Daneva.

My analysis of the participants' responses to the interview questions, actions displayed during the observations, and reviews of the organizational documents showed that ERP system project planning (see Table 2) is critical for business leaders who want to implement an ERP system successfully. By using the concepts of general systems theory as the conceptual framework for this study and from the findings of the first theme, I determined that successful ERP system implementation requires multiple strategies. Bernus et al. (2016) identified that, like general systems theory, it is possible to achieve dynamic structure through deliberate management control actions.

Table 2

Frequency of Themes Crucial ERP Project Planning

Theme	*n*	Frequency of occurrence (%)
Preimplementation processes	16	23.53
ERP system benefit	32	47.06
Communication	20	29.41

Note. *n* = frequency of themes.

In analyzing participant responses and reviewed documents, I identified several subthemes from the findings as critical elements in ERP system project planning (see Table 2), discovering that an ERP system project plan was beneficial and necessary. The ERP implementation strategies specified by P001, P008, P010, P011, and P012 showed the need to integrate preimplementation processes and the benefits of the ERP system and communication. Lagos, Mos, and Vion-Dury (2017) indicated that business leaders could incorporate stakeholders and business processing to implement ERP systems successfully. The crucial ERP system project planning approach showed a common goal of improving the business processes to improve organizational performance.

Preimplementation processes. Responses from participants and the organizational documents showed that business leaders considered preimplementation processes an ERP system implementation strategy. P001 stated, "One of my main functions during the preimplementation phase consisted of making sure the end-user processes were accurate." P007 reported, "A major portion of my time was focusing on preimplementation processes." P008 explained his biggest headache was "making sure products and services [were] listed in ERP." P011 detailed how he "made sure that all the inventory documents were completed or cleared prior to the actual go-live date." P012 expounded, "Prior to implementation, we had to clean up any areas that required action, review all users' current access, and determine what access they will need after implementation to perform their jobs." Government documents (e.g., Khan, 2017; Wendelken, 2014) indicated that a key benefit of ERP systems was the integration of

information management across an entire organization while optimizing business operations and normalizing costs.

The responses from some participants indicated that investing in preimplementation processes for end users was crucial for implementation success. P002 stated, “Before we implemented ERP, we did not really understand the system we were going to use.” P007 explained that “the user manager can make your transition smooth, increase role approval times, offer advice or judgment or the assignment of roles, and be the point of contact for all ERP information to your command” as everyone works through problems. P008 noted the importance of “making sure products and services are listed in ERP.” P012 mentioned the need to “verify your data prior to implementation and clean up any areas that require action, review all users’ current access, and determine what access they will need after implementation to perform their jobs.” The responses from P002, P007, P008, and P012 were consistent with an organizational report, which showed that business leaders believed that they could use data from the ERP system to greatly enhance business processes and readiness (Wendelken, 2014).

Preimplementation processes were a critical focus in the government agency; if business leaders did not take the processes seriously, the risk of ERP implementation failure was high. P001 noted that “traveling to other locations was beneficial when it came to role-mapping personnel prior to go-live.” P002 explained, “During preimplementation, my focus was making sure that people got the appropriate roles and

[that] they got the right access." P003 said, "I attended many conference calls and meetings after meetings with subject matter experts prior to go[ing] live."

Dortch (2011) indicated that business leaders believed they could implement an ERP system to improve and standardize business processes. P006 identified his big concern, saying, "There was not any real knowledge as to what was going to change and what was going to stay the same with the new system." P007 declared, "Conducting proper roadshows and sending my personnel to visit other agencies that had completed an ERP implementation project was crucial to our success." P012 explained, "I spent many months developing flow charts and detailed plans of action and milestones with timelines for review of all [the] material that focused on ERP implementation goals and expectations." García et al. (2016) noted that advanced planning processes are crucial for the successful implementation of challenging computerized support to increase an organization's decision-making capabilities.

P001 indicated, "The complexity of the ERP implementation process is vast." P002's and P006's responses were consistent with the documentation and information of ERP system preimplementation processes; before implementation, the end users did not understand the ERP system or know what processes were going to change. P012 explained, "Business leaders provided financial incentives for those employees who attained upper-level ERP system certification that supported the implementation timeline and budget." Sasidharan (2019) identified that one of the main problems with ERP system implementation is the gap between the knowledge and understanding of the

potential benefits of an ERP system. Furthermore, Sasidharan stated that knowledgeable employees and effective management teams directly indicate successful implementation projects. The organizations' public records (e.g., Donelson, n.d.; Kenyon-Ely, 2011; Wendelken, 2014) and the participants' responses showed that preimplementation processes were strategies for implementing a successful ERP system. The findings from García et al. (2016) are consistent with the findings from these public records.

To comply with DoD schedule and budget constraints, business leaders had to identify, develop, and incorporate preimplementation processes early in the ERP system implementation planning and development phase. Integrating business processes could be costly and time-consuming. P007 discussed the importance of assigning roles early, identifying subject matter experts and points of contact for problem resolution, and using command-level communication for working through implementation problems. P012 said, "Business leaders must make sure their data is clean and [that] end user access requirements are reviewed and corrected prior to implementation." P012 stated, "We had to determine the crucial interaction between legacy computer systems and the ERP system." P007's and the P012's responses matched Khan's (2017) report on the importance of identifying and retiring as many legacy systems as possible. The crucial interaction was consistent with the findings from Shao, Feng, and Hu (2017) on schedule and budget goals.

ERP system benefits. For integrating business processes, agency public documents showed the benefits of ERP systems, including standardized business

processes, the incorporation of best commercial practices, and one centrally managed, locally executed system. In addition, end users could use the ERP system to copy and paste a list of predetermined data into a transaction, access near real-time financial reports to quickly predict and identify cost overruns, and improve business process efficiencies in allowancing, outfitting, and demand planning. Organizational reports (e.g., Khan, 2017; Wendelken, 2014) showed the expected benefits of ERP system implementation to be the integration of information management across an entire organization and the reduction of acquisition and overhead costs. Standardized processes were one of the main benefits of ERP systems. P005 emphasized, "A major benefit to ERP systems is standardized processes." P007 shared, "Once your organization knows the why and how of ERP processes, your functions run more smoothly." ERP systems provide extensive benefits to the whole enterprise (Abd Elmonem, Nasr, & Geith, 2016). The findings from Abd Elmonem et al. (2016) are consistent with participants' responses.

ERP systems are the backbones of financial management and are critical for transforming business operations (Khan, 2017). The Wendelken (2014) report indicated the increase in operational effectiveness and efficiency through the acceptance of improved finance and accounting processes in manufacturing, sales and service, and customer relationship management. P002 stated, "The military has many different systems, and the cost of maintaining all of those systems is crippling the government." P007 mentioned, "In my mind, ERP has brought greater accountability, which I think is good." P009 stated, "I can see [the] material inventory at other sites in real-time." In

addition, P009 explained, “I can also see [the] material in the movement chain, issued, picked, shipped, received, and stowed.”

Military organizations are complex. Business leaders from military organizations could benefit from ERP systems and achieve financial audit readiness. The Khan (2017) report showed the benefits of using an ERP system to modernize 142 business processes through the integration of finance, workforce, programs, and supply management. P011 explained, “The long-term benefits will include a culture change where government workers at all levels actually enjoy the visibility.” Likewise, P011 stated, “I would say in the end it was successful because they were able to gather experts in SAP from across the country and use them pre- and postimplementation to troubleshoot any major issues that arose.” P012 recognized, “ERP provides a complete picture for the supply system, bringing all into one single supply system.” Additionally, P012 noted, “The removal of the old UADPS and other financial legacy systems is a cost-saving by eliminating the upkeep of these systems.” P019 demonstrated the increased visibility of material availability in a global environment.

Communication. Osnes et al. (2018) explained that ERP system implementation problems frequently occur due to communication issues among managing directors. P002 explained, “What you need is summations of data for the big picture.” P007 stated, “Increased communication, responsibility-sharing, and friendships between echelons is vital to organization[al] success.” Additionally, P007 said, “Communicate, communicate; roadshows are very valuable.” P008 declared, “We pretty much have a great

communication level with subject-matter experts." The responses from P002, P007, and P008 were consistent with the Wendelken (2014) report and showed that finalizing the approach to harnessing ERP system data was vital for informed decision-making.

P010 insisted, "ERP is great when sharing information internally and across the enterprise." P012 contended, "Communication provides a way to educate users on changes to their environment and is the major way to help users understand the changes before implementation." Top business leaders who communicated with employees during the ERP preimplementation phase helped employees understand the expectations of the new system. P007 reasoned, "Departments work together at times for a shared goal."

Some participants did not believe that information sharing, and communication provided value to the implementation process because the data-sharing process was complex and some of the subject matter experts were not on site. These views were inconsistent with organizational reports (Kenyon-Ely, 2011; Wendelken, 2014) that showed that improved visibility of orders and sourcing based on flexible business rules and enhanced algorithm capabilities provided enterprise-wide management visibility. P003 argued, "Transparency is an issue due to access and user role requirements." P004 noted, "Information sharing between departments is not really feasible inside ERP."

Additionally, P004 mentioned, "Everything is compartmentalized to prevent role conflicts and ensure [the] separation of duties." P006 described, "The short answer, from my experience, is there was no added value in interdepartmental information sharing." P006 acknowledged that, although he did not see any value added to data sharing, his

department-to-department communications and information sharing were good. P006 claimed, “As a command, I feel we already had good department-to-department communication and information sharing.”

Consistent with Wahab et al. (2016), P007 and P012 noted that communication was crucial in the early phases across all organizational levels for a successful ERP system implementation project. P007 explained, “It takes a long time for roles to be approved. Communicate this beforehand to your people.” P012 said, “Send communication to all users and others to ensure there is an understanding of the upcoming change and what is needed to implement the system.” This included communication with major agency stakeholders.

Communication provided business leaders with an opportunity to bridge the gap between the end users and subject matter experts and might have resulted in successful ERP system implementation. Osnes et al. (2018) argued that open and honest communication is a CSF during an ERP implementation process. P007 contended, “Visibility has improved.” P011 asserted, “All material is now visible.” P012 deemed, “Movements such as issues and receipts are posted in ERP, which provides a complete picture of the stock at the warehouse.” The responses provided by P007, P011, and P012 were consistent with Osnes et al. (2018).

Theme 2: ERP System Implementation Strategies

The second theme was the ERP system implementation strategies business leaders needed for successful ERP system implementation. Participants mentioned quite a few

strategies presented in the public documents (Kenyon-Ely, 2011; Khan, 2017; Wendelken, 2014) and validated by prior research. I found that the necessary strategies for successful ERP system implementation were addressing ERP system acceptance, consultations, increased efficiency, and workarounds.

The findings showed that, during the preimplementation phase, business leaders needed to actively support the new ERP system to foster end-user acceptance and successful ERP system implementation. In addition, business leaders needed to prioritize and resolve any issues that could result in schedule delays and cost overruns for the ERP system implementation project. The high occurrence of accepted ERP systems (see Table 3) showed that leader involvement was critical for integrating processes from multiple systems to a single-source system and successful ERP system implementation. These findings indicated the necessity of business leader involvement in both the pre- and post-ERP system implementation phase. Velte et al. (2017) noted that general systems consist of different interrelated and interdependent parts; a change in one part could influence other parts. Table 3 presents the core themes that emerged from the data analysis for successful and necessary ERP system implementation strategies.

Table 3

Frequency of Themes ERP System Implementation Strategies

Theme	*n*	Frequency of occurrence (%)
ERP acceptance	29	46.77
Consultants	12	19.35
Workarounds	21	33.87

Note. n = frequency of themes.

ERP acceptance. The business leaders from a U.S. military base in the state of Washington, found that ERP system acceptance by end-user personnel was a significant indicator of successful ERP system implementation. P014 discussed inventory management processes and noted, "The workload is consistent with other information systems I have managed in the past." P002 affirmed, "I have good people that know how to use it, and I'm not one of these people that has to see every little nib in order to make a decision." P007 asserted, "It is a big pain for the financial team, but not a bad thing for the organization." The participants' responses were like findings from Humlung and Haddara (2019) and the organizational reports (Khan, 2017; Wendelken, 2014).

Some participants believed that focusing on the benefits of an ERP system was crucial for increasing end user acceptance. P007 argued, "I believed it was a step forward, toward increased fiscal responsibility, with more visibility on timekeeping, expenditures, invoicing, and material movement." P008 stated, "I am one of the few people who believed in and liked ERP." P010 claimed, "Training was great and helped me with [a] better understanding [of] the program and . . . [to] support my customers as needed." P011 emphasized, "I wasn't skeptical of ERP at all. We had been operating in a

SAP environment for 5 to 6 years already." P012 stated, "ERP provides a full picture of the stock in the supply system." Consistent with P011's response, P015 demonstrated inventory management functions and noted, "Once accustomed to ERP, the functions seem to flow pretty smooth." The participants' responses were consistent with the findings of Foroudi et al. (2018) and showed that a connection existed between customer behavior and customer readiness.

Consultants. Companies rely on the expertise of ERP consultants and best practices while understanding these do not guarantee the success of an ERP implementation project or ERP system performance. P007 noted "contractor interaction was essential during the implementation phase." In addition, P007 recognized some contractors "knew the material very well and presented it professionally but had little experience with the system on how it worked." P009 stated, "ERP vendors provided the guidance necessary when we were developing our training programs." Sasidharan (2019) argued the role of consultant is crucial to the success of an ERP system implementation project. Consistent with the responses of P007 and P009, P016 demonstrated the fundamental differences that caused the reluctance of some employees to accept the new way of doing business.

Business leaders from a military base depended on ERP consultants and best practices for successful ERP system implementation. Participant responses provided detailed information on the importance and interaction with ERP consultants. Kutin et al. (2018) noted, ERP consultants earn large salaries. Consistent with Kutin et al., P003

mentioned “cost was a factor when determining which functions of an ERP system to incorporate.” P008 stated, “ERP consultants earn an enormous salary. As such, they were one of the first items cut when we ran into cost overruns.” Furthermore, P008 said, “Initially, ERP consultants were hired to provide training to our trainers. This lasted for about a year before we cut that part of the contract.”

Business leaders from a military base were tasked to determine which functions were needed to ensure financial audit readiness. The Khan (2017) report outlined the true cost drivers and the processes for improving the financial management and auditability. Mahendrawathi et al. (2017) maintained, consultants serve as the knowledge center with an insight to current tasks outside the organization while providing technical and business expertise. Consistent with Mahendrawathi et al. (2017) research and the Khan (2017) report, P003 discussed that “consultants provided the guidance on the specific attributes available in an ERP system.”

