2020

Strategies Managers Use to Improve Software Project Success and Profitability

Sylvester Nnabugo Otiji
Walden University

Walden University

College of Management and Technology

This is to certify that the doctoral study by

Sylvester N. Otiji

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. Gregory Uche, Committee Chairperson, Doctor of Business Administration Faculty

Dr. Michael Campo, Committee Member, Doctor of Business Administration Faculty

Dr. Kenneth Gossett, University Reviewer, Doctor of Business Administration Faculty

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

Walden University
2020

Abstract

Strategies Managers Use to Improve Software Project Success and Profitability

by

Sylvester N. Otiji

MGA-MIS, University of Maryland University College, 1995

MURP, San Jose State University, 1987

BA, University of Minnesota, 1984

BA, University of Minnesota, 1982

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

October 2020

Abstract

Business leaders of global software companies invest a significant amount of human capital, time, and funds for software innovation and development projects. However, between 1994 and 2016, the majority of global software projects failed. Some business leaders in software firms operate below a profitable level because they lack strategies to improve software project performance. Grounded in the contingency theory, the purpose of this qualitative multiple case study was to explore strategies managers in software firms use to improve software project success rate and profitability. The participants were 6 software managers from 2 software firms in the District of Columbia, Maryland, and Northern Virginia, who effectively used strategies to improve software projects' success rate and profitability. Data sources included company documents, field notes, observations, and semistructured interviews. The thematic analysis process was used to analyze the data. Four themes emerged: stakeholder requirement; testing, evaluation, and training; communication; and project management process. The key recommendation to software project managers is to implement frequent testing and evaluation of software projects and provide employees with adequate training to perform their jobs efficiently. In addition, project managers should meet stakeholders' requirements to improve their success rate and profitability. The implications for positive social change include the potential for managers in software firms to create job opportunities, provide social amenities and welfare, and promote regional communities' economic development.

Strategies Managers Use to Improve Software Project Success and Profitability

by

Sylvester N. Otiji

MGA-MIS, University of Maryland University College, 1995

MURP, San Jose State University, 1987

BA, University of Minnesota, 1984

BA, University of Minnesota, 1982

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

October 2020

Dedication

I dedicate this dissertation to my wife and best friend, Karen. We have been married for 40 years, and she has tirelessly supported my wish to attain as much education as I desire. I also dedicate this dissertation to my children, Dr. Adaora Otiji-Spizler, Azuka, and Amaobi, who have become adults that I much admire and respect.

I extend sincere thanks and love to my brothers, Dr. Moses Otiji and Barrister Joseph Otiji. I love you and your families unconditionally.

I remember my parents, Royal Highnesses Patrick Aniachunam Otiji and Mercy Nwanota Adinde Otiji, who were my ardent supporters and role models. I will forever cherish and be indebted to you for the love, support, and sacrifices you made. I also dedicate this study to my grandchild, Azai Adinde Otiji-Spizler, and Zack Otiji-Spizler, my son-in-law.

Acknowledgments

I want to thank God for giving me the foresight, courage, and strength to complete this doctoral study. I want to offer a special thanks to Karen Leah Otiji, Dr. Adaora Otiji, Azuka Otiji, Amaobi Otiji, Azai Adinde Otiji-Spizler, Dr. Moses Otiji, Joseph Otiji, Esq., Zack Spizler-Otiji, Laura Cox-Otiji, and numerous family members and friends for their continued support and sacrifice during my DBA journey. I extend special gratitude to my research committee chair, Dr. Gregory Uche, second committee member, Dr. Michael Campo, URR, Dr. Ken Gossett, and the program director, Dr. Susan Davis, for your incredible patience, ability to lead, and nudges to get me through this program. Thanks to my friends for helping me get to the finish line. I want to thank all participants for the critical role they played in completing this study program. Special thanks to my coworkers and my present and past students for their encouragement and prayers.

Table of Contents

List of Tables

Section 1: Foundation of the Study

Leaders in the software industry lack strategies to improve the innovation process and quality of software and to reduce associated risks. From 1994 to 2016, 60% of global software development projects failed, resulting in organizations operating below profitable levels (Shahzad, Awan, Lali, & Aslam, 2017). Annually, the software industry spends over $250 billion on software development projects, and most of them predictably fail within 5 years (Office of Management and Budget, 2019; Shahzad et al., 2017). The U.S. government spends $81 billion annually on software and information technology (IT) development projects (Office of Management and Budget, 2019). According to the Office of Management and Budget, about 80% and 71% of software project expenditures in the United States are on schedule and budget, respectively. However, of all software and IT development projects initiated worldwide in 2016, only 16.2% were on time (El Yamami, Ahriz, Mansouri, Qbadou, & Illousamen, 2017). Thus, the impact of poor-quality software and project failure remains a persistent problem for firm managers and leaders in the industry (El Yamami et al., 2017; Maassen, 2018). The purpose of this study was to explore strategies software managers use to improve project success and profitability.

Background of the Problem

Business leaders of software companies invest a significant amount of human capital, time, and funds for software innovation and effective quality management strategies (Bugnar, Mester, & Fora, 2016; Shahzad et al., 2017). Software firm leaders encounter global competition from traditional and nontraditional software sectors, such as

software products developed through an open-source process, which threatens to disrupt established product markets (Bolemen, Amrit, Kuhlmann, & Ordonez-Matamoros, 2014; Schrape, 2017). The U.S. government spent $81 billion on software and IT development projects in 2016, and only 80% and 71% were on schedule and budget, respectively (Office of Management and Budget, 2019). Of all software and IT projects worldwide in 2016, about 16% met scheduled time (Shahzad et al., 2017). The continuing development of software capabilities could improve organizational proficiencies while also creating better employee job opportunities and a competitive market advantage (Ebert, 2014). Leaders of software organizations should understand that having a myriad of efficient strategies could positively impact profitability and add value to their business (Malaquias, & Albertin, 2018; Shahzad et al., 2017). Research indicates that having a skilled workforce, practical strategies, and quality software could generate higher profits and market share and increase organization and employee longevity (Dawson, 2015; Ebert, 2014). The review of software innovation process strategies may reveal whether an increase in software complexity could influence implementation failure (Shahzad et al., 2017). Business leaders should understand the strategies for improving their firm's software project success and profitability.

Problem Statement

From 1994 to 2016, 60% of software projects failed globally (El Yamami et al., 2017; Shahzad et al., 2017). The U.S. Commerce Department in 2016 submitted a report to the White House calling for a drastic reduction of defects estimated at 25 errors per 1,000 lines of code in the U.S. government-contracted, proprietary, and open-source

software (Black, Badger, Guttman, & Fong, 2016). Consequently, some software business leaders operate below a profitable level, due to a lack of strategies to improve software quality and reduce operational costs (Jindal, Malhotra, & Jain, 2016; Shahzad et al., 2017; Yubin, Xiang, Yingquan, & Xiaolin, 2018). The general business problem was that software projects typically fail due to leaders' lack of skills and knowledge to lead their projects effectively. The specific business problem was that some software leaders lack effective strategies for improving the success rate of software projects to improve profitability.

Purpose Statement

The purpose of this qualitative multiple case study was to explore strategies software managers use to improve the success rates and profitability of their projects. The targeted population consisted of six software managers from the District of Columbia, Maryland, and Northern Virginia who have successfully implemented strategies to improve software projects resulting in increased profitability. This study could contribute to positive social change by providing software project managers with a better understanding of software innovation project strategies that could promote business growth and increased profitability, thereby improving local economies through job creation.

Nature of the Study

Researchers may use any of the three research methods--qualitative, quantitative, and mixed methods—in their studies (Gill et al., 2010; Gill, 2014; Johnson, 2015; Yin, 2018). According to Yin (2018), researchers typically select research methodologies

based on their research questions. I selected the qualitative approach to answer my research question by conducting an in-depth exploration of the phenomena under study. The quantitative method involves the application of deductive testing, empirical measurement, and statistical analysis of preformulated hypotheses of the relationships that may exist among identified variables (Dahl, Lariviere, & Coriere, 2017). The quantitative approach form of investigation is highly structured and suitable for a study with a large amount of data (Saunders, Lewis, & Thornhill, 2015; Tjaden et al., 2019). The use of a quantitative research method for this study was inappropriate because I did not intend to explore the relationship among variables or gather a large amount of data.

The mixed-methods approach combines qualitative and quantitative methods in a single research study (Venkatesh, Brown, & Sullivan, 2016; Venkatesh, Brown, & Bala, 2013). Mixed methods would not have been appropriate for this study because the purpose of the study was exploratory, which was achievable using the qualitative method. The use of qualitative methods to identify and explore areas in an investigation (Dahl et al., 2017) was consistent with the nature of this study. By using qualitative methods, I was able to perform an in-depth exploration of the participants' experiences. Researchers have used the qualitative method to understand different study phenomena through the use of rich data and thick descriptions (Deasy, 2018; Gustafsson, 2017; Manojlovich et al., 2015). The qualitative approach was the most appropriate research method for this study, because it enabled me to gain a better understanding of the complexities involved in the improvement of software projects and profitability.

I reviewed the following potential designs for qualitative analysis: (a) phenomenology, (b) ethnography, (c) grounded theory, (d) narrative research design, and (e) case studies (Dahl et al., 2017; Moustakas, 1994; Goldschmidt et al., 2017; Yin, 2018). According to Moustakas (1994), a researcher needs to have an in-depth understanding of the phenomenon before collecting data about the incident. Phenomenological research designs require exploration of human experience, behavior, and relationships. Qualitative researchers use a multiple case study design to explore participants' experiences (Shahzad et al., 2017; Yin, 2018). The multiple case study design was most appropriate for this study because I explored strategies managers use to improve software projects success and profitability.

Research Question

What strategies do managers use to improve the success rate of software projects and profitability?

Interview Questions

Participants answered the following questions:

1. What strategies do you use to improve the quality of software projects in your company?
2. How effective were the strategies in improving software projects?
3. What challenges did you encounter in implementing the strategies?
4. How did the strategies you used to improve software projects result in increased profitability in your company?
5. How effective were the strategies in improving profitability?

6. What are the critical metrics you use to measure software project success rates in your company?
7. What software project auditing practices do you use to measure improvement in the software project and profitability?
8. What other information can you provide on strategies managers could use to improve software projects and increase profitability.

Conceptual Framework

The contingency theory constituted the lens for viewing this study. Fiedler developed the contingency theory in 1967. The contingency theory 's central premise is that a leader's success depends on leadership style and situation, and extends to a service context (Williams, Ashill, & Naumann, 2017). Using contingency theory, Tereso et al. (2019) examined the extent to which key project management improvement initiatives and embedding factors are dependent on organizational context, namely, the sector of activity, organization size, geographic area, and project type. Fiedler's aim in advancing the contingency theory was to help guide professionals in making project improvement decisions.

IT firms use contingency theory to examine initiatives, such as corporate standardization and tailoring of project management process tools and techniques (Tereso et al., 2019). The leader’s effectiveness may impact subordinates’ behavior and job performance (Fiedler & Mahar, 1979; Rose & Furneaux, 2016). The effectiveness of a project group depends on the leader’s personality and the leader’s ability to control or influence employees and the situation (Bons & Fiedler, 1976; Fiedler & Mahar, 1979).

The leader's effectiveness in a project depends on whether task fulfilment or interpersonal relations motivate the leader, and the extent to which the situation provides the leader with control and a sense of security to accomplish the project. Fielder and Mahar (1979) explained that different project situations require different types of leaders. Other types of leadership styles are directing, which is useful when one is working with a freelancer or contractors, and coaching leadership style, which is when leaders are directing their team to achieve their vision. Researchers have used contingency theory to evaluate leadership style, situations, and project improvements (Williams, Ashill, & Naumann, 2017). The contingency theory was, thus, appropriate for exploring the strategies managers use to improve software project success and profitability.

Definition of Terms

The following terms are used in this study:

Consumer evaluation: Consumer evaluation is an attempt to evaluate digital product innovation to determine the difference between old and new products (Zhang & Lee, 2016).

Contingency theory: Contingency theory is an organizational theory that claims that there is no best way to arrange or organize the management of a corporation. The ultimate way to lead an organization is contingent on the internal and external event. (Northouse, 2016).

Innovation diffusion: Innovation diffusion is the architecture of the market perception of an innovative product, and the end user of such a product is known as an adopter (Bolemen et al., 2014).

International Organization for Standardization (ISO): ISO standards set out quality management system criteria and provide guidelines and tools for organizations and companies to ensure that their products and services meet consumer expectations (Almutairi & Weheba, 2018).

Open-system software (OSS): OSS is computer software whose source code is made available to all. Users have the right to study, change, and distribute it without restriction, as well as access to develop it in a collaborative manner (Dhir & Dhir, 2017).

Software development life cycle (SDLC): SDLC is a planning model that enables standardization for planning and organizing and facilitates cost estimation (Kramer, Sahinoglu, & Ang, 2015).

Software quality: Software quality is a multidimensional property of the software product (Bubevski, 2013).

Total quality management (TQM): TQM is a management philosophy that aims to improve the speed and quality of processes and productivity within organizations (Hummour, Athamneh, & Al-balas, 2018).