Córdova and Gutiérrez (2018) maintained top leader involvement and support is crucial for ERP implementation success. Some participants noted efficiency increases throughout the ERP implementation process were in keeping with the goals of top business leaders within the organization which aligned with the Córdova and Gutiérrez study. P007 deemed, “Actually, I think efficiency increased because finally the employee sees how the process directly relates to somebody else.” P005 said, “In 2011 when I was the command metrics POC, there was a lot of frustration from departments that could use legacy systems to pull information at different departments, and with the implementation

of ERP, it stopped that." P005 and P007 responses are like the Khan (2017) report in that the real business value is realized through optimizing business processes.

Gençer and Samur (2016) discussed successful business leaders utilize a wide variety of skills to influence people. A key hurdle for top business leaders was to motivate employees familiar with a legacy system. Legacy systems provided comfort to some employees that never used a different system and were reluctant to learn new process. P007 reasoned "do not discount the knowledge of your older or experienced employees." P007 response is consistent with the Wendelken (2014) report in that business leaders contemplate the possibility of expanding functionality.

One tactic used by top business leaders to excite employees on the new system, focused on the potential benefits after a steep learning curve. P014 demonstrated the steep learning curve through the additional steps required to accomplish the same function in a legacy system. Consistent with the P014 demonstration, P010 explained "efficiency will increase once employees accept ERP as the only system."

Córdova and Gutiérrez (2018) maintained that top leader involvement and support are crucial for successful ERP system implementation. Some participants noted that increased efficiency during the ERP system implementation process was one of the goals of top business leaders, which aligned with the observations of Córdova and Gutiérrez. P007 stated, "Actually, I think efficiency increased because finally the employees [saw] how the process directly relate[d] to somebody else." P005 said, "In 2011, when I was the command metrics POC, there was a lot of frustration from departments that could use

legacy systems to pull information at different departments, and with the implementation of ERP, it stopped that." P005's and P007's responses were like the Khan (2017) report and showed that real business value was realized through business process optimization.

Gençer and Samur (2016) discussed how successful business leaders utilize a wide variety of skills to influence people. A key hurdle for top business leaders was motivating employees who were familiar with a legacy system. Some employees comfortable with the legacy systems who had never used a different system were reluctant to learn a new process. P007 reasoned, "Do not discount the knowledge of your older or experienced employees." P007's response was consistent with the Wendelken (2014) report and showed that business leaders contemplated the possibility of expanding functionality.

One tactic used by top business leaders to excite employees about the new system was focusing on the potential benefits after a steep learning curve. P014 demonstrated the steep learning curve through the additional steps required to accomplish the same function in a legacy system. Consistent with the P014 demonstration, P010 explained that "efficiency will increase once employees accept ERP as the only system."

Workarounds. Significant gaps in ERP system program capabilities demanded manual workarounds to perform daily operations. Process workarounds reduce end user proficiency in many ERP system operations. Morquin and Ologeanu-Taddei (2016) noted that workarounds ultimately decrease operational effectiveness and eventually cause adverse effects instead of the expected benefits. Like Morquin and Ologeanu-Taddei,

P012 said, “Workload shifted from working on both systems to just one system, which indicates [that the] ERP increased my workload due to workarounds but is different than what it was.” P004 shared, “We work entirely in workarounds now because the standard state of every T-code is the most inefficient, non-useful state it can be.” P019 demonstrated that many workarounds were required to support customers who did not use an ERP system.

Sallah and Janczewski (2019) identified that inadequate training and policy expertise on the complexity of daily operations could result in workarounds. P009 shared, “Procedures had to be improvised on the spot and reporting data was not easily available.” In addition, P009 said, “They gave us these little cards as aids to help get around until we got more proficient. When you lost one, you were screwed.” P012 mentioned, “There were a few problems identified that created extra workload for users due to workarounds that had to be done to accomplish their jobs.” P009’s and P012’s responses were like the Wendelken (2014) report and showed that understanding and preparing data was critical for successful ERP system implementation

Theme 3: Senior business leader support

The third theme was that business leaders and change management were necessary for successful ERP system implementation. Business operation changes, ERP obstacles, failure to accept ERP systems, and management support are themes that business leaders needed for successful ERP system implementation. These findings

showed that business leaders who utilized implementation strategies increased the probability of a successful ERP system implementation project.

Given the emergent theme of senior business leaders, I concluded that the U.S. military organization worked as a system with different strategies for successful ERP system implementation. General systems theory applied to the organization's integrated design processes for ERP systems implemented to provide innovative solutions. Table 4 shows the subthemes that emerged from the data analysis on how senior business leaders successfully implemented an ERP system.

Table 4

Frequency of Themes for Senior Business Leader

Theme	*n*	Frequency of occurrence (%)
Business operation changes	35	51.47
ERP obstacles	22	32.35
Management support	11	16.18

Note. n = frequency of themes.

Business operation changes. Some participants commented that business leaders needed to be mindful about ERP system implementation being more than just updating software: It had a significant impact on the relationships between employees and business leaders. P001 stated, "ERP is off-the-shelf software, so there were certain things that it did, and we had to fit what we did into those processes. This was a huge paradigm shift from what it was previously." P002 described, "We don't do financial management the exact same way; it's the same transaction, but each clamancy has its own rules built into its version of ERP that require different data elements." P003 mentioned, "As COTS

software, the ERP system required changes in our business paradigms." The responses from P001, P002, and P003 were consistent with the Kenyon-Ely (2011) report and showed that the ERP system was a COTS product with less than 2% transaction customizations. P006 declared, "The things that were easy and more streamlined in the old system are not the same in the new, and vice versa." P007 emphasized, "This is a big change for your organization." The responses from P006 and P007 were consistent with the Wendelken (2014) report and showed that modernized and standardized business processes were critical for successful ERP system implementation.

One significant business operation change was the near real-time visibility of functions in a global environment. P004 said, "We have all become experts in building variants because no T-code begins in a user-friendly state." P007 reasoned, "There is a new shift from just getting something done to getting it done correctly." The participant continued, "The business office and higher levels can hold departments accountable with time and leave taken and time codes, purchase limits and approvals, contract completion in a timely manner, adhering to wellness program guidelines, [and] credit card buyer guidance."

Inventory management changes resulted in near real-time visibility of material in a global environment. P007 affirmed, "Much more time and thought are given to thinking about where/how money will be spent [and] the product and services plan." P009 said, "I can see material inventory at other sites around the world." One downfall of an ERP system was that members of the fleet unit commands did not use it. P010 mentioned, "It

is great dealing with ashore customers, but [it] has no use for my afloat customers who still use programs like RSUPPLY, NALCOMIS, et cetera." The responses from P007, P009, and P010 were like the Donelson (n.d.) report, showing that the ERP system provided support for the military's financial audit ability and compliance but was not intended to include members from the fleet units.

ERP obstacles. Business leaders have varied opportunities during ERP system implementation to influence and display the leadership qualities necessary for the success of the ERP system. P014 noted, "Restrictions seem self-induced by GLS because I know ERP can handle more than they are letting it handle." P014 demonstrated an inventory management function by issuing and returning material from and to a warehouse shelf. P014's demonstration was consistent with the Donelson (n.d.) report and showed that ERP systems provided end users with increased asset visibility, which resulted in reduced inventory.

P001 noted, "For the purchase requesters, it used to be a couple of steps, and now there [are] like 20 steps in it, so it increased in just the PR request process." In addition, P001 stated, "My biggest obstacle was figuring out what access the users actually needed in the end." P002 stated,

> There are different versions of ERP out there. And not only did we have the case where not only were we going under ERP, but our customers were still using traditional systems and expected us to have the certainty, especially the financial certainty, associated with those traditional systems when we no longer had the

> tools provided, which was kind of frustrating. But then they moved into ERP, and I talked to a couple people, and I said, "Now you know where we were coming from."

P018 mentioned, "If going to contracting, the PR is canceled in ERP because the contracting shop does not use ERP." P018 demonstrated a material purchase function by processing a purchase request and then canceling the purchase request, as contracting was the required procurement method. P018's demonstration was like the Donelson (n.d.) report and showed that users could use the ERP system to process common data during real-time information exchange and reporting.

P012 mentioned, "Change is always the biggest obstacle for any system implementation." In addition to the change itself, supervisors struggled with motivating end users to use a system that required extra steps to accomplish the same function. P007 shared, "A new hire cannot perform the job immediately." P010 noted, "The ERP program was not tailored to the needs of the military when it first rolled out, so there were transaction issues that required adjustments in ERP that caused delays in processing." The responses from P007, P010, and P012 were consistent with the Donelson (n.d.) report and showed that change management for reengineered processes could result in improved efficiency through the implementation of commercial best practices.

One expectation was that new employees would be away from their departments for a period that ranged from 4 weeks to 3 months. P003 noted, "Depending on the

required roles, you might lose a new employee for a couple months." P006 mentioned, "The system was extremely slow." Furthermore, P006 said, "There have been continual submissions of heat tickets since implementation. One problem gets fixed and another one pops up." P007 explained, "It also takes a long time for training to be completed and [for] roles to be activated." These delays became ordeals for supervisors who were struggling to motivate new employees. P012 mentioned another hurdle to acceptance, saying, "Access changed based on roles in ERP compared to what we had in the legacy systems."

P006 explained, "There were so many bugs in the system that would just pop up out of nowhere that it created work stoppages now and then." P007 emphasized, "You not only had to learn how a process worked, but what to do if the student pressed the wrong button or chose the wrong icon [or] how to return to the correct screen." P012 shared "concern of whether or not the problems would be fixed or not, and when." P003 mentioned, "Many of the department heads were afraid to report what was actually going on to their boss."

P019 described "too many internal restrictions that probably are not ERP requirements as much as organization[al] requirements." P019 demonstrated an inventory management process by completing a material inventory report in the HAZMAT warehouse. P003 explained, "For supervisors, you lose a new employee for 2 weeks right off the bat just so they can get the required training to get into ERP, which does not

include doing their job." P004 noted, "I think a portion of the inefficiencies is more of a government-rules thing than an ERP thing."

Another significant hurdle to successful ERP system implementation in one government agency from a military base in Washington, was that end users failed to accept the ERP system. P013 noted that the end user could not purchase any items unless there was a record built into the ERP system, stating, "For those of us [who] have experience using other systems, this was kind of a hard pill to swallow." P002 explained that in "post-implementation, I spent a lot of time explaining to people who had been transitioned to ERP and didn't like it [that] I don't like it either. It's the way it is get on with it." P003 another problem frequently encountered: "After we spent all the time and energy training a new employee, they might hang around for a year or so and then leave for a better job and we would have to start the process all over again."

P004 mentioned, "If we're going to spend billions [of dollars] on a system, get the best version and use its functionality appropriately." P005 explained, "ERP was the only system I knew, so I wasn't skeptical," continuing, "Unfortunately, I mostly hear people complain about ERP." P007 noted, "People just didn't understand why they [needed to] implement more steps to get their work completed." P009 declared, "This was frustrating, not only to our chain of command but [to] others needing outbound data on the receiving end of our material." P010 remarked, "There [were] growing pain[s] with people not accepting the change and not want[ing] to give it a chance, so that was an issue."

P012 argued, “Users are concerned [about] the impact on their workload, what changes can they expect, and why are we doing this.” P011 stated, “Short-term benefits, depending on which site you visit, have been hampered by the resistance to change.” P010 explained, “I honestly did not like the program in the beginning because I felt that I was trying to fit a square peg in a round hole every time I [came] across a problem.”

P009 noticed, “My guys had problems interpreting certain data fields, as [the fields] were not immediately recognized.” P003 described, “Systems we were familiar with and knew worked were replaced by a system we were not familiar with [and] was substantially more complex, and few knew if it was going to work.”

P006 mentioned, “All we could do is be ready for the chaos and confusion, and I cannot say it has any added benefits.” The participant continued:

> The only reason I can see why someone would see ERP as being a successful route to inventory accuracy, user accountability, and sustainability, is that someone saw that a program like what we are working with now was somewhat successful somewhere else.

P002 admitted, “I was a bit skeptical.” P009 echoed this sentiment, saying, “I was very skeptical. I still don’t like it.” P011 noted, “Some processes [have] changed from the way we used SAP in the BRE environment, and some personnel could not accept that.” A large portion of the agency’s customers failed to embrace the ERP system.

P021 mentioned, “The biggest obstacle is [that] not many of our customers are using ERP; the ones [who] do are not on the same version.” Furthermore, P021 described

"the creation of required funding documents [that] the customer could not accept." P002 stated, "Explaining to customers who weren't on it yet why we were doing some of the stupid shit we were doing that they didn't understand." In addition, P002 maintained, "The bottom line is [that] you get these results out of ERP, and you can't really explain where the cost came from because it is all averaged out, and you don't know where the average came from." In addition, P002 related, "Near actual costing as established in ERP caused additional labor costs." P003 stated, "The first CO was a real screamer, did not believe in ERP, and did not want to hear of any problems that would affect his perception of a smooth implementation."

Management support. Change is never easy but offering supervisors opportunities to demonstrate leadership characteristics was critical for successful ERP system implementation. P016 demonstrated the ability to validate material and resource sharing in other parts of the country and was extremely familiar with the ERP system for someone who did not use it all that often. P003 stated, "Some top-level supervisors pushed the responsibility onto relieving supervisors, as most were only at the command for 2 to 3 years." P002 explained, "Some people, and I think a lot of senior business leaders are like that, can't form a picture of where they need to go from a scattered series of data points and use intuition." P007 argued, "business leaders must be involved, not just lip service. If business leaders understand the major shift in process, the employees will buy in."

P007 emphasized, “Make sure you have business leaders present, plus experts in transition, experts in process, user management, and training.” P003 noted, “Most supervisors, military and civilian, just wanted to survive by not upsetting the Commanding Officer and without destroying their career.” P016 stated, “It is all about lead[ing] by example,” relating how he walked through each ERP system screen and explained each function and purpose. P007 encouraged “face-to-face meetings between your user manager and training manager and other commands or echelons.” In addition, P007 stated, “There is [a] great value [in] seeing the process work and learning ERP tips along the way.”

Theme 4: Ineffective Strategies Affecting ERP Systems Performance

The fourth theme was that business leaders who were seeking ERP system implementation experienced efficiency decreases, increased workload, and training shortfalls (see Table 5).

Table 5

Frequency of Themes for Ineffective Strategies Affecting ERP System Performance

Theme	*n*	Frequency of occurrence (%)
Changes in efficiency	45	44.12
Increased workload	14	13.73
Training shortfalls	43	42.16

Note. *n* = frequency of themes.

Changes in efficiency. P018 commented, “The ERP process is not very efficient compared to other business systems used by other divisions [and] departments in the same organization.” P018 demonstrated the 15 steps required to process an employee’s

time compared to the four steps in the previous system. Like P018's demonstration, P002 noted, "There are many, many more transaction steps to process, and they take longer to do in ERP." P003 mentioned, "The biggest issue was [that] the number of keystrokes required to accomplish the same function increased by over 200%." The participant continued, "What used to take three keystrokes on one screen now takes 10 keystrokes on three screens."

P013 explained, "To build a record, you need to get all [the] identifying data [and] create a unique local stock number if no national stock number exist[s]; entries must be verified and approved by GLS." P013 demonstrated how to create a PR and then routed it to the department head for approval. P019 noted, "Some processes are pretty difficult to master when compared to systems used in the past." P019 demonstrated the process of creating a PR in the ERP system and discussed how the ERP differed from other systems used in the past. Once approved by the department head, the PR went to GLS to verify the item number, funding availability, and that it met the minimum requirement, causing a 24- to 48-hour delay in processing the PR before purchase. P001 recalled, "For the most part, efficiency went down," something P003 echoed, saying, "Efficiency decreased, as did production." Consistent with P001, P002 explained, "Efficiency and value changes have been somewhat significant." P003 said, "The processes required in the ERP system far exceeded other systems for the same result." P004 shared that

> The consensus among all groups was that the number of steps for nearly every process that was moved into ERP had increased, the complexity of many steps

had increased, and processing time for many steps—and overall process—had increased.

Consistent with P004, P022 noted, “There are too many permissions required and no less than 15 workarounds used to accomplish the basic functions.” In addition, the participant demonstrated the more common workarounds for processing material receipts, issues, and procurements.

P006 noted, ”With little to no training on a system we were going to be absolutely dependent on, to get our work done on time like we did with the previous system, there was no question this was going to be a bumpy ride.” P007 clarified, “It took so many more steps to make a purchase, create a purchase requisition, receive approval for a buy, implement personal property inventory, and warehousing procedures.” P009 mentioned, “Too many steps to do the same function.” P011 stated, “In my opinion, productivity in the warehouse went down right after implementation as personnel learned new processes and procedures.” P020 explained, “ERP systems are more complex than other systems I have used to track money.” P020 emphasized that there were “too many permissions required to do almost everything.” P020 displayed total permissions and demonstrated the process of issuing material from the warehouse, explaining each of the additional steps while correlating the specific permissions required to accomplish each step. This process was consistent with the comments from P006, P007, P009, and P011.

Increased workload. P015 explained that they spent “a good majority of time conducting one-on-one training and developing or updating training aids.” In addition,

P015 demonstrated the more common mistakes made with data entry in the ERP system. P001 maintained, “My workload increased, and I think it increased on the warehouse side, too.” Consistent with P001, P011 stated, “My workload increased as I had to clear header blocks from sales orders so that material could be issued.” P004 explained, “During continuous process improvement projects, many people stated that ERP implementation had increased their workload.”

P007 recalled, “I was called away from my desk many times to demonstrate a procedure in person, to create a timekeeping variant, or explain how to approve a PR or timesheet.” Similarly, P010 explained,

> We had to assemble tiger teams to input missing data that [the] ERP needed for us to complete transactions, such as making issues, processing receipts, validating inventory, and ensuring that the hazmat module has the required information to complete a transaction: shelf life, SDS, special handling, et cetera.).

P012 noted, “My workload changed somewhat. I no longer have to use the two different legacy systems that were being used at the time of implementation.” Contrary to what many participants stated, P002 said, “The actual work that we are doing is no different.” Consistent with P002, P006 stated, “If you are referring to the possibility of ERP creating a heavier workload, then the answer is no.” P003 argued, “Their workload definitely increased.” P008 stated, “There were more requirements and things became

very hectic." Similarly, P010 explained, "After implementation, it seemed that our workload doubled."

Training shortfalls. P001 shared, "On the training side of it, they have web based training they have to do for any role and the classroom training for a lot of roles." P015 explained,

> The training topics are very complex. All [are] required to assign the required roles in ERP to allow the employee to perform their function[s], and tracking [the] training is not accomplished in ERP as much as an external Excel spreadsheet.

P015 demonstrated the effectiveness of using the developed training aids for ERP system function support. P002 noted the differences in ERP systems, stating:

> Normally, in most other system implementations we have ever done, you give people some upfront training, you give them the keys to the system, and you give them over-the-shoulder support and show them how to do things for individual transactions.

P001 voiced concern, saying,

> We have lots of trainers, and [must keep] those trainers trained because when somebody leaves, you lose all that knowledge. So, you must get a new trainer trained to replace that person, and that is [the] kind of the direction we are leaning to now.

P002 noted the downfall of ERP, saying,

> In some of our areas, it may take up to 90 days to get a person enabled to do what they [have] to do because they do all this training, and you [have] to get them into a class, and it's just another obstacle.

P005 explained, "My suggestion for a command would be to either hire and train ERP SMEs, or [the] ERP needs to have an easily accessible manual to help people navigate [its] multiple functions." P007 noted, "There is a lot of training required for folks to learn their job[s] and be able to back up their coworker[s]." P017 discussed that staff members "must not compare the way things are with the way things were-[that] provides no benefit for anyone." To address the concerns of P001, P002, P005, and P007, P017 demonstrated the process of creating a PR and receiving material at the warehouse while utilizing various training aides, which consisted of training handouts and three-by-five cards with instructions on the process.

P008 emphasized the importance of "great trainers [who] know how the system should work and, best of all, speak the language." P009 explained, "We got more used to using ERP, but things never really got easier." P010 noted that

> The program was designed to teach a selected group across the enterprise the basics of ERP so they can bring the knowledge back to their commands to train and certify employees so they can perform their jobs in the system.

P011 mentioned, "I was a trainer for physical inventory and warehouse and material movement roles, so I gave training across the NAVSUP Enterprise." P012 explained the "need to determine training requirements for users to perform their job functions, review

ERP roles, and compare them to user's current roles to identify roles needed to perform their jobs." P012 further commented on the importance of "setting up a training plan to address training based on the user level." P015 explained, "The amount of training required might be considered extensive by some, but if the supervisor wants the employee to have the role, they have to complete the training." P015 displayed the roles required to accomplish most warehouse operation functions.

P001 discussed, "The roles are not activated until the classroom training is done. There is no getting around it." P003 explained, "Training included 10 online courses, which took about 5 hours each to complete, and two classroom courses, which lasted 5 workdays each. In the end, it did not seem sufficient due to the complexity of the ERP system." P010 mentioned that

> I would say about 2, maybe 3 months in a classroom setting and [I] had a lot of on-the-job training with lead technicians using conference calls, e-mail, [and] virtual training (computer) because of the constant change and updates in the program.

P002 shared that

> The sum of training is not largely value-added; it is just the way it is. It adds a huge amount of time [to get] people activated. To get a new person before used to take a couple [of] weeks, and you could have them working in the system, doing work.

P006 added, “The overall learning curve of a brand-new system that we were not used to using made it difficult to do basic functions.” Like the comments of P001, P002, P003, P006, and P010, P015 explained, “There is no testing to validate training effectiveness.” P015 demonstrated the processes used for more common functions, including purchase request, warehouse inventory validity processes, material receipts, and material issues. P015 explained that each function was a matter of repetition over the effectiveness of training.

P012 recalled, “There was a need to provide additional training to users to support changing purchase orders to process receipts in ERP.” Additionally, P012 explained they “had to provide additional training and access to ERP to allow the customer to pick up the material.” P010 stated, “I had to make time to reteach and show partners and other associates where to find solutions to the error messages they encountered when processing.” P003 noted, “The amount of training required to achieve a specific role is excessive.” Consistent with the comments of P003, P010, and P012, P019 also recalled that “the learning curve was excessive.” P019 demonstrated the processes for the primary ERP system functions and noted the training required throughout each step of the process.

P003 shared, “I had to have an idea of what my people were required to do, so I took all the training for the material handlers.” Furthermore, P003 mentioned, “Depending on the required roles, you might lose a new employee for a couple [of] months.” P005 opined, “I think the biggest thing this command is lacking with ERP is the

lack of available training on how to use ERP." P007 explained, "When training is first introduced, it [is] presented as 3-day training, then later as 2-day training, until finally the training [is] reduced to a few hours." In addition, P007 said, "We updated training materials, reviewed processes for role assignment, role activation, [and] training assignment[s] and requirements, which became very beneficial." P014 described spending "most of my time looking up and correcting other people's issues with ERP." P014 demonstrated the more common issues encountered and how to correct each issue with PR creation, material management functions, material receipt functions, and inventory functions.

Applications to Professional Practice

Public and private sector business leaders can use the strategies identified in this study for successful ERP system implementation. The study included the perceptions of 22 business leaders on the specific strategies used for successful ERP system implementation in one government agency. P002, P007, P008, and P012 acknowledged that business leaders understood that they could use effective implementation strategies to enhance business processes and organizational readiness. These beliefs were consistent with the Wendelken (2014) report. Furthermore, business leaders understood that successful implementation projects were the direct result of knowledgeable end users and effective management teams (P002; P006; P012; Sasidharan, 2019).

In keeping with the findings of Lagos et al. (2017), business leaders understood that incorporating stakeholders and business processing were critical strategies for

successful ERP system implementation. ERP systems became the backbone of financial management and were critical to transforming business operations (Khan, 2017). Additionally, business leaders from a military base needed to determine which functions were essential for achieving financial audit readiness. Successful ERP implementation strategies began with preimplementation processes. P001, P008, P010, P011, and P012 described the need to integrate preimplementation processes, present the ERP system's organizational benefits, and maintain communication throughout the project for a successful ERP system implementation.

Some of the key motivational factors for ERP system implementation are competitor pressure, supply chain partners or customer requests, system upgrades, or legacy system replacement (Lucke et al., 2019). Military business leaders received briefings on the importance of implementation strategies, learning that possible delays in bringing the ERP system online would require continued funding for the operation and maintenance of legacy systems at an increased cost of approximately $2 billion (Khan, 2012). Successful ERP system implementation provided business leaders with the data required to increase their organizations' competitive advantages. Some of the key functions of maintaining a competitive advantage include improved time management and innovation that result in enhanced decision-making and increased productivity (Gunasekaran et al., 2017).

Townsend et al. (2018) detailed the key factors that indicated successful ERP system implementation: restricting the efforts of external vendors, involving system

vendors, hiring implementation consultants, and engaging knowledgeable project managers. P011 and P012 identified one of the key benefits of ERP systems to be the integration of information throughout an entire organization while optimizing business operations and normalizing costs. Business leaders must understand that communication barriers and tensions among managing directors may negatively impact successful ERP system implementation (Osnes et al., 2018).

Business leaders had differing perspectives on end-user morale. P001 stated that some end users disliked the ERP system because of the increased number of steps required to accomplish the same task. P002 explained that if end users did not understand the process, they might resent it for months or until they became more familiar with the system. P003 was frustrated that, after spending extensive time and energy on bringing the end users up to speed, some of these employees would leave for other positions. P008 believed in the system and, as a result, end users were more content to support the new process.

P010 fostered high morale among end users by exhibiting increased patience and providing training, which resulted in loyal workers who were determined to make the new process a success. Participant responses were in line with the findings from Foroudi et al. (2018). Successful implementation of a new information technology system provides leaders with the opportunity to challenge and expand their leadership styles. Change may present obstacles. During these situations, business leaders must earn their pay. Management support emerged in the senior business leader theme.

Aversano et al. (2017) stated that the implementation process consists of meticulous planning, execution, and effective management to minimize inherent risks. The responses from P005 and P007 were consistent with the Khan (2017) report and showed that the real value of an ERP system was the standardization and optimization of organizational business processes. Like the findings of Gunasekaran et al. (2017), business leaders accepted the premise that information technology advances were critical for increasing the effectiveness and efficiency of traditional logistics and supply chain operations.

Trust was another crucial strategy for successful ERP system implementation. Business clients need trust to increase their overall stock of implementation knowledge and allow each customer to determine if the project meets agreed-upon objectives (Mayeh et al., 2016). Like the findings of Akrout and Diallo (2017), business leaders believed in and set essential strategies for establishing working relationships with trust and respect. Communication, as identified in the crucial ERP system planning theme by P001, P008, P010, P011, and P012, was an essential strategy for successful ERP system implementation.

Khan (2017) explained that successful ERP system implementation requires DON business leaders to receive briefs and recognize and incorporate effective strategies while avoiding ineffective ones. P007 noted that contractor interaction was essential during the implementation phase. Like Sasidharan's (2019) findings, P009 stated that ERP vendors were crucial to the success of an ERP system implementation project. Advances in

information technology were critical to increasing the effectiveness and efficiency of traditional logistics and supply chain operations (Gunasekaran et al., 2017).

Effective strategies are an essential component of successful ERP system implementation (Kutin et al., 2018; Osnes et al., 2018; Tseng et al., 2019). Sallah and Janczewski (2019) identified that inadequate training and policy expertise correlates with difficulty in performing daily operations. Additionally, Haddara and Moen (2017) indicated that training is a critical strategy for ensuring the comprehensive understanding required for ERP system postimplementation success. Legacy systems or systems from other vendors can present significantly higher risks when integrated with ERP system modules (Lugert et al., 2018). To support organizational goals, business leaders must develop a prioritized list of the specific ERP modules most effective for managing both cost and schedule constraints.

Implications for Social Change

I studied the responses from 22 participants and publicly available organizational documents to identify four ERP system implementation themes: crucial ERP system project planning, ERP system implementation strategies, senior business leader support, and ineffective strategies for ERP system performance. ERP system implementation is critical for transforming DoD business operations. Khan (2017) discussed the importance to fully deploy an ERP system to alleviate the challenge of producing reliable financial data and auditable financial statements. Business leaders could use these themes to develop an efficient plan to address known implementation corrective actions and

milestones. Due to the complexity of the ERP system implementation process, successful implementation will require continued support from business leaders, end users, and stockholders. By addressing financial improvement and audit readiness challenges early in the implementation process, business leaders can foster corporate responsibility and reasonably assure reliable financial data in compliance with budget and appropriations laws.

Recommendations for Action

DoD business leaders who anticipate an ERP system implementation project can utilize the findings and recommendations from this study. Business leaders who are willing to use ERP system implementation strategies could realize they have the requisite skills for successful ERP system implementation. Business leaders can use a successful ERP system implementation to increase their visibility in business performance. In addition, those involved in the pre- and post-ERP system implementation process may find the results of this study useful. Business leaders could benefit from the results of this study by recognizing failed ERP system implementation strategies before starting their implementation projects. The findings identified in this study could provide DON business leaders with a foundation from which to recognize and incorporate effective ERP system implementation strategies and avoid ineffective ones. The results of this study are available for distribution through scholarly journals, DON and DoD professional and business publications, and agency conferences. Furthermore, the

findings of this study could be suitable for seminars and organizational briefs as a guide for business leaders seeking successful ERP system implementation.