User absorptive capacity: User absorptive capability is the ability of an individual to understand new skills and perform a specific task (Kim & Cameron, 2016; Zhang, 2017).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions are facts that are considered to be accurate, but which individuals cannot validate (Niven & Boorman, 2016). In this study, I made six assumptions about

the participants and their expected responses to the interview questions. The first assumption was that the participants would respond truthfully and honestly to all the interview questions. The second assumption was that participants would have a good knowledge and understanding of managing software projects and overcoming challenges. Managers and leaders in the software industry face challenges of poor-quality software and project failure (El Yamami et al., 2017; Maassen, 2018). Thus, I assumed that participants would be able to speak to these issues, even if they did not possess knowledge of other areas. Business leaders may not anticipate the costs required, for instance, for employees to gain new and necessary skills (Zhang, 2017). The third assumption was that the interview questions were appropriate to address issues arising in this study.

The fourth assumption was that the data collection mechanism of this study was adequate and proper for collecting pertinent data suitable for the study. The fifth assumption was that participants would be representative of the population under study and proffer strategies for improving software projects and profitability. Lastly, although Hahm (2017) asserted that software permeation into businesses affects individual perceptions, I assumed that the ubiquitous nature of software permeation into businesses would not change the participants' perceptions and responses during the interview process.

Limitations

Limitations refer to potential weaknesses in the research that the researcher cannot address or resolve (Yin, 2018). There were three limitations to this study. The first

limitation was inherent bias on my part that may have affected the study outcome, as the research was a qualitative study. The second limitation of this study was the use of online video or phone interviews to collect data from six participants from different firms and cultures. The use of video or phone interviews does not allow the participants to relax, show emotion, or behave naturally. The use of online video or telephone format for participant interviews lacks a personal connection provided by an in-person meeting. Therefore, online video or telephone interview format is a limitation for this study. Researchers find it difficult to draw broad inferences because of individuals' differences and changes in organizational cultures (Hartwell et al., 2016; Saunders et al., 2015; Vanova, Paulová, Rusko, & Hekelová, 2017). The final limitation was that software firm project leaders, because of their role, lack knowledge of measurable strategies to fix the problem of imperfect software project processes to minimize failure. Still, in sharing their strategies, participants offered insight on ways to improve software projects and profitability.

Delimitations

Delimitations are characteristics that limit the scope of a study or define its boundaries (Alpi & Evans, 2019). The first delimitation was the selection of study participants from different organizations, values, and cultures in the Washington, DC, metropolitan area. The research location defined the geographic boundary and constituted a delimitation of this study. The second delimitation of the study was that only software project leaders of software development firms participated in this study, as opposed to other types of project managers. The purposeful selection of participants defined the

research boundary and constituted a delimitation of this study. If other types of project managers were included in the study, there would have been variations in strategies presented by participants, as each project type present its unique challenges. Thus, the use of purposeful selection methods for participants narrowed the study findings to only managers with specific experiences.

Significance of the Study

This qualitative exploratory multiple case study might contribute to business practices by providing insight on strategies managers can use to improve software projects and profitability. The critical issues for leaders are the improvement of software projects and the maximization of profitability (Hammer, 1990; Khan & Malik, 2017). To be effective, software project managers should understand the critical success factors for improving software project profitability (Chen, Ahunbay, & Li, 2016; Rose & Furneaux, 2016; Scala, Micalizio, & Torasso, 2015). This study could reveal the best strategies and practices that business leaders can use to improve software projects and profitability.

Contribution to Business Practice

The results of this study could help software project managers improve their project success rates and profitability. Chen et al. (2016) advised managers to identify strategies to improve their firms' profitability. This study's findings might contribute to better business practices by identifying software process improvements and quality management strategies that improve an organization's profitability. Managers and business leaders should identify appropriate recruitment, training, compensation, and motivational strategies for their industry (Rose & Furneaux, 2016). Software project

managers could also learn from this study's findings the most appropriate recruitment, training, compensation, and motivational strategies for their industry.

The study results might also help software project managers perform a comparative cost analysis to determine whether to develop software in-house or externally. The outcome of this research study might be significant for business practices by providing business leaders with contingency theory tools to manage projects, enhance product innovation, and improve quality in the software industry. The results of this study might provide software firm leaders with new strategies for innovating software projects and instituting positive organizational changes to improve software quality and reduce the failure rate. Business leaders should enhance their competency and capability to promote creativity and innovation within the organization (Hammer, 1990; Scala et al., 2015).

Based on the outcomes of this qualitative multiple case study, software leaders could enhance their skills and expertise in the software project innovation and development process. With enhanced knowledge, managers could (a) establish a clear sense of direction, (b) open communication channels between management and employees, (c) create a collective sense of purpose, and (d) encourage employees to acquire new knowledge (Scala et al., 2015). The results of this study could help software leaders to establish a clear sense of direction and encourage knowledge sharing among employees. By publishing the results of this study, software business leaders could learn strategies for enhancing software project development, improve software project quality, and improve firm profitability.

Implications for Social Change

The results of the study might contribute to social change by adding knowledge about overall software project improvements, quality, and profitability. Business leaders should employ strategies for improving the skills, knowledge, and experience of employees (Garcia & Coltre, 2017; Stephan, Patterson, Kelly, & Mair, 2016). The study might help software business leaders to develop strategies for enhancing knowledge sharing among software employees. Finally, business leaders might gain a better understanding of ways to improve software employees' development knowledge.

By studying the research outcomes, software project managers might influence the cost of software development projects. Software project managers could enhance the project development cost through the improvement of organizational operations, efficiency, and profitability, which may increase the software firms' competitive advantage (Dolata, 2019; Khan & Malik, 2017). Researchers have demonstrated that business growth and profitability help to strengthen local economies, create jobs, and sustain small businesses (Stephan et al., 2016). Software business growth and profitability could contribute to social change by strengthening local economies, sustaining small businesses, and creating job opportunities, thereby improving the welfare and amenities for local communities.

A Review of the Professional and Academic Literature

The purpose of this qualitative multiple case study was to explore the strategies managers use to improve software projects and profitability in the District of Columbia, Virginia, and Maryland. The overarching research question for this study was, What

strategies do managers use to improve the success rate of software projects and profitability? In conducting the literature search, I reviewed various software project development models and strategies that might help to improve software projects and profitability among software firms. I used Walden University Library databases, including Academic Search Complete, ERIC, EBSCOhost, ProQuest Central database, Lexus Nexus, and Google Scholar, to obtain sources. Sources includes recent periodicals from various university libraries, journal articles, and different Internet sites. I conducted electronic searches with the following keywords: *leadership roles in software project implementation*, *software development life cycle*, *software development and outsourcing*, *International Organization for Standardization (ISO) regulations*, *Institute of Electrical and Electronics Engineers (IEEE) regulations*, *software failure and risk management*, *software risk assurance*, and *open-source software and competitive advantage.* Table 1 includes an overview of the literature review sources used in the study.

Table 1

Summary of Literature Review Sources

Reference type	> 5 years	< 5 years	Total
Peer-reviewed journals and articles	20	135	155
Dissertations		0	0
Non-peer-reviewed journals			
Books	5		5
Government or corporate sites		3	3
Total		138	163

The literature review yielded resources which consist of 155 journal articles, relevant government reports, published industry journals, rules and regulations, seminal articles, and books. The reviewed referenced work includes 133 (87.10%) peer-reviewed articles published within the 5-year window and three government standard rules and regulations published within five years to the anticipated graduation date along with two books. To add to the rigor of a study, researchers use the literature review to provide detailed planning of the research investigation (Gnyawali & Song, 2016). I reviewed extant and current literature to identify, describe, and analyze steps firm leaders employ to improve employees' skills that could help enhance software project success rate and profitability. This literature review contains analysis and discussion of elements related to the research question. The topics covered in this literature review include (a) contingency theory, (b) the alternative conceptual framework, (c) software project improvement, (d) software quality assurance, and (e) software risk management.

Contingency Theory

The most appropriate conceptual framework for supporting the premise of this study was Fred Fiedler's contingency theory, which the researcher developed in 1967. Thus, Mohammadi (2017) posited that the business world continues to undergo rapid changes making it impractical for businesses to adapt without the help of software. Therefore, business leaders should align their organizational processes with the associated IT application and information systems. The contingency theory emphasizes that leadership styles share similar characteristics in a broad sense; therefore, none of the leadership styles could claim to be superior to others (Fiedler & Mahar, 1979). The contingency theory was thus an ideal approach for exploring the strategies managers use to improve the success rate of software projects and profitability.

Fiedler and Mahar (1979) explained that a leader's effectiveness is contingent on the applicable situation or environment. Fiedler (1967) argued that the best leadership model is the contingency theory, a style that is flexible enough to allow for adjustment to fit any organizational situation. Researchers have proposed the use of the contingency theory and the least preferred coworker (LPC) scale to determine the suitability of a manager to perform a leadership role within an environment (Fiedler & Mahar,1979; Northouse, 2016). Fielder's research was on forecasting the effectiveness of leaders by measuring the LPC of an individual.

The LPC, as measured in the case of a manager, is a selection of previous and present employees with whom the manager works well (Fiedler & Mahar, 1979). The LPC is a rating of employees using a set of bipolar adjective scales (Fiedler & Mahar,

1979). When applying the LPC scale, a leader who strictly rates the subordinate least favorable would score the least on the LPC scale. In contrast, a leader who leniently scores the subordinate more favorable would score higher on the LPC scale (Fiedler & Mahar,1979). Between 1964 and 1967, LPC scoring factors evolved to include essential determining factors. The first essential factor is motivation. Fiedler (1967) explained that the higher the LPC a leader possesses, the more motivated the leader would likely be to achieve a targeted goal. The second essential factor assumes that the higher a leader's LPC, the closer the relationship the leader would tend to establish with the employees (Fiedler & Mahar,1979). Fiedler and Mahar (1979) stated that leaders with high LPC are more likely to be supportive, empathetic, and eager to have an improved relationship with others. Researchers have argued that a leader who scores low on the LPC scale is likely to value the success and completion of tasks more than a leader who scores high on the LPC scale (Fiedler & Mahar,1979).

Furthermore, Zhang (2017) contended that contingency theory reflects contextualizing system utilization, focusing on the nature of the system, and identifying contingency factors. The contingency factors include the task, system, user, and leadership of the firm (Zhang, 2017). The fundamental premise of the contingency theory is its best-fit scenario aspect, which is that a leader could control factors such as an employee’s performance and software testing technology, and to a certain extent, the culture within the organization, to help achieve the desirable outcome (Kim & Cameron, 2016; Tosi & Slocum, 1984).

Fiedler (1967) stated that leadership style is a result of the leader's accumulated experiences over his or her lifespan. The effectiveness of a task group depends on two main factors: the personality of the leader and the extent to which the situation gives the leader power, control, and influence over the subordinates and the situation (Bons & Fiedler, 1976; Fiedler, & Mahar, 1979). The leader's effectiveness may impact the behavior and job performance of the subordinates (Fiedler & Mahar, 1979). Software project managers could use the contingency theory constructs to improve the success rate of software projects and profitability of their projects.

The fundamental construct underlying the contingency theory include intrinsic and extrinsic factors that impact the organization's employees. The intrinsic factors that influence job satisfaction (dissatisfaction) are (a) vision of need, (b) effective plan, (c) previous success, (d) education of stakeholders, (e) expert knowledge, (f) user support, (g) leadership style, (h) emotional intelligence, (i) investment in knowledge, and (j) motivation (Jacob & Jenkins, 2014; Rose & Furneaux, 2016). Similarly, the extrinsic factors that support job satisfaction include (a) a sense of satisfaction derived from accomplishing a job, (b) an employee's sense of personal achievement, (c) the level of incentive remuneration allotted to employees, (d) the level of empathy displayed for employees and their families, (e) provision of true and honest feedback to employees, (f) inclusion of employees in the firm's cultural and social events, (g) provision of mentorship to employees, (h) employees' opportunities to experience other firm functions (job rotation), (i) flexible work opportunities for employees, and (j) shared leadership to

create a sense of ownership and belonging for employees (Jacob & Jenkins, 2014; Rose & Furneaux, 2016).

Intrinsic factors. In contingency theory, the ability to lead depends upon various situational factors. According to the proponents of contingency theory, there is no best form of administering and organizing a firm for decision-making (Bons, & Fiedler, 1976; Fiedler, & Mahar, 1979). The underlying assumption in contingency theory is that organizational decisions are equally contingent on the internal and external situations surrounding the firm at any time. Locke and Schattke (2018) argued that the terms intrinsic and extrinsic factors are not appropriate to infer to humans as an attribute. The term *intrinsic* means a factor inside an entity, while the definition of an *extrinsic* factor is outside an object (Locke & Schattke, 2018). According to Yan and Nair (2016), when adopting the contingency theory, researchers can explore whether the external context moderates internal structure and the effect on project outcomes. Managers could use aspects of the contingency theory approach for improving the success rate of software projects and profitability.

The contingency theory, as applicable to software project improvement, suggests the deliberate and iterative application of 10 characteristics. Some of the characteristics are the vision of a need, development and deployment of an effective plan, an organization's previous success, education of stakeholders concerning the needs for the project, and acquisition of expert knowledge and technical details at all levels. Other features include (a) user support, organizational policy, administration, interpersonal communications, and relationships; (b) leadership style; (c) emotional intelligence; (d)

investment in knowledge; and (e) motivation (Jacob & Jenkins, 2014; Rose & Furneaux, 2016). Managers could apply the 10 characteristics of contingency theory to improve the success rate of software projects and profitability.