Recommendations for Further Study

I used a purposeful sample of 22 business leaders from a military base in Washington. In part, the basis for the study was from a select list of publicly available documents. My data collection efforts consisted of semistructured interviews, observer-as-participant observations, and reviews of publicly available documents on ERP system implementation practices.

Through the analysis of my data collection efforts, I identified crucial insights and evidence on the specific strategies necessary for successful ERP system implementation. Based on the findings of this study, I believe further research is necessary for business leaders to effectively and efficiently tailor ERP system implementation strategies to their specific organizations. It is crucial for business leaders to utilize successful ERP system implementation strategies (Aydiner et al., 2019; Müller et al., 2018; Tseng et al., 2019; Yang, 2016).

One recommendation for DoD business leaders is that their ERP system implementation plans should include a cost-benefit analysis of hiring professional ERP system trainers versus a train-the-trainer method. Business leaders identified additional cost savings from excluding professional trainers. Business leaders did not identify the overall cost of system workarounds, end user reworks, and decreased morale. The DoD provides specific ERP system implementation strategies for achieving audit readiness

(Frontz, 2012; Khan, 2017). As such, in order to advance the limits of this study, supplementary investigation of this subject is needed to address the DoD audit mandates.

The findings in this study could provide future researchers with a foundation for conducting a quantitative or mixed methods examination of the differences in ERP system implementation projects within the DoD to achieve the common requirement of audit readiness throughout all DoD agencies. Additionally, I recommend that future researchers compare the strategies for ERP system implementation in public and private-sector organizations. The data found through comparing public and private sector organizations could contribute to a set of best practices and policies for reducing instances of ERP system implementation failure, cost overruns, and other delays.

Reflections

I began my journey for a terminal because I did not have one. My professional life and my personal life were extremely satisfying. Some of my mentors, a few of my cousins, and people for whom I have great respect had doctorates. When the opportunity presented itself, I jumped. I thought I had an idea of what to expect, but I was wrong. The coursework was not unlike any of the other courses I had taken. It was not until I made it to the research phase that I felt I was out of my depth.

During the research phase, I gained insight into the complexity of doctoral-level research, and my perspective changed. The level of attention to detail and the alignment required for scholarly research were not particularly troublesome, but every little nuance and perception of the process became quite frustrating. The participants who provided

support for this study pleasantly surprised me. The data collection process—coding and mining information that emerged during the semistructured interviews, observer-as-participant observations, and document reviews—was a bit overwhelming. All participants were DoD civil service professionals whose pride, professionalism, and passion for ERP system implementation from a military base in Washington, were quite motivating.

I am a DoD civil service business professional and supervisor with knowledge and experience with an ERP system. I work with an ERP system daily, and I was affected by the results of this study. The findings were consistent with my experiences in a previous organization with ERP systems. Each participant brought a different perspective to the ERP system implementation project experience. Business leaders faced many similarities and challenges in implementing an ERP system successfully. Throughout this study, I identified unique strategies and practices that were beneficial to my organization. My main goal in conducting the single case study was to inform DoD business leaders of the concerns they will face when implementing an ERP system. In addition, I strove to develop my proficiency while conducting complex qualitative research.

Summary and Study Conclusions

Schedule delays and excessive cost overruns from ERP system implementation projects have adverse effects on the business leaders' ability to audit financial and inventory management systems successfully (Khan, 2017). Khan identified a continuing increase in the cost of ERP systems, whereas end user acceptability and performance

remain constant. ERP systems are extremely complex; as such, business leaders need to understand the requirements for an effective implementation strategy (García et al., 2016).

ERP system project planning is crucial for successful implementation. The preimplementation process was critical for identifying the organization's ultimate needs for process standardization, financial audit readiness, and inventory management. The individual requirements and desires of the organization indicated which ERP system modules were necessary. Upon identification of the specific modules, business leaders can develop a notional cost for the implementation (Wendelken, 2014).

Business leaders recognize that ERP systems provide extensive benefits to the entire enterprise (Abd Elmonem et al., 2016). As such, ERP systems are the backbone of financial management and are critical for transforming business operations (Khan, 2017). One issue encountered that affected successful ERP system implementation was end users' knowledge and understanding of the ERP system and its potential benefits. Various end users struggled to accept more work for the same outcome than required by previous financial and inventory management systems.

Osnes et al. (2018) noted that ERP system implementation problems frequently occur due to communication issues among managing directors. Consistent with findings from Wahab et al. (2016), top-level business leaders who openly and continuously communicated with end users during the ERP system preimplementation phase helped the end users realize the expectations and importance of the new system. End users who

saw that top-level business leaders supported the new system were more likely to give the new system a chance and accept the additional work required.

Some participants believed that focusing on the benefits of an ERP system was crucial for increasing end user acceptance. ERP system acceptance from end user personnel is one of the greatest hurdles for successful ERP system implementation (Humlung & Haddara, 2019). The participants' responses were consistent with Foroudi et al.'s (2018) findings and showed that a correlation existed between customer behavior and customer readiness.

Consistent with Sasidharan's findings (2019), the business leaders from a military base depended on ERP system consultants to implement their ERP system successfully. Some participants who noted increased efficiency throughout the ERP system implementation process were in keeping with the goals of top business leaders within the organization, which aligned with Córdova and Gutiérrez (2018). Some participants acknowledged that, due to the complexity of the ERP system when working on daily operations, they incorporated workarounds to complete specific tasks. This was consistent with Sallah and Janczewski (2019).

Some normal business processes change because the ERP system is a COTS system and few business leaders conduct business in the same way as the DoD (Turki et al., 2019). Business leaders encountered various obstacles during ERP system implementation; accordingly, they became proficient in finding ways to address the impacts of those obstacles. One of the biggest hurdles was that some employees close to

retirement who are accustomed to doing certain processes in certain ways might not accept the ERP system (Morquin & Ologeanu-Taddei, 2016). Additionally, some business leaders were inclined to push certain responsibilities onto subordinates who were unable to handle specific situations or the added stress.

Overall workload efficiency decreased when the end user needed to perform 15 steps to accomplish the same function that once took four steps. The manager was responsible for motivating end users to accept an increased workload for the same results. Finally, training shortfalls are the driving factor for decreased efficiency (Sallah & Janczewski, 2019). ERP systems were complex and challenging to navigate for new end users. Training consisted of online and classroom instruction. Many employees felt overwhelmed by the large amount of information provided in a relatively short period.

The specific business problem for this study was that some business leaders lacked the strategies for successful ERP system implementation (Khan, 2013). I conducted a qualitative single case study to identify successful ERP system implementation strategies in one organization from a U.S. military base in the state of Washington. The conceptual framework for this study was general systems theory (Von Bertalanffy, 1972). The purpose of this study was to identify successful ERP system implementation strategies in one organization.

The participants in this study were all employees of the same military organization in Washington. Twenty-two business leaders took part in semistructured

interviews and in observer-as-participant observations. Additionally, I utilized public documents from the DON organization to support the interview data.

A thorough analysis of the data produced four themes: crucial ERP planning, ERP implementation strategies, senior business leaders, and ineffective strategies with effects on ERP system performance. Effective strategies are crucial for successful ERP system implementation (Kutin et al., 2018; Osnes et al., 2018; Tseng et al., 2019). Specific strategies are needed to address end user training on ERP systems and to identify and use CSFs, project management, and financial management (Townsend et al., 2018).

The findings from this study indicate that business leaders must understand effective ERP system implementation strategies and the critical failure factors with adverse effects on the outcome of ERP system implementation. Sadiku-Dushi et al. (2019) maintained that business leaders should use business processes to address deficiencies in end user training, top-level business leader support, and management practices with adverse effects on process improvement goals. Business leaders must understand how critical factors could indicate the success of an ERP system implementation project (Mahendrawathi et al., 2017; Namugenyi et al., 2019). Additionally, ERP systems may have an impact on practically every business function within an organization, including accounting and finance, human resources, and supply chain management (Sørheller et al., 2018). In keeping with the general systems theory, business leaders must understand system integration (Aydiner et al., 2019) and identify

and select effective ERP system implementation strategies to coordinate various business processes into a single function (Aversano et al., 2017).

References

Abd Elmonem, M. A., Nasr, E. S., & Geith, M. H. (2016). Benefits and challenges of cloud ERP systems – A systematic literature review. *Future Computing and Informatics Journal, 1*(1), 1-9. doi:10.1016/j.fcij.2017.03.003

Abdulkhaleq, A., Lammering, D., Wagner, S., Röder, J., Balbierer, N., Ramsauer, L., . . . Boehmert, H. (2017). A systematic approach based on STPA for developing a dependable architecture for fully automated driving vehicles. *Procedia Engineering, 179,* 41-51. doi:10.1016/j.proeng.2017.03.094

AboAbdo, S., Aldhoiena, A., & Al-Amrib, H. (2019). Implementing enterprise resource planning ERP system in a large construction company in KSA. *Procedia Computer Science, 164,* 463-470. doi:10.1016/j.procs.2019.12.207

Abollado, J. R., & Shehab, E. (2018). A systems approach for the definition of lean workflows in global aerospace manufacturing companies. *Procedia CRIP, 70,* 446-450. doi:10.1016/j.procir.2018.03.053

Acar, M. F., Tarim, M., Zaim, H., Zaim, Z., & Delen, D. (2017). Knowledge management and ERP: Complementary or contradictory. *International Journal of Information Management, 37,* 703-712. doi:10.1016/j.ijinfomgt.2017.05.007

Aduhay, T. M., Nigatie, Y. G., & Kocalchuk, S. V. (2018). Towards predicting trend of scientific research topics using topic modeling. *Procedia Computer Science, 136,* 304-310. doi:10.1016/j.procs.2018.08.284

Akdoğan, A. A., Arslan, A., & Demirtas, Ö. (2016). A strategic influence of corporate

social responsibility on meaningful work and organizational identification, via perceptions of ethical leadership. *Procedia – Social and Behavioral Science, 235,* 259-268. doi:10.1016/j.sbspro.2016.11.029

Akrout, H., & Diallo, M. F. (2017). Fundamental transformations of trust and its drivers: A multi-stage approach of business-to-business relationships. *Industrial Marketing Management, 66,* 159-171. doi:10.1016/j.indmarman.2017.08.003

Alfieri, F., Cordella, M., Sanfelix, J., & Dodd, N. (2018). An approach to the assessment of durability of energy-related products. *Procedia CIRP,69,* 878-881. doi:10.1016/j.procir.2017.11.082

Alola, A. A., Bekun, F. V., & Sarkodie, S. A. (2019). Dynamic impact of trade policy, economic growth, fertility rate, renewable and non-renewable energy consumption on ecological footprint in Europe. *Science of the Total Environment, 685,* 702-709. doi:10.1016/j.scitotenv.2019.05.139

Amankwah-Amoah, J. (2017). Integrated vs. add-on: A multidimiensional conceptualization of technology obsolescence. *Technological Forecasting and Social Change, 116,* 299-307. doi:10.1016/j.techfore.2016.10.006

Ambrose, A., Goodchild, B., & O'Flaherty, F. (2017). Understanding the user in low energy housing: A comparison of positivist and phenomenological approaches. *Energy Research & Social Science,34,* 163-171. doi:10.1016/j.erss.2017.06.035

Ansyori, R., Qodarsih, N., & Soewito, B, (2018), A systematic literature review: Critical success factors in implement enterprise architecture. *Procedia Computer Science,*

135, 43-51. doi:10.1016/j.procs.2018.08.148

Arvanitou, E. M., Ampatzoglou, A., Chatzigeorgiou, A., Galster, M., & Avgeriou, P. (2017). A mapping study on design-quality attributes and metrics. *Journal of Systems and Software, 127*, 52-77. doi:10.1016/j.jss.2017.01.026

Atieh, A. M., Keylani, H., Al-abdallat, Y., Qaderi, A., Ghoul, L., Jaradat, L., & Hdairis, I. (2016). Performance improvement of inventory management systems processes by an automated warehouse management system. *Procedia CIRP, 41*, 568-572. doi:10.1016/j.procir.2015.12.122

Aulia, R., Tan, H., & Sriramula, S. (2019). Prediction of corroded pipeline performance based on dynamic reliability models. *Procedia CIRP, 80*, 518-523. doi:10.1016/j.procir.2019.01.093

Aversano, L., Guardabascio, D., & Tortorella, M. (2017). Analysis of the documentation of ERP software project. *Procedia Computer Science, 121*,423-430. doi:10.1016/j.procs.2017.11.057

Aydiner, A. S., Tatoglu, E., Bayraktar, E., & Zaim, S. (2019). Information systems capabilities and firm performance: Opening the black box through decision-making performance and business process performance. *International Journal of Information Management, 47*, 168-182. doi:10.1016/j.ijinfomgt.2018.12.015

Bachrach, D. G., & Mullins, R. (2019). A dual-process contingency model of leadership, transactive memory systems and team performance. *Journal of Business Research, 96*, 297-308. doi:10.1016/j.jbusres.2018.11.029

Barricelli, B. R., Cassano, F., Fogli, D., & Piccinno, A. (2019). End-user development, end-user programming and end-user software engineering: a systematic mapping study. *Journal of Systems and Software,* 149, 101-137. doi:10.1016/j.jss.2018.11.041

Baruch, A., May, A., & Yu, D. (2016). The motivations, enablers and barriers for voluntary participation in an online crowdsourcing platform. *Computers in Human Behavior, 64*, 923-931. doi:10.1016/j.chb.2016.07.039

Baykasoğlu, A., & Gölcük, İ. (2017). Development of a two-phase structural model for evaluating ERP critical success factors along with a case study. *Computers & Industrial Engineering, 106*, 256-274. doi:10.1016/j.cie.2017.02.015

Bellini, A., Aarseth, W., & Hosseini, A. (2016). Effective knowledge transfer in successful partnering projects. *Energy Procedia, 96,* 218-228. doi:10.1016/j.egypro.2016.09.127

Bernus, P., Goranson, T., Gøtze, J., Jensen-Waud, A., Kandjani, H., Molina, A., . . . Turner, P. (2016). Enterprise engineering and management at the crossroads. *Computers in Industry, 79*(Supplement C), 87-102. doi:10.1016/j.compind.2015.07.010

Bhattacharya, P. (2017). Modelling strategic alignment of business and IT through enterprise architecture: Augmenting archimate with BMM. *Procedia Computer Science, 121,* 80-88. doi:10.1016/j.procs.2017.11.012

Birollo, G., & Teerikangas, S. (2019). Integration projects as relational spaces: A closer

look at acquired mangers' strategic role recovery in cross-border acquisitions. *International Journal of Project Management, 37*, 1003-1016. doi:10.1016/j.ijproman.2019.09.002

Blazquez, D., & Domenech, J. (2018). Big data sources and methods for social and economic analyses. *Technological Forecasting and Social Change, 130*, 99-113. doi:10.1016/j.techfore.2017.07.027

Bloomfield, R. E., Popov, P., Salako, K., Stankovic, V., & Wright, D. (2017). Preliminary interdependency analysis: An approach to support critical-infrastructure risk-assessment. *Reliability Engineering & System Safety, 167*, 198-217. doi:10.1016/j.ress.2017.05.030

Boddewyn, J. J. (2016). International business-government relations research 1945-2015: Concepts, typologies, theories, and methodologies. *Journal of World Business, 51*, 10-22. doi:10.1016/j.jwb.2015.08.009

Boiko, A., Shendryk, V., & Boiko, O. (2019). Information systems for supply chain management: uncertainties, risks and cyber security. *Procedia Computer Science, 149*, 65-70. doi:10.1016/j.procs.2019.01.108

Cao, L., Navare, J., & Jin, Z. (2018). Business model innovation: How the international retailers rebuild their core business logic in a new host country. *International Business Review, 27*, 543-562. doi:10.1016/j.ibusrev.2017.10.005

Celtekligil, K., & Adiguzel, Z. (2019). Analysis of the effect of innovation strategy and technological turbulence on competitive capabilities and organizational

innovativeness in technology firms. *Procedia Computer Science, 158*, 772-780. doi:10.1016/j.procs.2019.09.114

Cepeda-Carrion, I., Martelo-Landroguez, S., Leal-Rodríguez, A. L., & Leal-Millán, A. (2017). Critical processes of knowledge management: An approach toward the creation of customer value. *European Research on Management and Business Economics, 23*, 1-7. doi:10.1016/j.iedeen.2016.03.001

Chan, N. N., Ahrumugam, P., Scheithauer, H., Schultze-Krumbholz, A., & Ooi, P. B. (2020). A hermeneutic phenomenological study of students' and school counselors' "lived experiences" of cyberbullying and bullying. *Computers & Education, 146*, 103755. doi:10.1016/j.compedu.2019.103755

Chang, Y. B., & Kwon, Y. O. (2018). Ambiguities in valuing information technology firms: Do internet searches help? *Journal of Business Research, 92*, 260-269. doi:10.1016/j.jbusres.2018.07.053

Comer-Warner, S., Knapp, J. L. A., Blaen, P., Klaar, M., Shelley, F., Zarnetske, J., . . . Krause, S. (2020). The method controls the story - Sampling method impacts on the detection of the pore-water nitrogen concentrations in streambeds. *Science of the Total Environment, 709*, 136075. doi:10.1016/j.scitotenv.2019.136075

Connett, B., & O'Halloran, B. (2018). Systems engineering design: Architecting trustworthiness in cyber physical systems using an extended aggregated modality. *Procedia Computer Science, 140*, 4-12. doi:10.1016/j.procs.2018.10.286

Córdova, F. M., & Gutiérrez, F. A. (2018). Knowledge management system in service

companies. *Procedia Computer Science, 139,* 392-400. doi:10.1016/j.procs.2018.10.275

Crispim, J., Fernandez, J., & Rego, N. (2020). Customized risk assessment in military shipbuilding. *Reliability Engineering & System Safety, 197,* 106809. doi:10.1016/j.ress.2020.106809

Cui, L., Chan, H. K., Zhou. Y., Dai, J., & Lim, J. J. (2019). Exploring critical factors of green business failure based on gray-decision making trial and evaluation laboratory (DEMATEL). *Journal of Business Research, 98,* 450-461. doi:10.1016/j.jbusres.2018.03.031

Dai, J., Peng, S., & Li, S. (2017). Mitigation of bullwhip effect in supply chain inventory management model. *Procedia Engineering, 174,* 1229-1234. doi:10.1016/j.proeng.2017.01.291

Dallasega, P., Rauch, E., & Linder, C. (2018). Industry 4.0 as an enabler of proximity for construction supply chains: A systematic literature review. *Computers in Industry, 99,* 205-225. doi:10.1016/j.compind.2018.03.039

Darmaningrat, E. W. T., Muqtadiroh, F. A., & Bukit, T. A. (2019). Communication management plan of ERP implementation program: A case study of PTPN XI. *Procedia Computer Science, 161,* 359-366. doi:10.1016/j.procs.2019.11.134

Davis, J. S. (2019). IQA: Qualitative research to discover how and why students learn from economic games. *International Review of Economics Education, 31,* 100160. doi:10.1016/j.iree.2019.100160

Davis, K. (2017). An empirical investigation into different stakeholder groups perception of project success. *International Journal of Project Management, 35,* 604-617. doi:10.1016/j.ijproman.2017.02.004

De Florio, V. (2017). Systems, resilience, and organization: Analogies and points of contact with hierarchy theory. *Procedia Computer Science, 109,* 935-942. doi:10.1016/j.procs.2017.05.430

Dewi, R. S. (2019). Maturity level assessment for ERP systems investing using Val IT framework. *Procedia Computer Science, 161*, 250-257. doi:10.1016/j.procs.2019.11.121

Donelson, L. N. (n.d.). Navy ERP – NAVSUP implementation. Naval Supply Systems Command, Naval Inventory Control Point. Retrieved from http://www.erp.navy.mil

Dortch, D. (2011). NAVSUP transition to Navy ERP. Retrieved from Department of the Navy website: https://www.navy.mil/submit/display.asp?story_id=59606

Dubey, R., Gunasekaran, A., Childe, S. J., Roubaud, D., Wamba, S. F., Giannakis, M., & Foropon, C. (2019). Big data analytics and organizational culture as complements to swift trust and collaborative performance in the humanitarian supply chain. *International Journal of Production Economics, 210,* 120-136. doi:10.1016/j.ijpe.2019.01.023

Erkoyuncu, J. A., Roy, R., Shehab, E., Durugbo, C., Khan, S., & Datta, P. (2019). An effective uncertainty-based framework for sustainable industrial product-service

system transformation. *Journal of Cleaner Production, 2018,* 160-177. doi:10.1016/j.jclepro.2018.09.182

Faller, C., & Höftman, M. (2018). Service-oriented communication model for cyber-physical-production-systems. *Procedia CIRP, 67,* 156-161. doi:10.1016/j.procir.2017.12.192

Faucett, W. A., & Davis, F. D. (2016). How Geisinger made the case for an institutional duty to return genomic results to biobank participants. *Applied & Translational Genomics, 8,* 33-35. doi:10.1016/j.atg.2016.01.003

Favotto, A., Kollman, K., & Bernhagen, P. (2016). Engaging firms: The global organsational field for corporate social responsibility and national varieties of capitalism. *Policy and Society, 35,* 13-27. doi:10.1016/j.polsoc.2015.12.003

Fernandez, D., Zainol, Z., & Ahmad, H. (2017). The impacts of ERP systems on public sector organizations. *Procedia Computer Science, 111,* 31-36. doi:10.1016/j.procs.2017.06.006

Fernández-Álvareza, J., Díaz-Garcíaa, A., González-Roblesa, A., Bañosbc, R., García-Palaciosac, A., & Botella, C. (2017). Dropping out of a transdiagnostic online intervention: A qualitative analysis of client's experiences. *Internet Interventions, 10,* 29-38. doi10.1016/j.invent.2017.09.001

Foroudi, P., Gupta, S., Sivarajah, U., & Broderick, A. (2018). Investigating the effects of smart technology on customer dynamics and customer experience. *Computers in Human Behavior, 80,* 271-282. doi:10.1016/j.chb.2017.11.014

Frontz, A. J. (2012). Navy Enterprise resource planning system does not comply with the standard financial information structure and U.S. government standard general ledger. *DOD Inspector General* (Report No. DODIG-2012-051). Retrieved from http://www.dodig.mil/

Fuchs, J., Oks, S. J., & Franke, J. (2019). Platform-based service composition for manufacturing: A conceptualization. *Procedia CIRP, 81*, 541-546. doi:10.1016/j.procir.2019.03.152

Furlong, C., De Silva, S., Guthrie, L., & Considine, R. (2016). Developing a water infrastructure planning framework for the complex modern planning environment. *Utilities Policy*, *38*, 1–10. doi:10.1016/j.jup.2015.11.002

Gallab, M., Bouloiz, H., Alaoui, Y. L., & Tkiouat, M. (2019). Risk assessment of maintenance activities using fuzzy logic. *Procedia Computer Science, 148*, 226-235. doi:10.1016/j.procs.2019.01.065

García, S., Romero, O., & Raventós, R. (2016). DSS from an RE perspective: A systematic mapping. *Journal of Systems and Software, 117*(Suppl. C), 488-507. doi:10.1016/j.jss.2016.03.046

García-Valls, M., Escribano-Barreno, J., & García-Muñoz, J. (2019). An extensible collaborative framework for monitoring software quality in critical systems. *Information and Software Technology, 107*, 3-17. doi:10.1016/j.infsof.2018.10.005

Gellweiler, C. (2017). Bridging IT requirements to competitive advantage: The concept

of IT value planning. *Procedia Computer Science, 121*, 145-151. doi:10.1016/j.procs.2017.11.020

Gençer, M. S., & Samur, Y. (2016). Leadership styles and technology: Leadership competency level of educational leaders. *Procedia – Social and Behavioral Sciences, 229*, 226-233. doi:10.1016/j.sbspro.2016.07.132

Gilgor, D., Bozkurt, S., & Russo, I. (2019). Achieving customer engagement with social media: A qualitative comparative analysis approach. *Journal of Business Research, 101*, 59-69. doi:10.1016/j.jbusres.2019.04.006

Goldstein, B. L., Ick, M., Ratang, W., Hutajulu, H., & Blesia, J. U. (2016). Using the action research process to design entrepreneurship education at Cenderawasih University. *Procedia - Social and Behavioral Sciences, 228*, 462-469. doi:10.1016/j.sbspro.2016.07.071

Guaragni, F., Schmidt, T., & Paetzold, K. (2016). Traditional and agile product development in a hyperconnected world: Turning weaknesses into strengths. *Procedia CIRP, 52*, 62-67. doi:10.1016/j.procir.2016.07.020

Gunasekaran, A., Subramanian, N., & Papadopoulos, T. (2017). Information technology for competitive advantage within logistics and supply chains: A review. *Logistics and Transportation Review, 99*, 14-33. doi:10.1016/j.tre.2016.12.008

Günther, W. A., Mehrizi, M. H. R., Huysman, M., & Feldberg, F. (2017). Debating big data: A literature review on realizing value from big data. *The Journal of Strategic Information Systems, 26*, 191-209. doi:10.1016/j.jsis.2017.07.003

Guo, J., Pan, J., Guo, J., Gu, F., & Kuusisto, J. (2019). Measurement framework for assessing disruptive innovations. *Technological Forecasting and Social Change, 139*, 250-265. doi:10.1016/j.techfore.2018.10.015

Haddara, M., & Moen, H. (2017). User resistance in ERP implementations: A literature review. *Procedia Computer Science, 121*, 859-865. doi:10.1016/j.procs.2017.11.111

Hajji, A., Pellerin, R., Ghargi, A., Léger, P. M., & Babin, G. (2016). Toward valuable prediction of ERP diffusion in North American automotive industry: A simulation based approach. *International Journal of Production Economics, 175*, 61-70. doi:10.1016/j.ijpe.2016.02.007

Hansen, K. S., Mukkamalaa, R., Hussaina, A., Grønli, T. M., Langberg, H. & Vatrapuab, R. (2016). Big social data in public health: A mixed-methods case study of Sundhed.dk's Facebook strategy, engagement, and performance. *Procedia Computer Science, 98*, 298-307. doi:10.1016/j.procs.2016.09.046

Hasan, M., Kotov, A., Carcone, A. I., Dong, M., Naar, S., & Hartlieb, K. B. (2016). A study of the effectiveness of machine learning methods for classification of clinical interview fragments into a large number of categories. *Journal of Biomedical Informics, 62* 21-31. doi:10.1016/j.jbi.2016.05.004

Hazen, B. T., Weigel, F. K., Ezell, J. D., Boehmke, B. C., & Bradley, R. V. (2017). Toward understanding outcomes associated with data quality improvement. *International Journal of Production Economics, 193*, 737-747.

doi:10.1016/j.ijpe.2017.08.027

Hodosi, G., Johansson, D., & Rusu, L. (2017). Does is matter the loss of tacit knowledge in IT outsourcing? A study in a Swedish government agency. *Procedia Computer Science, 121,* 491-502. doi:10.1016/j.procs.2017.11.066

Hong, D., & Zang, L. (2017). Does transactive memory systems promote knowledge integration. *Procedia Computer Science, 112,* 896-905. doi:10.1016/j.procs.2017.08.107

Hosseini, S., Ivanov, D., & Dolgui, A. (2019). Review of quantitative methods for supply chain resilience analysis. Transportation Research Part E: Logistics and Transportation Review, 125, 285-307. doi:10.1016/j.tre.2019.03.001

Humlung, O., & Haddara, M. (2019). The hero's journey to innovation: gamification in enterprise systems. *Procedia Computer Systems, 164,* 86-95. doi:10.1016/j.procs.2019.12.158

Hung, C. L. (2017). Social networks, technology ties, and gatekeeper functionality: Implications for the performance management of R&D projects. *Research Policy, 46,* 305-315. doi:10.1016/j.respol.2016.11.009

Hussain, S., Melewar, T. C., Priporas, C. V., Foroudi, P., & Dennis, C. (2020). Examining the effects of celebrity trust on advertising credibility, brand credibility, and corporate credibility. *Journal of Business Research, 109,* 472-488. doi:10.1016/j.jbusres.2019.11.079

Hustad, E., Haddara, M., & Kalvenes, B. (2016). ERP and Organizational Misfits: An

ERP Customization Journey. *Procedia Computer Science, 100,* 429-439. doi:10.1016/j.procs.2016.09.179

Islam, M. S., & Nepal, M. (2016). A fuzzy-bayesian model for risk assessment in power plant project. *Procedia Computer Science, 100,* 963-970. doi:10.1016/j.procs.2016.09.259

Issa, A., Hatiboglu, B., Bildstein, A., & Bauemhansi, T. (2018). Industrie 4.0 roadmap: Framework for digital transformation based on the concepts of capability maturity and alignment. *Procedia CIRP, 72,* 973-978. doi:10.1016/j.procir.2018.03.151