For software innovation, a leader should have the foresight to envision an outcome. Upgrading an existing system is a complicated endeavor because of the need to verify and certify every aspect of the process, including legal issues, stakeholder support, available skill sets, and the current market (Jacob & Jenkins, 2014; Rose & Furneaux, 2016). Because the field of software development has become fluid, leaders in the software industry should consider how to become proactive in developing and implementing effective plans to stay above disruptive forces (Jacob & Jenkins, 2014; Rose & Furneaux, 2016). Managers could use the contingency theory approach to develop and implement effective plans to improve software project success rate and profitability.

Aruna (2016) demonstrated a positive correlation between project management, planning, and performance. Aruna argued that customers have become increasingly knowledgeable by applying the concept known as consumer valuation. Therefore, business leaders should build on their previous organizational successes rather than introducing an unproven concept. software quality involves understanding and fulfilling the customers' desired requirements (Aruna, 2016; Rose & Furneaux, 2016). A crucial salient factor for a successful leader is managing the firm's dependence on and support of stakeholders (Jacob & Jenkins, 2014). The acquisition of expert knowledge and technical details at all levels is crucial for leaders to develop appropriate strategies for practical

innovation (Koskinen & Krogh, 2015; Rose & Furneaux, 2016). Managers could improve the success rate of software projects and profitability of their projects by applying the contingency theory concepts.

Managers should ensure user support, organizational policy, administration, interpersonal communications, and relationships at all levels of the organization. Aruna (2016) posited that customers consider a product or service as high quality and acceptable if it meets or exceeds their needs. Leadership style is the underlying need structure of individual leaders that motivate employees' behavior in distinct leadership environments (Choi, Kim, & Kang, 2017; Coveilli & Mason, 2017; Van Wart, 2013). Leadership style is a moderating factor to human and employee behavior, depending on the nature of the desired goal (Choi et al., 2017). By adapting the contingency theory approach, managers could enhance their leadership style and skill, which might improve software projects' success rate and profitability.

Business leaders can use their leadership style to improve organizational performance. Researchers have examined the effectiveness of leadership styles and concluded that there are two forms of leadership (Choi et al., 2017). The first type of leadership, which emanates from the formal team membership, is transformational leadership while the second type of leadership is known as a distributed or shared leadership style (Choi et al., 2017). Both forms of leadership are essential for a leader to contribute positively to the team's and organization's effectiveness. Choi et al. (2017) explained that leaders who use the transformational leadership style seek to foster team effectiveness and improve productivity. The general belief is that shared leadership

enhances a team's organizing and planning efficacy (Choi et al., 2017; Jacob & Jenkins, 2014). By implementing the contingency theory approach, managers could enhance their leadership style, skill, which might help to improve software projects success rate and profitability of their projects and convey confidence to the workforce.

An essential quality of a good leader is emotional intelligence. Emotional intelligence is a trait that helps enhance a leader's quality and enables him or her to exhibit empathy towards other people (Ybarra, Kross, & Sanchez-Burks, 2014). Therefore, emotional intelligence is a trait that good leaders value because they believe that it is essential to regularly deal with other people (Ybarra et al., 2014). Organizations are increasingly embracing the concept of emotional intelligence or the concept of the *big idea* because it enhances their management skills in terms of how they treat their employees (Ybarra et al., 2014). Managers should implement CT approach to improve the success rate of software projects and profitability.

The supervisor's attitude and behavior could affect an employee's performance. Lam, Walter, and Huang (2017) suggested that supervisors are likely to exhibit hostile and aggressive behavior toward their employees. A supervisor's undesirable behavior may include resource deprivation which may often lead to employee's hostile reaction (Lam et al., 2017). A supervisor's hostile behavior may make an employee harbor negative feeling which may affect his or her psychological well-being and job performance. Study findings have shown that employees are more motivated and likely to stay longer with firms if leaders treat them with respect and empathy and if they establish reasonable remuneration and rapport (Lam et al., 2017). However, monetary rewards

alone may not be adequate to improve the lives or well-being of employees (Lam et al., 2017). Creating additional and varied compensation schemes, such as allowing employees to contribute ideas and rewarding those ideas could create a positive environment and a sense of ownership, belonging, and trust among the employees (Lam et al., 2017). A project manager's desirable behavior to team members could improve the success rate of software projects and profitability.

Business leaders can improve software innovation development process and quality by working with engineers that perform the actual work. Business leaders should develop relationships and empathy with their subordinates to create a positive work environment, build trusting relationships, and promote a sense of belonging and ownership. For the organization to ensure social change, it should invest resources in improving the work environment. For example, firms could assist the employees in developing and nurturing emotional intelligence, a sense of community good, and support employees having family difficulties (Valenti, 2014). According to Cerasoli, Nicklin, and Ford (2014), if a leader's goal is to have people perform a better job, the leader should provide subordinates with a more enticing reward. Cerasoli et al. suggested that it is essential that organizational leaders understand and buy into the concept of employee motivation which is fundamental to a well-organized and well-run business (Cerasoli et al., 2014). The next subsection contains the exploration and discussion of extrinsic factors which might influence an employee's everyday life, including job performance.

Extrinsic factors. Fiedler's contingency theory, also known as a leader-match theory, is focused on the leader's ability to manage an organization and how leadership is

subject to various situational factors that influence operational decisions (Hoffman-Miller, 2013). The contingency theory is an organizational theory which is supported by the proposition that there is no best form for administering and organizing a firm and decision-making (Bons, & Fiedler, 1976; Fiedler, & Mahar, 1979). Therefore, organizational decisions are contingent on the external situation surrounding the organization at any time. The contingency theory has extrinsic factors consisting of those elements which are adjustable and controllable until the attainment of the best fit scenario. Some indices leaders use to measure the effects of external factors include:

(a) the levels of satisfaction attained from accomplishing a particular job;

(b) an employee's sense of personal achievement;

(c) the level of incentive remuneration allotted to employees;

(d) the level of empathy for the employees and their families;

(e) levels of sincere and honest feedback to employees;

(f) level of inclusion of employees in the firm's cultural and social events;

(g) level of mentorship to employees;

(h) employees' opportunities to experience other firm functions (job rotation);

(i) employees' opportunities for flexible work hours; and

(j) the level of ownership and belonging created among the employees through shared leadership (Cerasoli et al., 2014; Van Wart, 2013; Valenti, 2014).

In discussing extrinsic incentives and their role in predicting job performance, scholars and business practitioners should note that intrinsic factors play a vital role in employee performance. Cong and Van (2013) insisted that extrinsic incentives do not

necessarily motivate employees to perform their work. However, a basic premise of contingency theory supports the relationship between incentives and job performance (Cerasoli et al., 2014). According to Feng, Morgan, and Rego (2017), capabilities are complex bundles of skill and knowledge instilled in the organizational process such that a firm performs well relative to rivals. By instilling organizational capabilities, business leaders may transform the available resources into valuable outputs.

Semura and Hopp (2015) argued that human capital plays an essential role in meeting the challenges for creation and development. Lyons, Buddie, and Purcell (2018) posited that business leaders should make efforts to provide responsive and integrative leadership development curricula and experiences essential for developing future leaders. A significant argument derived using the contingency theory is that LPC is related to lower performance than to a preferred coworker (Ellyson, Gibson, Nichols, & Doerr, 2012). The contingency theory is an ideal approach to explore the strategies managers use to improve the success rate of software projects and profitability.

The contingency theory implies that interactions between leaders and current events dictate leadership effectiveness (Ellyson et al., 2012). Therefore, a leader is effective when he or she can demonstrate the ability or skill to manage real problems in a given situation. According to Hoffman-Miller (2013), contingency theory aligns with other behavioral theories concerning the cause and effect of leadership style on the organization's performance. The focus of contingency theory is on the importance of a leader's personality traits and the leader's environment (Hoffman-Miller, 2013). Leaders should act in ways that are consistent with a situation to be effective.

Business leaders should embrace technological development to improve organizational performance. Gama, Sjödin, and Frishammar (2017) contended that many firms collaborate with external partners to advance technology development. However, some firms find it challenging to manage the uncertain and non-specific technology development process, especially those associated with external factors. If an external factor is involved, the leaders may not have or share the same project management approaches and control mechanisms. Researchers have indicated that inter-organizational technology development is a problem because firms lack enough partner understanding and struggle with aligning business objectives (Gama et al., 2017). Finally, the task-motivated and relationship-motivated contexts of the contingency theory are dependent upon situational variables, such as structure, power, and relationships with subordinates or other outside factors such as customers and market environment (Valenti, 2014). Managers should implement contingency theory approach to improve the success rate of software projects and profitability.

Many researchers have examined the application of contingency theory in business practice. Waters (2013) employed the contingency theory to examine the role of leaders in building public relations and found the theory useful. Raich et al. (2014) contended that because leaders often face the challenge of managing and maximizing profitability, they are more likely to pursue innovation processes to reduce software errors and maintain critical knowledge capital in the organization. Similarly, Waters posited that the leader's traits are not enough to determine success in managing and leading all professional scenarios. Burstrom and Wilson (2018) posited that the role of a

manager is essential to the efficient operation of a firm in terms of planning, execution, and managing day-to-day activities and long-term objectives. The manager's role in five significant aspects involving development, anchoring, re-organization, routinizing, and positioning are essential for the efficient operation of various project sizes (Burstrom & Wilson, 2018). The contingency theory is a useful tool that managers could use to improve business performance.

Joslin and Muller (2016) aligned with Fiedler and Mahar (1979) regarding the existence of a positive relationship between methodology and the characteristics of the project's success, noting the crucial role of environmental factors and governance. The suitability of the contingency theory as a project methodology and design depends on the degree of alignment with the project environment (Fiedler & Mahar, 1979; Joslin & Muller, 2016). Researchers have demonstrated that Fiedler's (1967) contingency theory is a useful model for improving business processes and profitability (Chen, Chen, & Chang, 2017; Ericsson, Gingnell, & Lillieskold, 2015; Sapunar et al., 2016). If a leader adopts contingency theory tenants to guide the identification of best-fit scenarios, the organization would likely produce quality software, avoid failure, and clients' rejection of the products (Ellyson, Gibson, Nichols, & Doerr, 2012). The contingency theory is the most appropriate framework to effectively explore and reveal organizational leaders' perceptions and experiences to improve software projects' success rate, which could impact the profitability of the organization.

In this qualitative multiple case study, I used the contingency theory model to examine the research question and the critical phenomenon under investigation. I studied,

identified, described, and analyzed the strategies firm leaders use to improve employees' skill sets, produce high quality software, and reduce associated risks to maximize profitability. Business leaders should carefully study the approach of using project methods to advance organizational ideas and goals because each new project must align with the firm's strategic objectives and day-to-day business operations (Hyatali & Fai Pun, 2016). Practitioners use the contingency theory concept to contextualize system utilization, focusing on the nature of the system and identifying contingency factors such as task, system, user, and leadership of the firm (Carlton, 2017; Zhang, 2017). The contingency theory concept is suited for this study.

Business leaders should focus on individual team members' assessment approach to determine their consistency with the contingency theory premise (Waraporn, 2015). Practitioners' could use the contingency theory to predict software project quality, assess associated risks, and ensure effective risk management. Some researchers studied the improvement of the product innovation process to improve quality and risk reduction (Waraporn, 2015; Carlton, 2017; Joslin & Muller, 2016), while other scholars investigated customer relations and product acceptability (Sunyaev, 2013; Peeters & Vaidya, 2016). In implementing contingency theory, managers should ensure that individual team members align with the contingency theory premise.

Researchers have demonstrated that contingency theory conceptual framework addresses collaboration between leaders and employees, which contribute to efficiency and higher productivity in the workplace (Carlton, 2017; Zhang, 2017). The advantage of collaboration between organizational leaders and employees include efficiency, improved

software quality, organizational growth, facilitation of social development, reduction of employee training costs, and increased performance (Stephan et al., 2016; Zhang, 2017). Consequently, using IT to manage organizational knowledge could help to facilitate the transfer of knowledge among employees, resulting in increased benefits to the organization (Zhang, 2017). The contingency theory is the most appropriate conceptual framework to explore the strategies that managers use to improve software projects' success rate and profitability.

Related and Contrasting Theories to Contingency Theory

Many conceptual frameworks may apply to the improvement of the software success rate and profitability. In this literature review, I considered theories and models that provide insight into strategies that software project managers could use to improve the project success rate and profitability. The results of the literature search indicated that researchers had used various project performance improvement models to enhance project performance. In this section, I discuss two alternative theories: the path-goal theory of leadership and complexity leadership theory.

The path-goal theory of leadership (PTL). Evans created the PTL in 1970 and is not specific to any situation. House (1971) modified the PTL into a more detailed framework to incorporate situational variables. Other social scientists continued to refine PTL after the original 1970 model (Northouse, 2016). The basis and root of the associated variables of the PTL is Vroom's expectancy theory of 1964. The PTL includes an element that points to a leader's role as a motivator (Asamani, Naab, & Ofei, 2016; House, 1971). For example, leaders can increase rewards for subordinates if followers

achieve a set goal. The proponents of the PTL concept provide a framework that leaders could use to motivate followers.