Jamil, M. A., Nour, M. K., Alhindi, A., Abhubakar, N. S. A., Arif, M., & Aljabri, T. F. (2019). Towards software product lines optimization using evolutionary algorithms. *Procedia Computer Science, 163,* 527-537. doi:10.1016/j.procs.2019.12.135

Jayakrishna, M. E. (2019). A review of Internet of things (IoT) embedded supply chain for Industry 4.0 requirements. *Computers & Industrial Engineering, 127,* 925-953. doi:10.1016/j.cie.2018.11.030

Jayawickrama, U., Liu, S., & Smith, M. H. (2016). Empirical evidence of an integrated knowledge competence framework for ERP systems implementation in UK industries. *Computers in Industry, 82,* 205-223. doi:10.1016/j.compind.2016.07.005

Jiang, J. J., Klein, G., & Chang, J. Y. T. (2019). Teamwork behaviors in implementing enterprise systems with multiple projects: Results from Chinese firms. *Journal of*

Systems and Software, 157, 110392. doi:10.1016/j.jss.2019.110392

Jituri, S., Fleck, B., & Ahmad, R. (2018). Lean or ERP: A decision support system to satisfy business objectives. *Procedia CRIP, 70*, 422-427. doi:10.1016/j.procir.2018.02.048

Johansson, A. E., Raddats, C., & Witell, L. (2019). The role of customer knowledge development for incremental and radical service innovation in servitized manufacturers. *Journal of Business Research, 98*, 328-338. doi:10.1016/j.jbusres.2019.02.019

Johansson, B., Karlsonnon, L., Laine, E., & Wiksell, V. (2016). After a successful business case of ERP : What happens then? *Porcedia Computer Science, 100*, 383-392. doi:10.1016/j.procs.2016.09.173

Jørgensen, L. (2018). Project teams: An untapped resource? *Procedia Computer Science, 138*, 799-804. doi:10.1016/j.procs.2018.10.104

Junior, C. H., Oliveira, T., & Yanaze, M. (2019). The adoption stages (evaluation, adoption, and routinization) of ERP systems with business analytics functionality in the context of farms. *Computers and Electronics in Agriculture, 156*, 334-348. doi:10.1016/j.compag.2018.11.028

Kabashkin, I. (2019). Reliability of cluster-based nodes in wireless sensor networks of cyber physical systems. *Procedia Computer Science, 151*, 313-320. doi:10.1016/j.procs.2019.04.044

Kaiya, H. (2018). Meta-requirements for information system requirements: Lesson

learned from software ecosystem researches. *Procedia Computer Science, 126*, 1243-1252. doi:10.1016/j.procs.2018.08.066

Kaur, L., & Mishra, A. (2017). Software component and the semantic web: An in-depth content analysis and integration history. *Journal of Systems and Software, 125*, 152-169. doi:10.1016/j.jss.2016.11.028

Kaur, S., Gupta, S., Singh, S. K., & Perano, M. (2019). Organizational ambidexterity through global strategic partnerships: A cognitive computing perspective. *Technological Forecasting and Social Change, 145*, 43-54. doi:10.1016/j.techfore.2019.04.027

Kawaguchi, N. (2019). Application of blockchain to supply chain: Flexible blockchain technology. *Procedia Computer Science, 164*, 143-148. doi:10.1016/j.procs.2019.12.166

Kenyon-Ely, M. (2011). NAVICP activates operational supply planning department. Retrieved from Department of the Navy website: https://www.navy.mil/submit/display.asp?story_id=61074

Khan, A. A. (2010a). *DOD Business Transformation: Improved Management Oversight of Business System Modernization Efforts Needed* (Report No. GAO-11-53), 1-110. Retrieved from United States Government Accountability Office website: http://www.gao.gov/

Khan, A. A. (2010b). *Department of Defense: Financial management improvement and audit readiness efforts continue to evolve.* (Report No. GAO-10-1059T), 1-34.

Retrieved from United States Government Accountability Office website: http://www.gao.gov/

Khan, A. A. (2011a). *DOD financial management: Ongoing challenges in implementing the financial improvement and audit readiness plan* (Report No. GAO-11-932T), 1-25. Retrieved from United States Government Accountability Office website: http://www.gao.gov/

Khan, A. A. (2011b). *DOD Financial Management: Challenges in the Implementation of Business Systems Could Impact Audit Readiness Efforts* (Report No. GAO-12-177T), 1-18. Retrieved from United States Government Accountability Office website: http://www.gao.gov/

Khan, A. A. (2012). *DOD financial management: Challenges in attaining audit readiness and improving business processes and systems* (Report No. GAO-12-642T), 1-27. Retrieved from United States Government Accountability Office website: http://www.gao.gov/

Khan, A. A. (2013). *DOD Financial Management: Ineffective Risk Management Could Impair Progress toward Audit-Ready Financial Statements* (Report No. GAO-13-123), 1-47. Retrieved from United States Government Accountability Office website: http://www.gao.gov/

Khan, A. A. (2017). DOD Financial Management: Significant Efforts Still Needed for Remediating Audit Readiness Deficiencies, (GAO-17-85). Retrieved from United States Government Accountability Office website: https://www.gao.gov/

Kim, Y. K., & Ryu, M. H. (2017). Towards entrepreneurial organization: from the case of organizational process innovation in Naver. *Procedia Computer Science, 122*, 663-670. doi:10.1016/j.procs.2017.11.421

Kodhelaj, I., Chituc, C. M., Beunders, E., & Janseen, D. (2019). Designing and deploying a business process for product recovery and repair at a servicing organization: A case study and framework proposal. *Computers in Industry, 105*, 80-98. doi:10.1016/j.compind.2018.11.002

Kohtamäki, M., Parida, V., Oghazi, P., Gebauer, H., & Baines, T. (2019). Digital servitization business models in ecosystems: A theory of the firm. *Journal of Business Research, 104*, 380-392. doi:10.1016/j.jbusres.2019.06.027

Kordos, M., & Vojtovic, S. (2016). Transnational corporations in the global world economic environment. *Procedia – Social and Behavioral Sciences, 230*, 150-158. doi:10.1016/j.sbspro.2016.09.019

Kunath, M., & Winkler, H. (2019). Usability of information systems to support decision making in the order management process. *Procedia CIRP, 81*, 322-327. doi:10.1016/j.procir.2019.03.056

Kutin, A., Dolgov, V., Sedykh, M., & Ivashin, S. (2018). Integration of different computer-aided systems in product designing and process planning on digital manufacturing. *Procedia CIRP, 67*, 476-481. doi:10.1016/j.procir.2017.12.247

Labuschange, I., Grace, C., Rendell, P., Terrett, G., & Heinrichs, M. (2019). An introductory guide to conducting the trier social stress test. *Neuroscience &*

Biobehaviorial Reviews, 107, 686-695. doi:10.1016/j.neubiorev.2019.09.032

Lagos, N., Mos, A., & Vion-Dury, J.-Y. (2017). Multi-context systems for consistency validation and querying of business process models. *Procedia Computer Science, 112*(Suppl. C), 225–234. doi:10.1016/j.procs.2017.08.101

Lempiälä, T., Apajalahti, E. L., Haukkala, T., & Lovio, R. (2019). Socio-cultural framing during the emergence of a technological field: Creating cultural resonance for solar technology. *Research Policy, 48*, 103830. doi:10.1016/j.respol.2019.103830

Lenkenhoff, K., Wilkens, U., Zheng, M., Süße, T., Kuhlenkötter, B., & Ming, X. (2018). Key challenges of digital business ecosystem development and how to cope with them. *Procedia CIRP, 73*, 167-172. doi:10.1016/j.procir.2018.04.082

Li, H.-J., Chang, S.-I., & Yen, D. C. (2017). Investigating CSFs for the life cycle of ERP system from the perspective of IT governance. *Computer Standards & Interfaces, 50*, 269-279. doi:10.1016/j.csi.2016.10.013

Liao, H., & Hitchcock, J. (2018). Reported credibility techniques in higher education evaluation studies that use qualitative methods: A research synthesis. *Evaluation and Program Planning, 68*, 1574-165. doi:10.1016/j.evalprogplan.2018.03.005

Liew, A. (2019). Enhancing and enabling management control systems through information technology: The essential roles of internal transparency and global transparency. *International Journal of Accounting Information Systems, 33*, 16-31. doi:10.1016/j.accinf.2019.03.001

Linh, H. T., Adnan, M., Ectors, W., Kochan, B., Bellemans, T., & Tuan, V. A. (2019).

Exploring the spatial transferability of FEATHERS — an activity based travel demand model — for Ho Chi Minh City, Vietnam. *Procedia Computer Science, 151*, 226-233. doi:10.1016/j.procs.2019.04.033

Liu, H., Fang, T., Zhou, T., Wang, Y., & Wang, L. (2018). Deep learning-based multimodal control interface for human-robot collaboration. *Procedia CIRP, 72*, 3-8. doi:10.1016/j.procir.2018.03.224

Longhurst, P. J., Tompkins, D., Pollard, S. J. T., Hugh, R. L., Chambers, B., Gale, P., . . . Sweet, N. (2019). Risk assessment for quality-assured, source-segregated composts and anaerobic digestates for a circular bioeconomy in the UK. *Environment International, 127*, 253-266. doi:10.1016/j.envint.2019.03.044

Lopes, K. M., & Zancul, E. (2019). Application of set-based concurrent engineering principles in R&D project prioritization. *Procedia CIRP, 84*, 49-54. doi:10.1016/j.procir.2019.04.194

Lucke, D., Einberger, P., Schel, D., Luckert, M., Schneider, M., Cuk, E., . . . Mitschang, B. (2019). Implementation of the MIALinx integration concept for future manufacturing environments to enable retrofitting of machines. *Procedia CIRP, 79*, 596-601. doi:10.1016/j.procir.2019.02.084

Lugert, A., Völker, K., & Winkler, H. (2018). Dynamization of value stream management by technical and managerial approach. *Procedia CIRP, 72*, 701-706. doi:10.1016/j.procir.2018.03.284

Madanhire, I., & Mbohwa, C. (2016). Enterprise resource planning (ERP) in improving

operational efficiency: Case study. *Procedia CIRP, 40,* 225-229. doi:10.1016/j.procir.2016.01.108

Maghrabie, H. F., Beauregard, Y., & Schiffauerova, A. (2019). Grey-based multi-criteria decision analysis approach: Addressing uncertainty at complex decision problems. *Technological Forecasting and Social Change, 146,* 366-379. doi:10.1016/j.techfore.2019.05.031

Mahendrawathi, E. R., Zayin, S. O., & Pamungkas, F. J. (2017). ERP post implementation review with process mining: A case of procurement process. *Procedia Computer Science, 124,* 216-223. doi:10.1016/j.procs.2017.12.149

Makri, K., Theodosiou, M., & Katsikea, E. (2017). An empirical investigation of the antecedents and performance outcomes of export innovativeness. *International Business Review, 26,* 628-639. doi:10.1016/j.ibusrev.2016.12.004

Malalgoda, C., Amaratunga, D., & Haigh, R. (2018). Empowering local governments in making cities resilient to disasters: Research methodological perspectives. *Procedia Engineering, 212,* 902-909. doi: 10.1016/j.proeng.2018.01.116

Malshe, A., Friend, S. B., Al-Khatib, J., Al-Habib, M. I., & Al-Torkistani, H. M. (2017). Strategic and operational alignment of sales-marketing interfaces: Dual paths within an SME configuration. *Industrial Marketing Management*, *66*(Suppl. C), 145-158. doi:10.1016/j.indmarman.2017.08.004

Marhdi, O. R., Nassar, I. A., & Almsafir, M. K. (2019). Knowledge management process and sustainable competitive advantage: an empirical examination in private

universities. *Journal of Business Research*, 94, 320-334. doi:10.1016/j.jbusres.2018.02.013

Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (6th ed.). Thousand Oaks, CA: Sage

Massen, J. J. M., Behrens, F., Martin, J. S., Stocker, M., & Brosnan, S. F. (2019). A comparative approach to affect and cooperation. *Neuroscience & Biobehavioral Reviews, 107,* 370-387. doi:10.1016/j.neubiorev.2019.09.027

Mayeh, M., Ramayah, T., & Mishra, A. (2016). The role of absorptive capacity, communication and trust in ERP adoption. *Journal of Systems and Software*, *119*(Suppl. C), 58–69. doi:10.1016/j.jss.2016.05.025

Mefteh, M., Bouassida, N., & Ben-Abdallah, H. (2018). Towards naturalistic programming: Mapping language-independent requirements to constrained language specifications. *Science of Computer Programming, 166,* 89-119. doi:10.1016/j.scico.2018.05.006

Mendonça, J., Andrade, E., Endo, P. T., & Lima, R. (2019). Disaster recovery solutions for IT systems: A systematic mapping study. *Journal of Systems and Software, 149,* 511-530. doi:10.1016/j.jss.2018.12.023

Meng, J., Yan, J., & Liu, B. (2016). An exploratory study of relationships between national culture and infrastructure sustainability. *Procedia Engineering, 145,* 1226-1233. doi:10.1016/j.proeng.2016.04.158

Mennenga, M., Cerdas, F., Thiede, S., & Herrmann, C. (2019). Exploring the

opportunities of system of systems engineering to complement sustainable manufacturing and life cycle engineering. *Procedia CIRP, 80*, 637-642. doi:10.1016/j.procir.2019.01.026

Miller, S. W., Yukish, M. A., Hoskins, M. E., Bennett, L. A., & Little E. J. (2019). A retrospective analysis of system engineering data collection metrics for a 3D printed UAS design. *Procedia Computer Science, 153*, 1-8. doi:10.1016/j.procs.2019.05.049

Morquin, D., & Ologeanu-Taddei, R. (2016). Professional facing coercive work formalization: Vicious circle of the electronic medical record (EMR) implementation appropriation. *Procedia Computer Science, 100*, 625-657. doi:10.1016/j.procs.2016.09.207

Müller, J. M., Buliga, O., & Voigt, K. I. (2018). Fortune favors the prepared: How SMEs approach business model innovation in Industry 4.0. *Technological Forecasting and Social Change, 132*, 2-17. doi:10.1016/j.techfore.2017.12.019

Muqtadiroh, F. A., Astuti, H. M., Darmaningrat, E. W. T., & Aprillian, F. R. (2017). Usability evaluation to enhance software quality of cultural conservation system based on Nielsen Model (WikiBudaya). *Procedia Computer Science, 124*, 513-521. doi:10.1016/j.procs.2017.12.184

Mura, M., Longo, M., & Zanni, S. (2020). Circular economy in Italian SMEs: A multi-method study. *Journal of Cleaner Production, 245*, 118821. doi:10.1016/j.jclepro.2019.118821

Muriana, C., & Vizzini, G. (2017). Project risk management: A deterministic quantitative technique for assessment and mitigation. *International Journal of Project Management, 35*, 320-340. doi:10.1016/j.ijproman.2017.01.010

Namugenyi, C., Nimmagadda, S. L., & Reiners, T. (2019). Design of a SWOT analysis model and its evaluation in diverse digital business ecosystem contexts. *Procedia Computer Science, 159*, 1145-1154. doi:10.1016/j.procs.2019.09.283

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979). The Belmont report: Ethical principles and guidelines for the protection of human subjects of research. Retrieved from https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html

Nazemi, K., & Burkhardt, D. (2019). Visual analytical dashboards for comparative analytical tasks – a case study on mobility and transportation. *Procedia Computer Science, 149*, 138-150. doi: doi.org/10.1016/j.procs.2019.01.117

Niewöhner, N., Asmar, L., Wortman, F., Röltgen, D., Kühn, A., & Dumitrescu, R. (2019). Design fields of agile innovation management in small and medium sized enterprises. *Procedia CIRP, 84*, 826-831. doi:10.1016/j.procir.2019.04.295

Nurhas, I., Aditya, B. R., Geisler, S., & Pawlowski, J. (2019). Why does cultural diversity foster technology-enabled intergenerational collaboration? *Procedia Computer Science, 161*, 15-22. doi:10.1016/j.procs.2019.11.094

Ocampo, J. R., Hernández-Matías, J. C., & Vizán, A. (2017). A method for estimating the

influence of advanced manufacturing tools on the manufacturing competitiveness of Maquiladoras in the apparel industry in Central America. *Computers in Industry, 87,* 31-51. doi:10.1016/j.compind.2017.02.001

Oesterreich, T. D., & Teuteberg, F. (2018). Looking at the big picture of IS investment appraisal through the lens of systems theory: A system dynamic approach for understanding the economic impact of BIM. *Computers in Industry, 99,* 262-281. doi:10.1016/j.compind.2018.03.029

Osnes, K. B., Olsen, J. R., Vassilakopoulou, P., & Hustad, E. (2018). ERP systems in multinational enterprises: A literature review of post-implmentation challenges. *Procedia Computer Science, 138,* 541-548. doi:10.1016/j.procs.2018.10.074

Özcan, G. B., Mondragon, A. E. C., & Harindranath, G. (2018). Strategic entry and operational integration of emerging market firms: The case of Cemex, Beko and Tata Steel in the UK. *Journal of Business Research, 93,* 242-254. doi:10.1016/j.jbusres.2018.02.024

Palacios Martinez, I. M. (2020). Methods of data collection in English empirical linguistic research: Results of a recent survey. *Language Sciences, 78,* 101263. doi:10.1016/j.langsci.2019.101263

Papamichail, M. D., Diamantopoulos, T., & Symenonidis, A. L. (2019). Measuring the reusability of software components using static analysis metrics and reuse rate information. *Journal of Systems and Software,* 158, 1-14. doi:10.1016/j.jss.2019.110423

Papatheocharous, E., Wnuk, K., Peterson, K., Snetilles, S., Cicchetti, A., Gorschek, T., & Shah, S. M. A. (2018). The grade taxonomy for supporting decision-making of asset selection in software-intensive system development. *Information and Software Technology, 100,* 1-17. doi:10.1016/j.infsof.2018.02.007

Parhizkar, M., & Comuzzi, M. (2017). Impact analysis of ERP post-implementation modifications: Design, tool support and evaluation. *Computers in Industry, 84*(Supplement C), 25-38. doi:10.1016/j.compind.2016.11.003

Parthasarathy, S., & Daneva, M. (2016). An approach to estimation of degree of customization for ERP projects using prioritized requirements. *Journal of Systems and Software, 117,* 471-487. doi:10.1016/j.jss.2016.04.006

Pasban, M., & Nojedeh, S. H. (2016). A review of the role of human capital in the organization. *Procedia – Social and Behavioral Sciences, 230,* 249-253. doi:10.1016/j.sbspro.2016.09.032

Pickard, M. D., & Roster, C. A. (2020). Using computer automated systems to conduct personal interviews: Does the mere presence of a human face inhibit disclosure. *Computers in Human Behavior, 105,* 106197. doi:10.1016/j.chb.2019.106197

Pietrantuono, R. (2020). On the testing resource allocation problem: Research trends and perspectives. *Journal of Systems and Software, 161,* 110462. doi:10.1016/j.jss.2019.110462

Pires, C., & Cavaco, A. (2018). Pre-systematic review on software tools to evaluate package inserts of medicine as prescription information. *Procedia Computer*

Science, 138, 177-184. doi:10.1016/j.procs.2018.10.025

Poecze, F., Ebster, C., & Strauss, C. (2018). Social media metrics and sentiment analysis to evaluate the effectiveness of social media posts. *Procedia Computer Science, 130*, 660-666. doi:10.1016/j.procs.2018.04.117

Qazi, A., Quigley, J., Dickson, A., & Ekici, Ş. Ö. (2017). Exploring dependency based probabilistic supply chain risk measures for prioritising interdependent risks and strategies. *European Journal of Operational Research, 259*, 189-204. doi:10.1016/j.ejor.2016.10.023

Rabe, N. S., Osman, M. M., & Backok, S. (2016). An assessment of stakeholder perception on the development of Iskandar Malaysia: Review of process and procedure. *Procedia – Social and Behavioral Sciences, 222*, 644-658. doi:10.1016/j.sbspro.2016.05.221

Rauch, S. (2019). Procedure to sustain competitive advantage in an ero of changing dominant design. *Procedia CIRP, 81*, 838-843. doi:10.1016/j.procir.2019.03.209

Rezaei-Yazdi, A., & Buckingham, C. (2016), Introducing a pilot data collection model for real-time evaluation of data redundancy. *Procedia Computer Science, 96*, 577-586. doi:10.1016/j.procs.2016.08.237

Ribeiro da Silva, E. H. D., Shinohara, A. C., Pinheiro de Lima, E., Angelis, J., & Machado, C. G. (2019). Reviewing digital manufacturing concept in the Industry 4.0 paradigm. *Procedia CIRP, 81*, 240-245. doi:10.1016/j.procir.2019.03.042

Rivera, A., & Kashiwagi, D. (2016). Creating a new project management model through

research. *Procedia Engineering, 145,* 1370-1377. doi:10.1016/j.proeng.2016.04.202

Roßmann, B., Canzaniello, A., von der Gracht, H., & Hartmann, E. (2018). The future and social impact of big data analytics in supply chain management: Results from a Delphi study. *Technological Forecasting and Social Change, 130,* 135-149. doi:10.1016/j.techfore.2017.10.005

Roumani, Y., Nwankpa, J. K., & Roumani, Y. F. (2017). Adopter's trust in enterprise open source vendors: An empirical examination. *Journal of Systems and Software, 125,* 256-270. doi: 10.1016/j.jss.2016.12.006

Roundy, P. T., Bradshaw, M., & Brockman, B. K. (2018). The emergence of entrepreneurial ecosystems: A complex adaptive systems approach. *Journal of Business Research, 86,* 1-10. doi:10.1016/j.jbusres.2018.01.032

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative interviewing: The art of hearing data* (3rd ed.). Thousand Oaks, CA: Sage.

Ruivo, P., Robrigues, J., Johansoon, B., Oliveira, T., & Rebelo, J. (2017). Differences in ERP value between Iberian manufacturing and services SMEs. *Procedia Computer Science, 121,* 707-715. doi:10.1016/j.procs.2017.11.092

Ruivo, P., Rodrigues, J., Johansson, B., Oliverira, T., & Rebelo, J. (2016). Using TOE and RBV theories to define a theoretical model to assess ERP value across Iberian manufacturing and services SMEs. *Procedia Computer Science, 100,* 474-479. doi:10.1016/j.procs.2016.09.184

Rustambekovich, Y. N., Gulyamov, S. M., Usmanova, N. B., & Mirzaev, D. A. (2017). Challenging the ways to determine the faults in software: Technique based on associative interconnections. *Procedia Computer Science, 120,* 641-648. doi:10.1016/j.procs.2017.11.290

Rycroft, T., Hamilton, K., Haas, C. N., & Linkov, I. (2019). A quantitative risk assessment method for synthetic biology products in the environment. *Science of the Total Environment, 696,* 133940. doi:10.1016/j.scitotenv.2019.133940

Sadiku-Dushi, N., Dana, L. P., & Ramadani, V. (2019). Enterpreneurial marketing dimiensions and SMEs performance. *Journal of Business Research, 100,* 86-99. doi:10.1016/j.jbusres.2019.03.025

Sales, L., Augusto, R., & Barbalho, S. (2017). Improper program management induced system archetypes. *Procedia Computer Science, 114,* 73-82. doi:10.1016/j.procs.2017.09.012

Sallah, K. A., & Janczewski, L. (2019). Security considerations in big data solutions adoption: Lessons from a case study on a banking institution. *Procedia Computer Science, 164,* 168-176. doi:10.1016/j.procs.2019.12.169

Sangeetha, M., & Chandrasekar, C. (2019). An empirical investigation into code smells retification through ADA_booster. *Ain Shams Engineering Journal, 10,* 549-553. doi:10.1016/j.asej.2018.10.005

Sarkar, B., Omair, M., & Kim, N. (2020). A cooperative advertising collaboration policy in supply chain management under certain conditions. *Applied Soft Computing,*

88, 105948. doi:10.1016/j.asoc.2019.105948

Sasidharan, S. (2019). Reconceptualizing knowledge networks for enterprise systems implementation: Incorporating doman expertise of knowledge sources and knowledge flow intensity. *Information & Management, 56*, 364-376. doi:10.1016/j.im.2018.07.010

Schäffer, E., Bartelt, M., Pownuk, T., Jan-PeterSchulz, J. P., Kuhlenkötter, B., & Franke, J. (2018). Configurators as a basis for the transfer of knowledge and standardized communication in the context of robotics. *Procedia CIRP, 72*, 310-315. doi:10.1016/j.procir.2018.03.190

Scherz, M., Zunk, B. M., Passer, A., & Kreiner, H. (2018). Visualizing interdependencies among sustainable criteria to support multicriteria decision-making processes in building design. *Procedia, CIRP, 69*, 200-205. doi:10.1016/j.procir.2017.11.115

Schmid, A., Löwer, M., Katzwinkel, T., Schmidt, W., Siebrecht, J., Feldhusen, J., . . . Rey, J. (2016). Life cycle of multi technology machine tools: Modularization and integral design. *Procedia CIRP, 50*, 719-726. doi:10.1016/j.procir.2016.05.017

Schmitt, G. Mladenow, A., Strauss, C., & Schaffhauser-Linzatti, M. (2019). Smart contracts and internet things: A qualitative content analysis using the technology-organization-environment framework to identify key-determinants. *Procedia Computer Science, 160*, 189-196. doi:10.1016/j.procs.2019.09.460

Schöpfel, J., Prost, H., & Rebouillat, V. (2017). Research data in current research information systems. *Procedia Computer Science, 106*, 305-320.

doi:10.1016/j.procs.2017.03.030

Schwade, F., & Schubert, P. (2016). The ERP challenge: An integrated e-learning platform for the teaching of practical ERP skills in universities. *Procedia Computer Science, 100*, 147-155. doi:10.1016/j.procs.2016.09.134

Sedova, K. (2017). A case study of a transition to dialogic teaching as a process of gradual change. *Teaching and Teacher Education, 67*, 278-290. doi:10.1016/j.tate.2017.06.018

Setiawan, R., Rasjid, Z. E., & Effendi, A. (2018). Design metric indicator to improve quality software development (Study case: Student desk portal). *Procedia Computer Science, 135*, 616-623. doi:10.1016/j.procs.2018.08.225

Shafqat, A., Welo, T., Oehmen, J., Willumsen, P., & Wied, M. (2019). Resilience in product design and development processes: A risk management viewpoint. *Procedia CIRP, 84*, 412-418. doi:10.1016/j.procir.2019.04.248

Shao, Z., Feng, Y., & Hu, Q. (2017). Impact of top management leadership styles on ERP assimilation and the role of organizational learning. *Information & Management, 54*, 902–919. doi:10.1016/j.im.2017.01.005

Sharma, P. K., & Misra, R. K. (2017). Core self evaluation scale: An empirical attestation among software professionals. *Procedia Computer Science, 122*, 79-85. doi:10.1016/j.procs.2017.11.344

Shaw, B. T. (2012). *Exploring the factors of an Enterprise Resource Planning system in a local government organization.* (Doctoral dissertation). Retrieved from ProQuest

Dissertations and Theses Global. (UMI No. 3510463)

Shen, L., Su, C., Zheng, X., & Zhuang, G. (2020). Between contracts and trust: Disentangling the safeguarding and coordinating effects over the relationship life cycle. *Industrial Marking Management, 84,* 183-193. doi:10.1016/j.indmarman.2019.06.006

Shi, H., Sun, L., Teng, T., & Hu, X. (2019). An online intelligence vehicle routing and scheduling approach for B2C e-commerce urban logistics distribution. *Procedia Computer Science, 159,* 2533-2542. doi:10.1016/j.procs.2019.09.428

Shida, T., & Tsuda, K. (2017). A study of software estimation factors extracted using covariance structure analysis. *Procedia Computer Science, 112,* 1378-1387. doi:10.1016/j.procs.2017.08.053

Siregar, J. J., Puspokusumo, R. A. A. W., & Rahayu, A. (2017). Analysis of affecting factors technology acceptance model in the application of knowledge management for small medium enterprises in industry creative. *Procedia Computer Science, 116,* 500-508. doi:10.1016/j.procs.2017.10.075

Sklyar, A., Kowalkowski, C., Tronvoll, B., & Sörhammar, D. (2019). Organizing for digital servitization: A service ecosystem perspective. *Journal of Business Research, 104,* 450-460. doi:10.1016/j.jbusres.2019.02.012

Slaman, M., & Haddara, M. (2019). How green can the lettuce be? A case study on greening initiatives in supply chains and sustainable ERP systems. *Procedia Computer Science, 164,* 79-85. doi:10.1016/j.procs.2019.12.157

Sönmez, F. Ö. (2019a). A conceptual model for a metric based framework for the monitoring of information security tasks' efficiency. *Procedia Computer Science, 160*, 181-188. doi:10.1016/j.procs.2019.09.459

Sönmez, F. Ö. (2019b). Security qualitative metrics for open web application security project compliance. *Procedia Computer Science, 151*, 998-1003. doi:10.1016/j.procs.2019.04.140