The leader can also facilitate the path for employees to gain a pay-off by clarifying goals, reducing obstacles, and providing more opportunities for employees' success (House, 1971). Thus, leaders could enhance subordinates' satisfaction and specifically, their satisfaction with the leader (House, 1996; Northouse, 2016). The primary assumption of the PTL is that employees could be inspired and motivated if they can effectively perform their jobs and gain higher skill and efficacy levels (Northouse, 2016). Project managers can use PTL to define achievable goals, clarify a management path, remove obstacles, and enable subordinates to succeed (Northouse, 2016). The PTL framework is not ideal for this study.

Some researchers have identified several weaknesses in the PTL framework (Cote, 2017). Some of the weaknesses of PTL include (a) complex as noted through the stages of evolution, (b) partial support based on many empirical studies for validity, (c) results of the study have not provided a real correlation between the assumptions and PTL, and (d) understanding the relationship between leader and individual on motivation (Bordieri et al., 2016; Cote, 2017). The focus of PTL is on a leader choosing a behavior based on employee and task characteristics to help employees along the path to reach goal accomplishment (Northouse, 2016). Leaders exemplify PTL when they help team members to set various goals and develop a path to accomplish the goals (Gordon, 2016). I could not align the PTL framework with the full scope of this study. Therefore, I did not use the PTL as a conceptual framework for this research.

The complexity leadership theory (CLT). According to the CLT, adaptability fosters performance and innovation development among interacting individuals, such that they act in response to pressures and opportunities in their native environment (Uhl-Bien & Arena, 2016). Walton (2016) contends that two broad approaches within CLT provide either a search for simple generalizable rules that govern complex systems or understanding complex systems within a specific environment. Extant research literature shows that, in a complex environment, business leaders need more social capital strategies to drive performance and innovation. Social capital refers to competitive opportunities that arise due to individuals' associations with others. Two main aspects of social capital are group cohesion and brokerage or mediation (Uhl-Bien & Arena, 2016). The proponents of the CLT concept provide a framework that informs project managers on the use of social capital strategies to improve performance and innovation.

Researchers described group cohesion as an individual's relationship with a group, as well as their relationships with individuals in the group. In principle, a group is cohesive when sub-relationships exist within the group (Uhl-Bien & Arena, 2016). There is evidence that group cohesion provides benefits to individuals, such as information sharing and the development of trust (Uhl-Bien & Arena, 2016). The CLT may be more appropriate for human resource development when considering individual relationships among groups. Therefore, CLT is not suitable for this research study because it deals with the development of strategies that encourage personal relationships, and not those concerned with functions and outcomes, such as software quality and risk reduction.

Software Innovation Development

According to Camino et al. (2018), software firms should strategically and methodically manage software project innovation to improve quality. Aldowaisan and Hassan (2016) posited that a quality concept plays an essential role in the achievement of operational excellence and appeasement of customers, which is critical to any business success. In a multiple qualitative research study that focuses on software project innovation development for the improvement of quality, the researcher should establish management responsibilities. Quality management is the focus of software project innovation process because of its complexity, the ambiguous nature of the many decisions made during the innovation development process, and the number of persons involved in the execution of the choices (Minamino, Inoue, & Yamada, 2016). The use of quality management instruments in the assessment of the software innovation process could help to improve operation management, reliability, and validity of the study output (Minamino, Inoue, & Yamada, 2016). Quality management is vital in improving software project success rate and profitability.

Researchers should focus on using an error checking process to explore the possibility of producing a quality product outcome that would address, as much as possible, the concerns of clients (Hyatali & Fai Pun, 2016). The understanding of the innovation development process is essential to discovering what is wrong (faults) and designing the strategies to improve the process that is not working correctly or needs enhancement. Organizations, in recent times, have relied on a series of project implementations mechanisms to boost organization strategic objectives. Leaders should

study and understand the correct application of different concepts (Hyatali & Fai Pun, 2016). Hyatali and Fai Pun noted that organizations employ projects as strategies for pursuing market advantage through competition in a dynamic business and operations environment. By deploying projects, business leaders quickly implement tasks geared towards adapting and transforming the organization. The management of the projects has become the instrument and means for transformation and development of organizational objectives.

Software Project Improvement

The other aim of this study was to explore the strategies software firm leaders use to improve projects, software quality, and manage risk. Reflecting on the objective of this study, the software project process improvement is a concept that managers often use in the software industry to improve software quality, manage emerging risk, or disruptive technology. Researchers argue that software development is a complicated endeavor that may yield a different result in terms of quality and other objectives, depending on the intended organizational goal, employee's technical know-how, and effectiveness of management (Carlton, 2017; Kostalova, Tetrevova, & Patak, 2017). Managers should understand the software project improvement concept to improve software project success rate and profitability.

According to Carlton (2017) and Ebert (2014), the outcome of the software project innovation process depends on the skill set of firm employees. Thus, the effectiveness of the software firm leader is dependent on the appropriate situational environment, which includes available skill sets and budgets (Carlton, 2017; Ogonowski

& Madziński, 2019). Leaders' level of emotional intelligence, among other factors, enables them to demonstrate the ability to nurture and encourage subordinates to effectively apply their skills to produce a quality product and improve profitability (Caridi, Carmeli, & Arazy, 2016). The production of high-quality software may allow the organization to achieve a more significant share of the market, gain competitive advantage, and increase profitability.

Consequently, in the context of a business that is competitive and offers products and technology with a short life cycle, software firms are expected to strategically manage the project process (Camio, Romero, Álvarez, & Rébori, 2018). Waraporn (2015) explored the management of the software development process that leads to the success of overall projects. The most critical factor in software innovation development is the composition of team members (Calton, 2017; Joslin & Muller, 2016; Waraporn, 2015). Therefore, the results of this study could be essential to the software project development field, because the focus is on the individual team members and not software development factors.

According to Camio et al. (2018), the software industry is becoming increasingly important in businesses and producing necessary business software requires effective strategies to affect software innovation. The ubiquitous demand for a customized software application for different needs such as marketing, customer relations, and hardware synchronization, makes it essential that leaders find effective strategies for meeting business requirements (Muschevici, Proenca, & Clarke, 2016). Software leaders should formulate ideas and strategies to fulfil the hardware compatibilities challenges,

customer needs, and marketing requirements (Muschevici, Proenca, & Clarke, 2016). In small businesses, a leader keenly focuses on identifying key capabilities and strategies that would lead to the achievement of favorable outcomes.

In some cases, an improved software project process could help to resolve the problem of poor software quality. Improvement of the software project process might highlight other issues existing in the organization, such as inadequacy of existing hardware and a knowledge gap among users. A software project goal is often to improve a bad situation, but in situations that the innovation or improvement endeavor fails, it is often very costly for organizations undertaking the project (Fisher, Kim, & Cummings, 2018). Fisher et al. examined the issue of abandoning innovation projects and stated that change has a higher value for each user, making each user less likely to quit. Business leaders should use timestamps to determine when to quit an innovation project. At the same time, people and firms should decide when and whether to abandon an innovation project based on their direct experience with the practice (Fisher et al., 2018). Some of the reasons why firms abandon innovation are day-to-day work requirements, the popularity of software in the firm, and people's experience of the innovation project (Fisher et al., 2018). Managers could benefit from research on strategies to improve software project success rate and profitability and minimize abandonment of innovation projects.

Tonelli, Zambalde, Jose de Brito, and Bermejo (2016) suggested that firms conduct a thorough investigation before embarking on any innovation project. According to Tonelli et al., some research results have shown that a highly competitive business

environment may involve software products and technology that can be disruptive to the existing situation or marketplace. Based on the disruptive circumstances, researchers have encouraged leaders to manage the software innovation project systematically and strategically. Managers of the software innovation project should be decisive and use intervention tools, which could help adjust key deficient variables and improve software quality (Camio et al., 2018; Jackman, Crust, & Swann, 2017). Managers should use adequate strategies to improve software project success rate and profitability.

Researchers have demonstrated that software innovation can play a significant role in keeping the organization viable, profitable, and competitive in the market arena. Tonelli et al. (2016) emphasized that the ability to affect innovation should align with the operations and ability to audit the current firms' portfolio of solutions effectively. Similarly, Seago (2017) argued that organization engagement objectives should focus on using appropriate criteria to evaluate governance, risk management, and controls of a project. Managers must understand the extent to which management and the board have established adequate criteria to determine when objectives and goals are met (Tonelli et al., 2016). Business leaders might view the success of software projects from the perspective of meeting the organizational objectives and goals.

Project managers should develop strategies to improve software project success rate and profitability. The concept of the ambidextrous organization describes the capacity of the organization to compete in mature markets while developing new products and services for emerging markets (Tonelli et al., 2016). Firm innovation activity is a mutual endeavor between local action and institutional logic (Tonelli et al.,

2016). Tonelli et al. demonstrated that the process of becoming ambidextrous is anchored in three stages that shed light on the relationship between logic and actions. The findings from Tonelli et al.'s study is particularly important to this research exploring the strategies managers use to improve software projects and profitability. Tonelli et al. highlighted three essential strategies, namely, the formulation of the initial reaction to conflict, stabilization mechanism, and the dynamics between action and response. These three strategies might be helpful for the software firm leaders looking for ways to understand, analyze, and device new approaches to a problem of low-quality software and projects in general.

Eito and Sicilia (2017) explained that innovation project management is a branch of management that studies the rules and regulations managers use to oversee the generation, diffusion, and adoption of an innovation project, including the associations between inputs and outputs. In the software industry, many small software companies with limited resources operate as sub-contractors. The small software firms develop software modules that integrate into larger companies' commercial or industrial systems. Rose and Furneaux (2016) defined the software innovation project as the ability to produce new and useful software systems. Rose and Furneaux argued that it is an essential capability for software and information system developers alike. Continuous development of innovative products is crucial to the survival of small software firms.

Scholars who study software development project literature have traditionally focused on automation and efficiency, while the innovation project is given little consideration in the software development context (Ancveire, Gailite, Gailite, & Grabis,

2015). Consequently, there is a gap in understanding how software production and process innovation is implemented and managed. Researchers posited that many studies did not pay much attention to synthesizing prior learning or providing perspective on integrating the key concepts which focus on software innovation project research (Gillespie, Otto, & Young, 2018; Rose & Furneaux, 2016). The focus of this study was on the strategies that managers use by to improve software projects and profitability. Project managers can achieve improvement in software project success rate and profitability through improved planning, process, and quality, as well as reduction of risks that might emanate from software and project failure.

Rose and Furneaux (2016) studied software innovation projects using a systematic review of the literature. They identified two essential forms of software innovation projects, namely, software product and service innovation and software process innovation. According to Rose and Furneaux, the most common form of software innovation project is the software product and service innovation project which results in novel and essential codes, and consequently, the creation of new software applications and functions. Software process innovation projects involve the formulation of tasks, norms, and formal or informal procedures, and may include new tools and techniques to help developers better organize their jobs. Managers of software projects could benefit from research on strategies to improve software project success rate and profitability.

Rose and Furneaux (2016) identified four categories of software innovation project drivers to include managerial drivers, knowledge drivers, team process drivers, and infrastructure factors. Managerial drivers influence the management of all aspects of

software innovation projects, such as monitoring, directing, and controlling. Knowledge drivers are factors linked to the acquisition and leverage of knowledge from internal and external stakeholders, and the relationships developed with these stakeholders (Babar, Ghazali, Jawawi, & Zaheer, 2015). Team process drivers underlying the software innovation project relate directly to software development team and its selected process (Rose & Furneaux, 2016). The process involves all the software innovation processes, including the release of new software and deployment to the client's location. Before the software release, leaders should transparently conduct quality assurance check activities to instill confidence in the customer (Chapman, White, & Woodcock, 2017; Sunyaev, 2013; Ghani, Bello, & Bagiwa, 2015; Ghani & Bello, 2015). The focus of this study included an understanding of how project managers can effectively implement and manage innovation projects to produce quality software.

Tomanek and Smutny (2014) studied the conceptual methodology for web development projects, centered on the project management adaptation of the Agile Development Process. Tomanek and Smutny proposed a shift to the Agile method, which they contend could improve the success rate of projects and mitigate some of the typical issues when using other methods of project development and management. Tomanek and Smutny demonstrated that the quality of the team leader and the scrum master made a difference in terms of delivery of efficient services, and concluded that combining the two methods will be more useful. Tomanek and Smutny's study is essential because it deals with software development approaches and their implications for high quality. Sunyaev (2013) reviewed the agile principles from a framework perspective and agreed

with Tomanek and Smutny's proposition to create a new and more suitable framework for software development.

Ramasubbu, Bharadwaj, and Tayi (2015) investigated the software development process diversity. They defined software development process diversity as a project condition emanating from the application of various processes in the development framework, which occurs at the request of the development team to comply with contingencies and compliances. By analyzing data collected from 410 commercial software projects by various firms, Ramasubbu et al. demonstrated that the diversity of software processes decreased as they increased process compliance enforcement. Ramasubbu et al. posited that project-level demands and compliance improve project performance.