Sørheller, V. U., Høvika, E. J., Hustad, E., & Vassilakopoulou, P. (2018). Implementing cloud ERP solutions: A review of sociotechnical concerns. *Procedia Computer Science, 138*, 470-477. doi:10.1016/j.procs.2018.10.065

Stone, A. A., Walentynowicz, M., Schneider, S., Junghaenel, D. U., & Wen, C. K. (2019). MTurk participants have substantially lower evaluative subjective well-being that other survey participants. *Computers in Human Behavior, 94*, 1-8. doi:10.1016/j.chb.2018.12.042

Superkar, S. D., Graziano, D. J., Riddle, M. E., Nimbalkar, S. U., Das, S., Shehabi, A., & Cresko, J. (2019). A framework for quantifying energy and productivity benefits of smart manufacturing technologies. *Procedia CIRP, 80*, 699-704. doi:10.1016/j.procir.2019.01.095

Susanto, T. D., Diani, M. M., & Hafidz, I. (2017). User acceptance of e-government citizen report system (a case study of city113 app). *Procedia Computer Science, 124*, 560-568. doi:10.1016/j.procs.2017.12.190

Tams, S., Thatcher, J. B., & Craig, K. (2018). How and why trust matters in post-

adoptive usage: The mediating roles of internal and external self-efficacy. *The Journal of Strategic Information Systems, 27*, 170-190. doi:10.1016/j.jsis.2017.07.004

Tegeltija, M., Oehmen, J., & Kozin, I. (2017). Risk management challenges in large-scale energy PSS. *Procedia CIRP, 64*, 169-174. doi:10.1016/j.procir.2017.03.023

Thaker, S., & Nagori, V. (2018). Analysis of fuzzification process in fuzzy expert system. *Procedia Computer Science, 132*, 1308-1306. doi:10.1016/j.procs.2018.05.047

Tob-Ogu, A., Kumar, N., & Cullen, J. (2018). ICT adoption in road freight transport in Nigeria: A case study of the petroleum downstream sector. *Technological Forecasting and Social Change, 131*, 240-252. doi:10.1016/j.techfore.2017.09.021

Townsend, M., Le Quoc, T., Kapoor, G., Hu, H., Zhou, W., & Piramuthu, S. (2018). Real-time business data acquisition: How frequent is frequent enough? *Information & Management, 55*, 422-429. doi:10.1016/j.im.2017.10.002

Tran, V. T., Porcher, R., Tran, V. C., & Ravaud, P. (2017). Predicting data saturation in qualitative surveys with mathematical models from ecological research. *Journal of Clinical Epidemiology, 82*, 71-78. doi:10.1016/j.jclinepi.2016.10.001

Treber, S., Breig, R., Kentner, H., Häfner, B., & Lanza, G. (2019). Information exchange in global production networks: Increasing transparency by simulation, statistical experiments and selection of digitalization activities. *Procedia CIRP, 84*, 225-230. doi:10.1016/j.procir.2019.04.214

Tseng, M. L., Lim, M. K., & Wu, K. J. (2019). Improving the benefits on sustainable supply chain finance under uncertainty. *International Journal of Production Economics, 218*, 308-321. doi:10.1016/j.ijpe.2019.06.017

Turki, A., Michael, R., Yang, Y., Wade, J., Verma, D., & Torngren, M. (2019). A literature review on obsolescence management in COTS-centric cyber physical systems. *Procedia Computer Science*, 153, 135-145. doi:10.1016/j.procs.2019.05.064

Turner-Bowker, D. M., Lamoureux, R. E., Stokes, J., Litcher-Kelly, L., Galipeau, N., Yaworsky, J. S., . . . Shields, A. L. (2018). Informating a priori sample size estimation in qualitative concept elicitation interview studies for clinical outcome assessment instrument development. *Value in Health, 21*, 839-842. doi:10.1016/j.jval.2017.11.014

Upadhyay, N. (2016). SDMF: System decision-making framework for evaluation of software architecture. *Procedia Computer Science, 91*, 599-608. doi:10.1016/j.procs.2016.07.151

Van der Laan, A. Z., & Aurisicchio, M. (2019). Designing product-service systems to close resource loops: Circular design guidelines. *Procedia CIRP, 80*, 631-636. doi:10.1016/j.procir.2019.01.079

Varghese, B. E., Raimond, K., & Lovesum, J. (2019). A novel approach for automatic remodularization of software systems using extended ant colony optimization algorithm. *Information and Software Technology, 114*, 107-120.

doi:10.1016/j.infsof.2019.06.002

Velte, C. J., Wilfahrt, A., Müller, R., & Steinhilper, R. (2017). Complexity in a life cycle perspective. *Procedia CIRP, 61,* 104-109. doi:10.1016/j.procir.2016.11.253

Vilcu, A., Verzea, I., & Herghiligiu, I. V. (2018). New method to optimize the production functions in the system of safety in operation management. *Procedia – Social and Behavioral Sciences, 238,* 424-431. doi:10.1016/j.sbspro.2018.04.020

Vityaev, E. E., & Demin, A. V. (2018). Cognitive architecture based on the functional systems theory. *Procedia Computer Science, 145,* 623-628. doi:10.1016/j.procs.2018.11.072

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

Von Bertalanffy, L. (2008). An outline of general system theory. *Emergence: Complexity & Organization, 10,* 103-123. doi:10.1093/bjps/I.2.134

Wahab, S., Rahmat, A., Yusof, M. S., & Mohamed, B. (2016). Organization performance and leadership style: Issues in education services. *Procedia – Social and Behavioral Sciences, 224,* 593-598. doi:10.1016/j.sbspro.2016.05.447

Wang, P., Zang, J., Zhai, H., & Qiu, J. (2017). A new structural reliability index based on uncertainty theory. *Chinese Journal of Aeronautics, 30,* 1451-1458. doi:10.1016/j.cja.2017.04.008

Wendelken, K. (2014). Navy ERP: The journey continues. Naval Supply Systems Command. Retrieved from https://www.slideshare.net/KurtWendelken/2013-

navy-erp-sea-air-space-exposition-presentation.

Whyte, W. F. (1997). *Creative problem solving*. Walnut Creek, CA: Alta Mira.

Williams, J. K., & Anderson, C. M. (2018). Omics research ethics considerations. *Nursing Outlook, 66,* 386-393. doi:10.1016/j.outlook.2018.05.003

Williams, M., Nurse, J. R. C., & Creese, S. (2019). Smartwatch games: Encouraging privacy-protective behavior in a longitudinal study. *Computers in Human Behavior,* 99, 38-54. doi:10.1016/j.chb.2019.04.026

Witkowski, K. (2017). Internet of things, big data, industry 4.0: Innovative solutions in logistics and supply chains management. *Procedia Engineering, 182,* 763-769. doi:10.1016/j.proeng.2017.03.197

Xiao J., Wu, Y., Xie, K., & Hu. Q. (2019). Managing the e-commerce disruption with IT-based innovations: Insights from strategic renewal perspectives. *Information & Management, 56,* 122-139. doi:10.1016/j.im.2018.07.006

Xiao, Z., Xiaoping, W., Peizhe, L, Zhigang, L., Hongyue, Y., Zhor, Z., . . . Zhang, L. (2019). Power communication network design considering global information fusion part two applications and explorations. *Procedia Computer Science, 155,* 768-773. doi:10.1016/j.procs.2019.08.112

Xue, H., & Desment, P. M. A. (2019). Researcher introspection for experience-driven design research. *Design Studies, 63*, 37-64. doi:10.1016/j.destud.2019.03.001

Yang, H. (2016). Project Team Right-sizing for the Successful ERP Implementation. *Procedia Computer Science*, *91*(Suppl. C), 672–676.

doi:10.1016/j.procs.2016.07.168

Ÿelik, H., & Topkaya, E. Z. (2016). Evaluation of the methodology of an ESP reading skills course for undergraduate medical students: Outsider perspective. *Procedia – Social and Behavioral Sciences, 232,* 326-331. doi:10.1016/j.sbspro.2016.10.030

Yeole, A., Kalbande, D. R., & Sharma, A. (2019). Security of 6LoWPAN IoT networks in hospitals for medical data exchange. *Procedia Computer Science, 152*, 212-221. doi:10.1016/j.procs.2019.05.045

Yin, R. K. (2011). *Qualitative research from start to finish*. New York, NY: The Guilford.

Yin, R. K. (2013). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Zehir, C., Cinar, F., & Sengül, H. (2016). Role of stakeholder participation between transparency and qualitative and quantitative performance relations: An application at hospital management. *Procedia – Social and Behavioral Sciences, 229*, 234-245. doi:10.1016/j.sbspro.2016.07.134

Zeng, Z., Kang, R., Wen, M., & Zio, E. (2018). Uncertainty theory as a basis for belief reliability. *Information Sciences, 429,* 26-36. doi:10.1016/j.ins.2017.10.050

Zhang, Y., Zhan, W., Xu, Y., & Kumar, V. (2020). International friendship cities, regional government leaders, and outward foreign direct investment form China. *Journal of Business Research, 108,* 105-118. doi:10.1016/j.jbusres.2019.09.056

Appendix A: Interview Protocol

Before conducting an interview, the researcher shall:

1. Secure permission from the commanding officer of the government agency to carry out the interview
2. Forward the informed consent forms via email or United States Postal Service to each participant
3. Schedule a conference room for 2 hours for each 1-hour interview
4. Dress professional and maintain a professional appearance (shave/haircut)
5. Verify recording device is operational
6. Gather notebooks and pens for each participant
7. Arrive early to set up tables and chairs as required in conference room
8. Bring snacks and beverages

During the interview process

1. Retrieve the signed informed consent form from the participant, annotate with code P001 through P012
2. Utilize the interview question (see Appendix D)
3. Be an active listener
4. Be patient
5. Do not provide input or make recommendations on how to answer a question
6. Be aware of body language and facial expressions
7. Take breaks as necessary

Upon completion of the interview

1. Thank the respondent for their time and participation
2. Return the conference room to its original condition, remove all equipment used during the interview process
3. Inform conference room coordinator at the government agency that the interviews are complete
4. Transcribe the recorded interview, print out copy for the participant's review
5. Remove personally identifiable information from transcribed data
6. Lock transcribed interview and informed consent form in wall safe at residence

Update NVivo® 11 for analysis

Appendix B: Observation Protocol

Before conducting an observation, the researcher shall:

1. Secure permission from the commanding officer of the government agency to carry out the observation
2. Forward the informed consent forms via email or United States Postal Service to each participant
3. Dress professional and maintain a professional appearance (shave/haircut)
4. Verify recording device is operational
5. Bring snacks and beverages

During the observation process

1. Retrieve the signed informed consent form from the participant, annotate with code P013 through P022
2. Be an active listener
3. Be patient
4. Be aware of body language and facial expressions
5. Take breaks as necessary

Upon completion of the observation

1. Thank the respondent for their time and participation
2. Transcribe the observation data, print out copy for the participant's review
3. Remove personally identifiable information from transcribed data
4. Lock transcribed interview and informed consent form in wall safe at residence

Update NVivo® 11 for analysis

Appendix C: Interview Question Checklist

Date / Time:
Location:
Interviewer:
Participant Code

Greetings and Introductions

There are a few items we need to discuss before we start the interview.

1. Does your supervisor support you participating in this interview? Yes / No
2. Before this interview, an informed consent form was emailed to you. You have signed and returned this form to me. Do you agree that your participation in this interview is interpreted as your consent? Yes / No
3. Your privacy is guaranteed in this interview. A random participant code is assigned to your information. A mapping of your participant ID and the name is locked in a secure container at my residence. Your name will not appear in any published work. Do you have any questions or concerns as they relate to your privacy? Yes / No
4. The interview will last approximately 45 minutes. Can you be interrupt free during that period? Yes / No
5. Do I have your permission to record this interview? A transcript of this interview is provided for your review within three business days. Yes / No
6. You are free to pass on any question, and you are free to terminate the interview at any time and withdraw from the study. Do you have any questions concerning the interview process? Yes / No
7. Do you have any questions before we begin? Yes / No

Interview Questions

1. What planning practices did you undertake before the actual implementation?

(Researcher Notes)

2. What obstacles did you or your team identify during post ERP implementation?

(Researcher Notes)

3. How did your professional workload differ during post ERP implementation?

(Researcher Notes)

4. How were you satisfied with the ERP system after implementation?

(Researcher Notes)

5. How much training did you receive before ERP implementation?

(Researcher Notes)

6. How have production, efficiency, and value changed post ERP implementation?

(Researcher Notes)

7. How have post ERP implementation changes affected inter-departmental information sharing?
   (Researcher Notes)
8. How is ERP implementation beneficial to your government agency?
   (Researcher Notes)
9. Do you have anything you would like to add that may help explain what key factors are associated with successful ERP system implementation in a government agency?
   (Researcher Notes)

After the Interview

1. Thank you for your participation
2. A copy of the transcript is forwarded for your review and approval. Please complete your examination and return the transcript within 24 hours. If this timeline is not acceptable, we will negotiate a mutually agreed timeline.

Appendix D: Observation Checklist

Date / Time:
Location:
Observer:
Participant Code

Greetings and Introductions
There are a few items we need to discuss before we start the observation.

1. Does your supervisor support you participating in this observation? Yes / No
2. Before this observation, an informed consent form was emailed to you. You have signed and returned this form to me. Do you agree that your participation in this observation is interpreted as your consent? Yes / No
3. Your privacy is guaranteed in this interview. A random participant code is assigned to your information. A mapping of your participant ID and the name is locked in a secure container at my residence. Your name will not appear in any published work. Do you have any questions or concerns as they relate to your privacy? Yes / No
4. The observation will last approximately 45 minutes. Can you be interrupt free during that period? Yes / No
5. Do I have your permission to record this observation? A transcript of this observation is provided for your review within three business days. Yes / No
6. You are free to terminate the observation at any time and withdraw from the study. Do you have any questions concerning the observation process? Yes / No
7. Do you have any questions before we begin? Yes / No

Observations

1. Observe the time management processes.
   (Researcher Notes)
2. Observe the inventory management processes.
   (Researcher Notes)
3. Observe the procurement processes.
   (Researcher Notes)
4. Observe the information technology and end-user maintenance processes.
   (Researcher Notes)
5. Do you have anything you would like to add that may help explain what key factors are associated with successful ERP system implementation in a government agency?
   (Researcher Notes)

After the observation

1. Thank you for your participation
2. A copy of the transcript is forwarded for your review and approval. Please complete your examination and return the transcript within 24 hours. If this timeline is not acceptable, we will negotiate a mutually agreed timeline.