Software firms have tried several models of software development life cycles and have not been able to pinpoint the universal better or more preferred model. Henriksen and Pedersen (2017) argued that the use of agile development methodologies affords more flexibility than other software development models. Similarly, Strode (2016) analyzed the dependencies, in three instances, of the co-located agile software development process, and displayed the process as a matrix with related rules and instructions for associated dependencies, segmented into categories. An adaptive (agile) practice can address multiple dependent variables in the software creation process (Fourie & de Vries, 2017; Strode, 2016). Strode argued that agile practice would be a suitable choice for organizing and collaborating on various projects. Strode's study is critical in

the software industry because it concerns how to measure quality deliberately and methodically during the planning and delivery stages of software development.

Singh and Gautam (2016) studied knowledge management and how it applies to the attainment of quality in a finished software product. They proposed a mixed or hybrid spiral framework. Singh and Gautam described the design as an integration of the spiral model and knowledge management. Researchers have introduced the use of a hybrid spiral model to improve quality, and explained that knowledge could come through creative experiences, EI, and intuition (Kim & Cameron, 2016; Singh & Gautam, 2016). Therefore, the four specific factors relating to performance considered in this qualitative case study include task, system, user, and leadership strategies.

Non-routine task. The software innovation development process is complex, and so it is not easy to predetermine its outcome. Non-routine tasks are the degree to which employees expect a job to match their exceptions (Kim & Cameron, 2016; Zhang, 2017). The software development leaders may perceive a process as complex when there are many uncertainties present that make execution less predictable. The uncertainties may arise due to the lack of a predetermined structured framework. Consequently, employees may tend to explore various featured options and may find a new way to accomplish the task. Concomitantly, if employees incorporate non-routine tasks and functions as part of a contingency factor, it may enable individuals to understand the demarcation between use and performance (Kim & Cameron, 2016; Xiaojun, 2017). By understanding non-routine tasks and functions, managers could improve software project success rate and profitability.

Perceived support for contextualization. Perceived support for contextualization is the level to which an employee understands that the application of a knowledge management system (KMS) can help supply context for knowledge assimilation. The complexity of KMS makes a big challenge in its use to complete a project. Because meaning is essential to achieving the full benefit of KMS, the background is incorporated as a contingency factor to fully understand the relationship between KMS and job performance (Kim & Cameron, 2016; Xiaojun, 2017). Project managers should understand the relationship between KMS and job performance.

Absorptive capacity. Absorptive capacity is the employee's ability to assimilate new skills and knowledge, and then apply that knowledge to accomplish a task. The concept of absorptive capacity is, in general terms, the employee's ability to acquire external knowledge and convert it for internal use to achieve competitive advantage (Kim & Cameron, 2016; Xiaojun, 2017). An employee who uses KMS may use the results to accomplish their tasks. The incorporation of the KMS process may explain the strong association between KMS and job performance (Gok et al., n.d.). Studies have found that many firms are hesitant to fund training and professional development, while many employees have an interest in keeping pace with current skills in the field (Ertirk & Vurgun, 2014). By training and developing the skills and capacity of team members, managers might improve software project success rate and profitability.

Software Quality Assurance

The definition of quality varies depending on the source, but a salient thread exists for what constitutes software quality. According to Sunyaev (2013), a major

premise of software development project is having adequate quality, which includes attributes such as the ability to reuse and maintain. Sunyaev explained that quality is in two main categories of activities, namely, delivering a product with demanding quality and making choices within stipulated constraints. Thus, Software Quality Assurance (SQA) is crucial to assess the stability of software firms, product quality and desirability, and the effect of a product on the firm's financial outlook and sustainability. Reviews of related literature showed that software quality is an ongoing process of constructing a sustainable relationship, by assessing anticipated needs and fulfilling the stated requirements of users (Shongwe, 2017). The software project success rate and profitability depend on the extent of software quality.

According to Carrizo and Alfaro (2018), SQA comprises of methods, tools, and techniques that allow enhancement of software quality and efficient management during the development process. Despite known fundamental elements necessary in developing a planned project, not all companies apply due diligence to protect the features that ensure software quality (Carrizo & Alfaro, 2018). The company's inability to observe due diligence could be due to lack of sufficient funding, or lack of skilled staff to affect required complex and complicated standards and tool required to produce quality software. Carrizo and Alfaro posited that SQA's central premise is to understand the framework of quality that did not manifest in activities or functions, but in the manner that the project group performs their jobs. The main objective of SQA is to control software project quality. The most critical aspect of SQA is dependent on the use of metrics to measure software quality and to assess the internal process mechanism

(Carrizo & Alfaro, 2018; Honig, Lampel, Siegel, & Drnevich, n.d.). Managers could use SQA to improve software project success rate and profitability.

Chen et al. (2016) developed an integrated SQA instrument for online pre-planning, with the capability to check the software efficacy and the goals of validating the software delivery of radiation to patients. Han (2018) suggested that software trustworthiness is a combination of software static quality against performance and conformance levels found in user evaluations and judgments. Consequently, the difference between user requirements and correct software operational behavior dictates the degree of trustworthiness the users perceive (Chen et al., 2016). Sato and Yamada (2016) contended that it is essential to confidently review and test, to assure software quality and review design requirements. By reviewing and checking each software development process, managers could augment each process step and might lead to a final product with higher quality.

Sadowski, Aftanilian, Eagle, Miller-Cushon, and Jaspan (2018) explained that software bugs cost developers and software companies a great deal of money to debug. Sadowski et al. indicated that some researchers had analyzed the use of bug-detection capabilities in producing functional quality software. However, there are some reasons why static detection is not the preferred tool for software engineers. Some of the reasons include that static tools are integrated into the developers' workflow or are too exhaustive to run, not actionable, automatic, or trustworthy. For example, debuggers might fail to detect errors or bugs un-manifested during manufacturing or software development process (Sadowski et al., 2018). The detection of software bugs during

development process could help to improve software project success rate and profitability.

Business leaders should have a complete understanding of what constitutes quality software in a current corporate environment, where software handles almost every aspect of business decisions and operations. Sadowski et al. (2018) explained the process that Google Corporation used to build quality software and maintain flexibility. At Google company, nearly all developer tools are centralized and standardized except for the development environment. Google made many parts of the infrastructure from scratch and ownership is by internal teams, giving them the flexibility to perform experiments, thereby gaining new skills. However, Google retains the ownership of its source codes and documentation.

The vital aspect of Google's software development concept is that the company uses a single-source control system and a single monolithic source code repository that holds all Google proprietary source code its developers use. All code in Google's repository originates from a customized version of the Bazel system. The Bazel build system requires that all builds should be hermetic in form. Hermetic means the declaration and storage of all inputs in source control environments for easy distribution and parallelization of the builds (Currier, 2015; Sadowski et al., 2018). Therefore, before any Google software engineer makes a change to any piece of source code, the engineer must secure approval from the source code creator.

Although there are other details to Google software development process, the essential lessons from Sadowski et al.'s study are streamlining the complex process,

reduction of errors by integrating bug detection software to the testing process, and code review integration. Other lessons from Google software development process include compelling error-prone development teams to perform continuous testing, that compiler errors are displayed early in the development process and are integrated into the developer workflow (Sadowski et al., 2018). Consequently, the importance and ubiquitous nature of software applications are increasing exponentially.

The software firm's management of quality requires a crucial or essential methodology for software development, quantitative evaluation, and analysis of completed software products (Shahzard et al., 2017). In this context, a closer look at characteristics that affect software performance is not often specific or explicit. Carrillo de Gea et al. (2012) examined the differences among required engineering tools. They contended that the tools must be specific to obtain the quality and reliability that the firm stakeholder demands. Carrillo de Gea et al. argued that the typical estimation for project management is to allocate approximately 10% of the effort to project requirements. Out of the 15 successful software projects, Carrillo de Gea et al. examined, leaders dedicated about 25% of the resources needed to meet requirements. Carrillo de Gea et al. concluded that poor resource allocation towards requirements is a significant cause of software project failure.

Researchers observed that efficient planning, use of automated tools, and efficient resource allocation contribute to high-quality software products, and can also minimize associated risks that might arise due to lack of structure (Calp & Kose, 2018; Teslia et al., 2017). In the review of SQA literature, the failure of software projects and their

implications on a business' overall health becomes apparent. Use of software production standards, such as those put forth in ISO/IEC, ISO/IEC 9126, ISO/IEC 14598, ISO/IEC 15939 and other IEEE or American National Standards Institute (ANSI), can guide the creation of quality software. Managers should consider using established standards to improve software project success rate and profitability.

ISO and ANSI standards have a salient common point, which is that the framework depends on software engineers and leaders putting standards into appropriate practice. For a firm to produce a positive and consistent software product, it must institute an avenue through which leaders and employees can check software product quality. According to Mazza and Azzali (2018), business leaders might lessen or reduce risk control as firms consistently and increasingly comply with rules and regulations. An organization should implement IT control scoping quality by employing an IT map of financial applications, infrastructure services, a risk assessment, and the IT links with the business. The audit fees are related to the quality of the software produced. Mazza and Azzali argued that the outcome of the software product is dependent on correctly segregating the duties assigned to different departments. Therefore, the benefits of adopting segregating techniques are the ability to localize faults in software products and resolve them before finalizing the product.

With the continued progress to incorporate software into most business and life activities, the software industry has recognized the nature of the crisis facing the sector (Khan, 2017). Therefore, researchers and leaders must take every action to improve the situation. The root architecture, or premise of software error, is that any human being

can cause software error, which in turn produces a defect in software codes and causes it to fail (Bergmane, Grabis, & Zeiris, 2017; Sedaghatbaf & Abdollahi, 2018). There are several qualities inherent in software products that may not manifest during the process of creating software. However, researchers and practitioners could use a well-thought-out framework to mitigate unforeseen errors or blind spots that only display in a finished output or product. Business leaders in software firms are making efforts to reduce or eliminate risks associated with software to improve a firm's outlook, profits, competitive advantage, and sustainability.

Software Risk Management (SWRM)

Researchers have studied SWRM and defined software quality as the multi-dimensional property of software products (Bubevski, 2013). Risk is present in every project and could affect the quality of software and hinder the achievement of the organization projected objectives and the client's expectations. Defective software, in a severe case, could lead to catastrophic failure, as had happened in many well-publicized cases (Chenarani, Druzhinin, & Kritskiy, 2017). Chenarani et al. defined risk as an uncertain event or condition that may result in a positive or negative effect on at least a project objective, such as time, cost, scope, or quality of the project. Similarly, Lindholm (2015) defined SWRM as the practice of assessing and controlling risk that affects the software project, process, or product. Khatavakhotan and Ow (2015) explained that the most crucial argument about risk management is the alteration of risks to reduce its effect. However, this ends up making it a challenge to manage. Project managers should use proper risk management models to identify risk and monitor changes through the

audit as the project progresses (Khatavakhotan & Ow, 2015). By minimizing or eliminating software risks, managers could improve software project success rate and profitability.

The virtual components of SWRM include data, codes, and documents which, in conjunction with human resources, budgets, hardware, and scheduling, make up the vulnerable assets of SWRM (Khatavakhotan & Ow, 2015). Bubevski (2013) adopted a methodology Motorola developed in the 1980s to study software reliability, risk management and customer satisfaction. The Motorola methodology has evolved into a comprehensive improvement framework and software tool. Bubevski characterized the conventional approach to managing software quality into two categories, namely, analytical models and structural methods (González-Marcos et al., 2016). Thus, Bubevski (2013) advanced a new approach to software quality risk management, which uses a combination of Six Sigma and Monte Carlo methods that researchers consider to be more superior, robust, and sophisticated than other analytical methodologies. Examination of the Six Sigma and Monte Carlo methods revealed that they are unrestricted concerning analytics and structure that apply to other similar frameworks (Bubevski, 2013). This study could assist managers to understand the strategies needed to improve software project success rate and profitability.

According to Khatavakhotan and Ow (2015), managers set up SWRM models for the evaluation and management of software projects. In 1991, Barry Boehm proposed the first SWRM model, which has evolved and is widely used by other software developers (Khatavakhotan & Ow, 2015). The extant literature review indicates that most research

studies preceding Boehm (1991) risk management model were in two factors, namely, risk management and risk control (Khatavakhotan & Ow, 2015). In a study of SWRM, some researchers adopted COCOMO and COCOMO II, a concept that most project managers use for estimating the cost in software production.

Drawing from research on software project risk management and the contingency theory model, Barki, Rivard, and Talbot (2015) developed an Integrative Risk Management Framework (IRMF). The IRMF outcomes are grounded in the concept of best-fit scenarios between project risk exposure and how risk is controlled and managed. Barki et al. (2015) tested the IRMF on 75 software projects. The results supported the contingency theory model premise and increased project performance. The results supported the idea that project risk management status should reflect the level of risk exposure (Rivard & Talbort, 2015). Concomitantly, leaders working on a project with a high level of exposure (risk) should consider using intensive data processing and analysis (Rivard &Talbort, 2015). Understanding the level of project risk exposure could assist managers to adopt appropriate strategies to improve software project success rate and profitability.

Project managers use different criteria to determine the success of a project. Barki et al. (2015) argued that the most suitable approach is dependent on the performance criteria and standards employed, primarily when the goal hinges on staying within the limits of the project budget. Consequently, successful high-risk projects tend to have high levels of internal structural integration, preparation, and planning. Similarly, when the goal of software is to achieve a specific performance level, high-risk jobs must require a

high level of skilled and user involvement to be successful (Berki et al., 2015; Salama et al., 2018). A high level of skill and user involvement are critical success criteria in software projects.

Software development is a knowledge intensive task and firms rely on the knowledge gained to develop quality software and become competitive in the industry (Taube, Scroppo, & Zelechoski, 2018). Individual employees hold some critical knowledge assets, and collectively, knowledge assets enable software firms to produce high-quality software. Risk management is an essential skill in either the individual worker or organizational leadership (Taube et al., 2018). Being aware of a strategy on how to avoid the risk can help foster and better manage the risk environment (Taube et al., 2018). Both Albano et al. (2017) and Shongwe (2017) contended that individual employees' knowledge assets are fragile and need nurturing and updating to maintain their value. Risk management skill is a critical success criterion in software projects.

Shongwe (2017) extensively reviewed the literature on Knowledge Management (KM) practices in software engineering and identified practices, challenges, and benefits. Shongwe identified four areas of KM research, namely, (a) software organization; (b) software development process and teams; (c) testing regiment and development methodologies; and (d) mitigating risks and roles in fostering learning in software development organizations. The software teams create, acquire, store, and share knowledge during the software development process (Shongwe, 2017). Shongwe concluded that there is a strong association between the exercise of KM and learning in

software development. Managers should understand the importance of KM and learning in improving software project success rate and profitability.

Project success depends on the skills of team members involved in the software project. Shongwe (2017) opined that KM is essential for the development of quality software and the minimization of associated software risk, given the inherent complexities in designing and producing software that has the intricate capability of addressing specified business requirements. Albano et al. (2017) showed that, in the past, technical prevention measures dominate risk management, despite the need for changes in professional requirement. Foidl and Felderer (2018) stated that risk-based testing is a frequently employed testing approach which utilizes identified risks of software systems to provide decision support in all phases of the testing activities. Foidl and Felderer conducted a case study using five open-source products. They demonstrated that a risk-based testing strategy outperformed lines of code-based testing strategy when the number of defects dictated is a consideration. Moqri, Mei, Qiu, and Bandyopadhyay (2018) opined that developers on OSS platforms receive incentives tied to future monetary rewards.

Project managers should ensure the quality of data during software testing. Ying et al. (2018) argued that some researchers conduct defect detection with the assumption that the training and future test data will be an area of software and the same distribution. According to Ying et al., in all practicality, data sets come from different domains and different distributions. Because external factors affect the data collected locally, researchers should take care to examine data quality (Ying et al., 2018). Some researchers

have demonstrated that the more thorough the software testing the fewer the defects, the more the software meets client requirement specifications, less likely it is that the software would fail (Chenarani et al., 2017; Foidl and Felderer, 2018). Controlling the risk associated with software development takes place in the SDLC, which is organized to ensure an orderly software development process (Shongwe, 2017; Sunyaev, 2013). Failures in project management are often as a result of deviations in scope, which would affect the cost, profitability, and feasibility of projects (Paver & Duffield, 2019). Project managers should understand the project scope definition to improve software project success rate and profitability.

The SDLC framework includes software architecture and design, development, testing, and maintenance (Shongwe, 2017). SDLC differs in how it is applied from organization to organization, but leaders and developers could use it to produce high-quality software and minimize risk (Shongwe, 2017). Understanding software quality and risk associated with failure means examining all characteristics and facets that constitute software quality globally. According to Elzamly and Hussin (2015), software failure is a risk fast emerging as the most critical element that affects business success. The threat has become an issue of significant worry to businesses, due to the notable increase in the complexities in software development and strategic position of the information systems currently being designed, developed, and deployed (Elzamly & Hussin, 2015). Managers should use SDLC to produce high-quality software and minimize risk, thereby improving software project success rate and profitability.

Elzamly and Hussin (2015) suggested that firm leaders should see software emergent risk as an opportunity for improvement and enhancement to organizational growth and competitive advantage. Fiedler and Mahar (1979) argued that corporate decisions often take into consideration internal and external circumstances surrounding the issue. Therefore, software leaders are not only dealing with the complexities of producing quality software, but also with external forces such as clients, disruptive technology, and the market. The information gain in this literature review might help inform the researcher's discussion of the concepts and strategies for software innovation development, SQA, and SWRM.

The Profitability of Software Projects and Businesses

The world of business is rapidly expanding and increasingly competitive. The profitability of software development projects has become a significant concern to businesses because of the high cost involved in such endeavors. According to Camio et al. (2018), software is becoming increasingly important in businesses. Software firms' production of necessary business software requires effective strategies and appropriate skill set to produce software that is error-free and meets the appropriate business requirements. Researchers observed that it is becoming indispensable to undertake a higher number of software projects at any given time for better resource optimization, due to poor strategies and project management skills. Project managers should use adequate strategies and possess excellent project management skills to improve software project success rate and profitability.

Software firms can always aspire to follow well-crafted strategies and a stipulated plan and error checking mechanism. The outcome of adopting effective strategies, plans, and an accurate fault dictation approach is increasingly profitable for business organizations. The better the project management strategies that firms adopt, the higher the business performance, yielding increased profits (Muschevici, Proenca, & Clarke, 2016; Yang-Rui et al., 2017). Yang-Rui et al. agreed that the ubiquitous demand for a customized software application for different needs makes it essential that leaders find effective strategies for meeting business requirements, which helps generate profit. Software leaders should formulate ideas and strategies to fulfill hardware requirements and customer needs, as well as marketing requirements (Muschevici et al., 2016). Project managers could improve software project success rate and profitability by formulating and implementing good ideas and strategies.

Software companies strategically and methodically adopt software project innovation in order to improve quality as well as profit (Camino et al., 2018). According to Aldowaisan and Hassan (2016), the software quality concept is a critical factor in the achievement of efficient business operations and an increase in organizations' profit. Software project's ambiguity and complexity require that managers delineate and delegate responsibilities to other members of the software production team with appropriate skill sets. The software project manager's due diligence will ensure improved software development processes, quality, and profitability.

Project managers could improve software project success rate and profitability by adopting quality management concepts. Minamino, Inoue, and Yamada (2016) posited

that quality management concepts are a critical factor in software project improvement, reliability, and profitability, and help to validate the study outcome. Project management skills are essential for all the executives of software firms, not just for project managers. A review of the literature on software project development revealed that approximately 34 percent of all the projects succeed, and the average software project has a 43 percent cost overrun. Given the poor software outcome percentage and cost overrun, the better means to improve software project management is to clearly define project objectives and requirements that contribute to software project success and increased profitability.

According to Ravindranath (2016), the two sets of skills project managers must possess to improve software project management are communication skill and flexibility. Communication skills involve communicating with team members and having the capacity to express ideas quickly and clearly to ensure that the team moves toward a common goal. Flexibility requires that software project managers recognize that each software project is unique, because each software project requires a unique template, technique, tools, and components. The software project manager ensures the implementation of appropriate steps, components, and management suitable for the project. Software managers can only be in control of the project by managing and adjusting to the proper time and cost constraints. Software project management can only be improved when managers deliver projects to a business that allows the realization of the strategic benefit (Minamino, Inoue, & Yamada, 2016; Ravindranath, 2016). Project managers should possess excellent communication skills and flexibility to improve software project success rate and profitability.

Transition and Summary

The purpose of this study was to explore the strategies leaders of software firms employ to improve software project success rate and profitability in the Washington, DC, metropolitan area. Section 1 contains the background of the problem, problem statement, purpose statement, nature of the study, research question, and interview questions. Other contents in Section 1 include the conceptual framework; definition of terms; assumptions, limitations, and delimitations of the study; the significance of the study; and review of academic and professional literature, including discussions on the contingency theory by Fiedler.

In section 2, I reiterated the purpose of the study and discussed my role as the researcher, participants, research method and design, and the population and sampling strategies. Section 2 also includes discussions on the ethical research, data collection instrument and technique, data organization and analysis techniques, and the validity and reliability in research. In section 3, I presented an overview of the study and presented the data from the study findings, including data from interviews and analysis of the interviews. Section 3 contains discussions on the application to professional practice, implications for social change, recommendations for action and further study, reflections, and the summary and study conclusions.

Section 2: The Project

In this qualitative multiple case study, I explored the strategies software managers use to improve the success rate and profitability of their projects. In Section 2, I will restate the purpose statement and discuss the researcher's role, participants, research methods and designs, population and sampling, and ethical research. Other contents of this section include discussions on the data collection instruments and techniques, data organization techniques, data analysis, and reliability and validity of the study findings.

Purpose Statement

The purpose of this qualitative multiple case study was to explore strategies software managers use to improve the success rates and profitability of their projects. The targeted population consisted of six software managers from the District of Columbia, Maryland, and Northern Virginia who have successfully implemented strategies to improve software projects resulting in increased profitability. This study could contribute to positive social change by providing software project managers with a better understanding of software innovation project strategies that will explore strategies software managers use to improve project success and profitability This study might further contribute to positive social change by offering employment opportunities and generation of income to employees, which may benefit their families, thereby boosting the local economy.

Role of the Researcher

The primary functions of researchers in qualitative studies are the organization and collection of data for analysis. The researcher's principal purpose is to become

knowledgeable about the tool, framework, and design plan (Saunders et al., 2015; Yin 2018). Another essential role of the researcher involves the elimination of all bias from the research, as well as having an elaborate plan to check for inherent bias (Coetzee, Hoffman and de Roubaix, 2015; Cugini, 2015; Lolis & Goldberg, 2015). I understood the research problem and used bracketing, reflexivity, and member checking to mitigate my personal bias and influence during this study.

The primary role of a researcher in a qualitative study is data collection. Researchers dictate the nature of the data collection instrument, the research requirements, and the protocol that governs the research design framework (Lyons, Buddie, & Purcell, 2018; Yin, 2018). An essential role of qualitative researchers is to investigate the presence of bias and take proper action to minimize or eliminate it. Qualitative researchers should make deliberate and persistent efforts to eradicate prejudice and faulty data collection and analysis (Lyons et al., 2018; Yin, 2018). In this qualitative research study, I was the primary instrument for the research process. I formulated the problem statement and research design and carried out data collection and data analysis.

Qualitative researchers should follow the ethical guidelines stipulated in "The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research (1979)" with the primary goal of protecting the rights of the participants (Cugini, 2015; Lolis & Goldberg, 2015). The essence of the *Belmont Report's* principles and guidelines is to assist the researcher in avoiding the appearance of unfair treatment of participants in the study (Coetzee et al., 2015). Researchers use the informed consent

form to disclose to the respondents in advance the various aspects of the research in a language that participants understand (Nusbaum, Douglas, Damus, Paasche-Orlow, & Estrella-Luna, 2017). In compliance with the *Belmont Report*, I used the consent form to provide participants with relevant information regarding the study. I ensured that the participants comprehended the purpose of the interview and had the right to withdraw from the study by e-mail, text message, or phone, expressing their intention to terminate their support without any repercussion or penalty.

Qualitative researchers use multiple methods to enhance the validity of their study findings. Triangulation is a useful tool for analyzing data collected through the interview process to reach a decision (Saunders et al., 2015; Yin, 2018). The use of an interview protocol, appropriate sampling strategy, and triangulation enables the researcher to properly analyze the collected interview data, arrive at an important decision, and produce a report (Burau & Anderson, 2014; Yin, 2018). I adhered to the interview protocol (see Appendix A) and framework by securing approval to conduct the interviews. Most researchers use an interview protocol to align the overarching research question with the literature review and link the interview questions with the study phenomenon (Fabregues & Molina-Azorin, 2017; Whitmore, Baxter, Kaasalainen, & Ploeg, 2018). I used the interview protocol to guide my interactions with the participants during the semistructured interviews. Pulley, Clayton, Bernard, Roden, and Masys, (2010) pointed out that Belmont principle stipulates respect for persons, systematic removal of all identifying information from the records, and the protection of the identity of study participants. I incorporated coding and encryption technology to safeguard the

research data and other information and to ensure anonymity and protection of the identities of the study participants. I used coding and identifying alphanumeric keys made up of letters and numbers to determine the participants as P1 to P6. The identification method was useful in tracking participants' information and other activities, such as communication records associated with the study, as well as preserving their anonymity. I secured the data collected in a lockbox, which I will keep for 5 years. I will destroy all the research data at the expiration of the 5-year time frame, per the industry best practice (Greaney, Sheehy, Heffernan, Murphy, Mhaolrunaigh, Heffernan, & Brown, 2012). I declare that I had no relationship with any of the participants in this study prior to the beginning of the study.

Participants

The participants in this qualitative multiple case study research joined the study of their own free will and with full consent. I selected participants who possessed the requisite knowledge, experience, and competence to understand the complexity and context of software project performance. According to Coetzee et al. (2015), researchers should seek and receive participants' consent before the commencement of the study. Six participants with 5 years' experience in managerial and innovation of software development, who were presently employed in the software development field, participated in this study. I requested permission and obtained approval to conduct this study from the Walden University Institutional Review Board (IRB) before commencing my research.

The researcher and participants are crucial to the success of a doctoral study (Saunders et al., 2015). I requested and obtained the names of potential participants from the human resources managers of nearby software firms. I sent an introductory letter to participate in the research study (see Appendix B) by registered mail to each potential participant. In the letter, I introduced myself and explained the purpose of the research study, eligibility for the selection of the participants, and the possible benefits that could come from the study. Upon receipt of the letter of cooperation, I secured access to the study participants by telephone, e-mail, and online video meetings. I did not pay any compensation or fees to the participants for their involvement in this study.

The participants in this qualitative multiple case study research joined the study of their own free will and full consent. I selected participants who possessed the requisite knowledge, experience, and competence to understand the complexity and context of software project performance. According to Coetzee et al. (2015), researchers should seek and receive participants' consent before starting the study. Six participants, presently employed and with 5 years' experience in managerial and innovation of software development presently employed in the software development field, participated in this study. I requested permission and obtained approval to conduct this study from the Walden University Institutional Review Board (IRB) before commencing my research.

Participants' identities should remain anonymous to ensure their confidentiality (Yin, 2018). The use of a coding process makes it easier to track participants' identities and their information, and the use of encryption ensures anonymity (Coetzee et al., 2015). I used a coding mechanism and encryption technology to ensure anonymity and to protect

all participants' identities. The coding of the participants' identities involved using the alphanumeric identification format system from P1 through P6.

The participants should have the right to withdraw from the study without advance notice. The participant could withdraw from the study by sending an e-mail, a phone call, or text message, at any stage of the study (Coetzee et al., 2015). All participants replied by mail and agreed to participate in the study. Researchers should safeguard the participants' information. I used an authentication mechanism to encrypt the data collected from the interviews. I will store encrypted data in a safe environment for 5 years. At the end of the 5-year storage period, I will destroy the storage devices containing the participants' information by incineration. Trustworthiness and document accuracy contributes to the credibility and validity of the research outcomes, according to Yin (2018). Houghton, Casey, Shaw, and Murphy (2013) and Yin (2018) stated that research findings should be valid, trustworthy, and accurately documented. Burau and Andersen (2014) explained that maintaining audit trails, triangulation, and reflexivity are mechanisms researchers use to establish rigor and conformity. Therefore, I used audit trails and triangulation to enhance the credibility and validity of my research findings. I will further discuss these points in a subsequent part of the section.

Research Method and Design

In this section, I present the research method, design, and justification for this study. I selected six participants from six software firms to participate in this study, each being a manager in the software firm. The three different categories of software quality are acceptable high quality, disputed quality, and rejected class (Dahl et al., 2017). In this

study, I used the responses to the interview questions to answer the research questions, as well as to solve the business problem regarding exploring the strategies for improving software acceptability and quality. Quality can have a lasting effect on competitive advantage in markets and a firm's positive economic outlook (Ebert, 2014; Shahzad et al., 2017). In the following subsections, I discussed the rationale for the choice of research method and design for this study.

Method

The three common forms of research method are quantitative, qualitative, and mixed methods (Green & Salkind, 2018). In this study, I utilized the qualitative research approach. Researchers initiate a qualitative research method by making general observations before progressing to a detailed comprehension of the data. Using a qualitative method enables a researcher to triangulate between different data sources to reach data saturation, without straddling into the quantitative method (Dahl et al., 2017). The qualitative approach is most useful in understanding the humanistic phenomenon. Clark and Veale (2018) contended that qualitative research is an instrument researchers use to record data that are not in a data form but the expression of opinions, feelings, and experiences. Qualitative researchers should collect, tabulate, and classify data to observe the patterns of the data (Green & Salkind, 2017). In this study, I explored, described, synthesized, and analyzed data trends. Despite the existence of guidelines to conduct qualitative research, each project must be unique. The researcher should decide how to proceed, because the researcher is the principal instrument for data collection and analysis.

Ramakrishna (2018) agreed with Clark and Veale (2018) that qualitative research is an integral part of the research process and helps to make the results of a qualitative study more transferable. Based on the literature review, the findings from qualitative inquiries are not generalizable to any other environment (Saunders et al., 2015). Researchers should be careful not to imply that their findings apply to other occurrences of similar phenomena. Consistent with qualitative methods, an in-depth and detailed understanding of the role business leaders' play in developing the strategies to improve software innovation development, quality, and risk management is essential for this study.

The quantitative approach is an essential design for finding answers to more structured questions (Garcia & Coltre, 2017; Ramakrishna, 2018). Quantitative researchers reach a conclusion or test hypotheses from numerical evidence (Daneault, 2018). A quantitative approach was not suitable for this study because the essence of this study concerns the software firm leaders' perceptions, and not on the codification of their beliefs, nor their relationships to intrinsic values. Using the qualitative method limits a researcher’s chances of documenting the experiences of research participants (Savela, 2018). The use of the quantitative method will not allow me to gain an in-depth understanding of the participants’ lived experiences on the phenomenon of study.

Researchers use mixed methods to test for contradictions in qualitative or quantitative data and relationships (Garcia & Coltre, 2017). Qualitative researchers follow a naturalistic approach, while quantitative researchers work in controlled environments through experiments to generate statistical results (Daneault 2018). A

mixed methodology is not appropriate for this study, because the goal of the study was not to generate statistical results but to explore the strategies software leaders use to improve project success rates and profitability. The suitable approach for this research study was a qualitative method, because the problem concerns a human phenomenon as well as participants' experience in developing strategies to improve software innovation development, quality, and risk management. I applied due diligence to ensure that the findings are valid and reliable and in agreement with the data collected from the participants. Therefore, the qualitative research method was the most appropriate research method for this study.

Research Design

Employing a qualitative exploratory multiple case study design enables researchers to comprehend a phenomenon. In this study, I explored leaders' contributions to improvements in the software innovation process, quality, and risk management practices at their firms. The goals of this study have a foundation in real-life events with intrinsic value that are unknown for software planning and production processes. Yin (2018) explained that researchers use qualitative exploratory multiple case study designs to explore, gather data, analyze, interpret, and describe the participants' responses. The case study design is a useful technique that researchers use to study phenomenon within unclear boundaries in a real-life context (Ebneyamini & Moghadam, 2018; Heyeres, Tsey, Yang, Yan, & Jiang, 2019). The multiple case study design was appropriate for this study because of unclear boundaries between the phenomenon and study context.

The qualitative multiple case study approach is more compelling and robust than a linear single case study research approach (Yin, 2018). The multiple case study design enables researchers to comprehend and construct a proper framework with measurable facts and a clear hypothesis (Garcia & Coltre, 2017). The use of a qualitative multiple case study approach in this study allowed me to incorporate a triangulated framework to examine software innovation, quality, and risk management issues. The most appropriate research design for this study was a multiple qualitative case study approach.

The application of a multiple case study approach involves the following steps: interviews of the participants, in-depth observation of the phenomena, and analysis of the collected data. Researchers have described each aspect of the design methodology and discussed the associated strengths and weaknesses (Saunders et al., 2015). Ridder (2017) posited that the potential advantages of multiple case study research are evident in the cross-case analysis of a project. Ridder further explained that a structured comparison using cross-case analysis would highlight differences and their effects on the study outcome. Using qualitative multiple case study to understand software industry leaders, their skill sets, and strategies was relevant to this study.

Researchers have demonstrated the use of different kinds of subjects for various types of studies. Other qualitative research designs include ethnographic, narrative, and phenomenological research designs (Castleberry & Nolen, 2018). An ethnographic investigation involves the exploration and interpretation of shared patterns of behaviors, cultures, sub-cultures, and languages within a social group with their associated characteristics (Atkinson & Morriss, 2017). The ethnographic research explains

origination, current status, cultural interactions, and survivability (Green & Salkind, 2018; Schober, Gerrish, & McDonnell, 2016). An ethnographic research design was not appropriate for this study, because the study objective was not concerned with shared patterns of behaviors, cultures, and languages, but on strategies that individual software project managers use to improve software project success rate and profitability.

A phenomenological design methodology may be descriptive rather than explanatory (Green & Salkind, 2018). Researchers use phenomenological research design to explore the sense a person makes about what is happening concerning the focal phenomenon (Bustard, Bolan, Devine, & Hutchinson, 2019) and the experience that individuals have about a phenomenon or concept (Ciftci, 2019; Rengi & Polat, 2019). The phenomenological research design was not appropriate for this study because the study objective was to explore the strategies to improve software project success rate and profitability from field experience of software project managers.

The narrative research design involves the use of stories as strategies for establishing knowledge. Researchers use the narrative research design to explore detailed stories or life experiences as told by an individual or group of persons (Wang & Geale, 2015). The objective of this study was not to portray superficial meaning or cultural underpins of software project managers, but to explore the facts on the strategies software project managers use to improve software project success rate and profitability. The narrative design was not appropriate for realizing the purpose of this study.

Boblin, Ireland, Kirkpatrick and Robertson (2013) posited that case studies may be investigative, descriptive, or explanatory, or may combine a couple of methods.

According to Boblin et al., a qualitative case study approach is an exploration of a case over time, through comprehensive data collection, involving multiple sources of information, each case having its sampling, data collection, and analysis strategies. In a qualitative case study, a researcher can examine single or multiple events (Boblin et al., 2013). The qualitative multiple case study was an ideal research design for this study.

In conducting this study, a qualitative multiple case study design was the basis for exploring the strategies project managers use to improve software project success rate and profitability. I commenced data collection by interviewing each leader individually while recording and keeping detailed field notes and repeated the data collection process until the last participant. Many researchers have indicated that the field notes and design of the study should support data analysis through the application of triangulation between the interview data and other collected data (Fusch, Fusch & Ness, 2018; Yin, 2018). Using the multiple case study design for this research, I explored and described the strategies six software firm leaders use to improve software project success rate and profitability. By analyzing the data, I identified the best practices for implementing strategies to improve software quality and effective risk management, as well as to maximize profitability to the firms.

Population and Sampling

The targeted population for this study were six leaders in the software industry in the Washington DC Metropolitan Area, which includes the District of Columbia, Northern Virginia, Maryland. In this study, I employed a purposive sampling method, also known as judgmental, selective, or subjective sampling. Valerio et al. (2016) have

used the sampling method to establish the guidelines for the leaders who had the required skill set and experience in software development practices. The purposive sampling technique is a useful tool for selecting an appropriate population that explicitly meets the established qualifications for research (Valerio et al., 2016). Using the purposive sampling technique enabled me to collect information from subject matter experts, who have an in-depth and rich understanding of the study phenomenon regarding the strategies for improving software project success rate and profitability.

Osobajo and Moore (2017) opined that the sample choice and size identified for a study is often constrained, depending on the method of data collection. Researchers should be transparent in making full information available regarding the practices and choices or reasons for making decisions (Osobajo & Moore, 2017). According to Yin (2018) and Valerio et al. (2016), purposive sampling is a means of selecting small numbers of participants for a qualitative research study. In purposive sampling, researchers select subjects who can best respond to the research question, given their knowledge of the population and study phenomenon (Kegler et al., 2019). I used a purposive sampling technique to select the participants for this study.

Purposive sampling supports synthesizing and discovering data that are the essence of the research (Valerio et al., 2016). A researcher defines purposive sampling by targeting participants within the general population to participate in a specified detailed study. Another sampling technique is random sampling, which deliberately includes a diverse community (people) with different characteristics. In contrast to random sampling, purposive sampling allows the researcher to gather vast amounts of

information by using various techniques. Researchers use purposive sampling to obtain a better cross-sectional view of the participants' responses (Valerio et al., 2016). I used the purposive sampling method to gather rich data and detailed descriptions from the participants.

The reason for using a purposive sample method in this study was because of the small sample size. Roberts (2013) argued that small sample size could best meet the requirement of interpretive analysis, whereas a large sample size can overwhelm the researcher with data. A purposive homogeneous sample is necessary for the formulation of themes from a group of participants who possess similar experiences (Roberts, 2013). In research, open access has become customary, both in the academia and science research community. The reason for the practice of research data sharing is that it tends to hasten scientific progress and increase scientific integrity, as well as optimize experimental data (Ross, Iguchi, & Panicker, 2018). I will disseminate the findings of this research study regarding the strategies that software managers use to improve software project success rate and maximize profitability.

Ethical Research

In this study, the collection of data commenced after application to and receipt of the approval from Walden University IRB. The Walden University IRB approval number is 05-29-20-0425623. Upon receipt of Walden IRB's approval for the study, I selected the sites, participants, and sought permission from the chosen venues to conduct this study. I abided by ethical standards set by Walden University, including the code of conduct and moral guidance, as stated in the Belmont Report. The Belmont Report

stipulated an ethical framework, based on respect and providing justice for the persons involved in human subject research project (Cugini, 2015; Ross et al., 2018). I completed the CITI Program web-based training (see Appendix C) to comply with ethical standards and protection of human research participants. I adhered to the principles and guidelines outlined in the Belmont Report in conducting this study.

The researcher must respect and not infringe upon the rights of the participants and should understand the ethical implications concerning the protection of human research participants (Dewey & Zheng, 2013). Qualitative researchers use informed consent to explain the process, benefits, and risk of the research to participants and confirm that respondents understand the research purpose and engagement rules (Nakkash et al., 2017). I used informed consent to disclose relevant information to the potential research participants to enable them to make a voluntary decision to accept or reject participation in the study. I shared the informed consent form to potential participants, and only respondents who returned a signed informed consent form participated in this study.

The study participants are software project managers who will benefit from the research findings. Participation in the study was voluntary, and respondents did not suffer any consequence for rejecting to participate or withdrawal from participation. In compliance with ethical research, participants are free to withdraw from a study at any time for any reason (Gu et al., 2019). Participants had the right to participate voluntarily and withdraw from the study at any time with or without reason by notifying the researcher (Doody & Noonan, 2013). The participants could opt-out of the study and

have their data nullified and destroyed upon request via email, text, phone, in writing, or person. I did not get any notification from any participant indicating an intention to withdraw from this study. Participants did not receive any incentive or monetary compensation to participate in the study, but their contributions could improve business knowledge and practice.

Novak (2014) advised researchers to mitigate bias in their research. I complied with the Walden IRB strict research standards and ethics to mitigate bias. Ethical researchers should protect the identity of research participants. Gomes and Duarte (2020) noted that researchers are obliged to protect all study participants from possible adverse consequences arising from their participation in a study. I used a coding system to ensure anonymity and protect the identities of all participants. Researchers use alphanumeric identifiers to track participants' information and maintain anonymity (Thomas, 2015). I used P1 through P6 to identify the research participants. I encrypted and stored collected data on a password computer and in a fireproof safe. After 5 years, I will incinerate or physically destroy all data.

Data Collection

Instruments

For this qualitative multiple case study, the researcher was the data collector, facilitator, interviewer, and certifier of data quality. In this qualitative case study, I served as the data collection instrument. The four sources qualitative researchers use to support data collection efforts are structured interview, semistructured interview, questionnaire, and organizational documents (Fusch & Ness, 2015). I collected data from six leaders

with expertise and experiences of providing leadership and support for improving software project success rate and profitability. Qualitative researchers should use open-ended interview questions to enable the participants to elaborate on their responses (Yin, 2018). Therefore, I used open-ended interview questions(see Appendix A) to encourage participants to respond and develop their answers.

Qualitative researchers reach data saturation when there are no new additional data, information, or themes to harness. The researcher conducting a qualitative study argues that data saturation is achieved when there is no new data, no new ideas, and no new codes (Vasileiou, Barnett, Thorpe, & Young, n.d.). Fusch and Ness (2015) argued that the data saturation determinant is not based on the number of participants only or the number of resources expended but on the depth of the data. According to Fusch and Ness, failure to reach a threshold of data saturation would have an impact on the quality and validity of the research. Some approaches that qualitative researcher could use to reach data saturation include interviews, collection of data through a focus group, and having the researcher or a second party design and construct a data saturation grid (Fusch & Ness, 2015). I reached data saturation through a semi-structured interview, coupled with member checking.

Cai and Zhu (2015) explained that researchers should infer useful data to be good quality data. Yin (2018) indicated that membership checking by participant review of transcripts for accuracy, credibility, and validity is prevalent and essential. In this study, I employed member checking mechanisms to discern whether the interpretation was correct and if the participants' account of events was accurate. I verified that the data was

in a form that would add rigor, credibility, validity, and imbue confidence to the research outcomes.

Data Collection Technique

Before starting the study and after obtaining approval from Walden University IRB, I carried out necessary activities to collect the data in an official capacity and ethical manner. I obtained IRB approval from Walden University to prove official institutional affiliation and then l sent an invitation email to the identified study participants. The introductory letter included brief background information on the purpose of the study (see Appendix B). I obtained consent from each of the study perspective participants. The participants signed the consent form to confirm their willingness to participate in the study voluntarily and without payment. Researchers should treat the participant's information with confidentiality and protect it from the public (Coetzee et al., 2015). Upon receipt of the letter of cooperation, I arranged for a convenient time and date to conduct a 30-45 minute interview session for each participant.

Sunyaev (2013) studied customers' acceptance of software quality at delivery through the application of a structured model and use of the software quality assurance management tool. The codification protocol depends on the research design and determines the quality of the research data collection (Peeters & Vaidya, 2016; Sunyaev, 2013). Saunders et al. (2015) and Yin (2018) explained that the method of triangulation is a conceptual instrument for managing active user-based investigations. Qualitative researchers collect data from interviews and review of company archival documents (Peeters & Vaidya, 2016). To enhance the validity and reliability of their study, many

qualitative researchers triangulate the interview data with multiple data sources (Yin, 2018). In this study, I collected data from interviews, observations, and review of company records.

Researchers explained that ethics in research requires the maintenance of appropriate conduct during a research study (Vasileiou et al., 2017; Yin, 2018). I used three methods to collect data, namely: semi-structured online video or phone interviews, observations, and organizational documents. By conducting semi-structured interviews, I used open-ended questions within the research delimitation to elucidate responses from the participants to answer the research question. To further validate the research findings, I used the data collected through observation and company archival data review.

The participants sent an email response to consent to participate in the study. I sent a copy of the interview questions by email to each participant before the formal interview session. At the agreed date and time, I interviewed each of the six participants, developed the interview transcript, and conduct member checking to verify the accuracy of the interview transcript. Researchers argue that the member checking concept is an appropriate and efficient way of ensuring rigor, credibility, and reliability in a qualitative research study (Chronister, Marsiglio, Linville & Lantrip, 2014). I shared the interview transcript with each participant to review, make corrections, and validate their transcribed interview data. I conducted an exit session with the participants to ensure that each had a clear and comprehensive understanding of the specific aspects of the study.

Some researchers conduct pilot studies before commencing their main study to establish the appropriateness of their planned data collection and analysis technique

(Drummond, 2017). I did not conduct a pilot study, because I used the academic community to validate the interview questions and used the purposive sampling technique to select individuals with expert knowledge of the research problem from the study population. Researchers share the interview transcripts with participants during member checking to verify the data accuracy and resonance with their experiences, thereby increasing the credibility of the study findings (Brear, 2019). To enhance the reliability and validity of the interview data, researchers conduct member checking to confirm their interpretations of what participants said or meant with the participants (Iivari, 2018; Santos, Magalhaes, & da Silva, 2017). After the interview, I shared the data transcript with participants to confirm my interpretations of what they said or meant to enhance the validity and reliability of my study findings.

Qualitative researchers must reach data saturation in the data collection process. The data saturation point is when there are no new additional data, information, or themes (Vasileiou et al., n.d.). According to Cai and Zhu (2015), qualitative researchers should verify the data collected to enhance the validity of their study findings. I employed an error checking mechanism to verify that the data collected was in a form that added rigor, credibility, validity, and imbues confidence to the research outcomes. In collecting the data for the study, I remained professional at all times with the participants.

Data Organization Techniques

Green and Salkind (2017) and Yin (2018) posited that organizing data into themes allow the understanding of the data and patterns. In the data organization, I employed a series of repeating steps to maintain the accuracy, validity, and truthfulness of the data

organization technique. To maintain an audit trail, scholars should segment and arrange data into clusters of information (Green & Salkind, 2017; Hoque, Covaleski, & Gooneratine, 2013). Journals are an essential method or avenue that researchers use for accessing qualitative data during the collection process (Burau & Anderson, 2014; Everette, 2013). I organized the data based on date, time, organization, and participants.

I used NVivo 10 software, journals, and Microsoft Excel spreadsheets to organize and store the research data. Morse (2015) and Yin (2018) posited that the validity and reliability of research findings might take place through the organization of the data. According to Morse, validity is the degree to which inference made in a study is accurate. I transcribed the interview data into groups of individual separate computer files, dedicating each group to a participant. Anyan (2013) remarked that the researcher should allow enough time to code the interview data and to perform administrative duties. Yin noted that thematic analysis allows the researcher to identify emerging themes and trends for data analysis and interpretation. In the data analysis process, I employed the coding mechanism by placing an alphanumeric code of P1 through P6 for the six selected participants of the study, to ensure and maintain their confidentiality and privacy. I stored collected data on a password computer and in a fireproof safe. At the end of the 5-year storage period, I will delete all data and securely incinerate the storage device.

Data Analysis Technique

The purpose of this exploratory qualitative multiple case study was to investigate strategies that leaders use to improve software projects' success rate and profitability. The overarching research question of this study was: What

strategies do managers use to improve the success rate of software projects and profitability? Participants answered eight questions (see Appendix A). In this multiple case study, I used the semi-structured interview to collect primary data from six participants and collected secondary data through review of company archival documents.

Researchers can employ data analysis programs such as NVivo 10 software to add rigor and validity to the qualitative research process (Hoque et al., 2013; Min, Anderson, & Chen, 2017; Sari et al., 2017). The appropriate data analysis process for this multiple qualitative case study is methodological triangulation. According to Nancy, Alba, Jennifer, and Alan (2014), Yin (2018), and Marshall and Rossman (2016), triangulation is the use of multiple methods or data sources to build a comprehensive understanding of phenomena or regularly occurring events. Pitre and Kushner (2015) concurred that theoretical triangulation is the concept that draws on alternative theories, such as analytical frameworks, to explore various angles or viewpoints regarding phenomena or occurrences. In research, triangulation can take place by using multiple methods, data collection sources, interviews, observations, journal keeping, and taking notes. I used methodological triangulation to add rigor and validity to the study findings.

Burau and Anderson (2014) stated that the triangulation of data also includes analysis of primary data, such as participant interview questions, secondary data collected from company brochures, pamphlets, and websites. Houghton et al. (2013) and Yin

(2018) concurred that in the data analysis phase, researchers should incorporate refining the codes, collapsing data, and eliminating some codes when necessary. Woods, Paulus, Atkins, and Macklin (2015) elaborated that researchers should generate and refine codes continuously until no new codes exist in the study. In this study, I continued to generate and refine codes until no new unique codes emerge from the data set.

Qualitative researchers should continue coding of transcripts until the data saturation point. I continued to examine and explore any emerging discrepancies among codes up to the data saturation point. Yin (2018) stipulated that the researcher should use coding to uncover the themes available in the transcripts, including data used to reach the saturation point. The process of using coding to uncover themes available within the transcript would help to ensure reliability, validity, and credibility.

I employed alphanumeric (mixture of letters and numbers) identifiers to uniquely identify the six participants from two software firms. The alphanumeric identifiers are "P" for the participant, and the numbers will range from 1 through 6 to identify study participants. After the interview, I transferred the results into a Microsoft word document and analyzed the emergent themes using the NVivo 10 software. The use of statistical analysis software, such as NVivo 10, expedited coding and categorization of the collected data during the analysis phase of research data (Chen, 2017; Green & Salkind, 2017; Min et al., 2017; Yin, 2018). The value of utilizing the NVivo coding manual and software to compile all transcripts ensured that the practice was consistent and valid through the overall analytical activities (Chen, 2017; Min et al., 2017). I used the coding manual,

compiled and organized the research transcript using NVivo 10 qualitative data analysis software.

I allocated the research data into different categories, matching categories with sources of evidence, and used it to create flowcharts which graphically displayed the trends. Following the NVivo software manual, the process for using the NVivo software entailed categorization of data in different categories, pairing categories with sources of evidence, then creating flowcharts (Kim et al., 2016; Min et al., 2017; Paulus, Woods, Atkins, & Macklin, 2017). The other types of statistical analysis that could take place included tabulating the frequency of certain words or codified thoughts, exploring relationships of variables, and allocation of data in other relevant and appropriate classifications. Researchers use the NVivo software for coding, referencing, counting, sorting, and displaying of the data from the participants (Burau and Anderson, 2014; Kim et al., 2016; Min et al., 2017; Paulus et al., 2017). NVivo software was appropriate for this study.

Qualitative researchers conduct data analysis to address the research question and achieve the main objective of the study (Xu & Recker, 2012; Yin, 2018). The focus of data analysis was to identify the key themes emerging from the interview transcripts of the participants. The consistency of the themes helped to provide information to understand the main themes that emerge from the literature and the interviews. I correlated the emerging themes with relevant themes from the review of the literature. The conceptual framework of this research study was the contingency theory advanced by Fiedler (1967). The fundamental premise of the contingency theory is its best-fit

scenario; the belief that a leader could control employees' performance, software testing technology, and culture within the organization to achieve a desirable outcome (Kim & Cameron, 2016; Tosi & Slocum, 1984). The data analysis process of this study enabled me to use Fiedler's contingency theory to identify the strategies managers use to improve software project success rate and profitability.

Reliability and Validity

Reliability

Reliability refers to how researchers address dependability. To establish the reliability in a research study, researchers should include in their methodology the verification of transcripts for mistakes to ascertain that there are no changes or errors in codes, rechecking, and cross-checking the process (Burchett, Mayhew, Lavis, & Dobrow, 2013). According to Yin (2018), and Coetzee et al. (2017), qualitative researchers should establish credibility, dependability, transferability, and conformability to ensure the trustworthiness of their research study. Research reliability depends on the researcher’s ability to replicate the results, including all the design processes and measurements (Coetzee et al., 2017; Görgens-Ekermans & Herbert, 2013; Yin, 2018). Therefore, to ensure accuracy, I cross-checked the results for consistency with the stated methods and processes utilized for collecting data.

According to Yin (2018), similar responses to specific questions can demonstrate flexibility and reliability. The number of interviews a researcher conducted would help establish the data saturation point, which occurs when no new data, information, or theme is available (Burau & Anderson, 2014; Cairney & St Denny, 2015; Green & Salkind,

2017). Fusch and Ness (2015) agreed with Burau and Anderson to argue that the data saturation determinant is not only based on the number of participants interviewed or the number of resources expended, but also on the depth of the data collected. I continued to interview participants until no new data, information, or themes were available. Most qualitative researchers establish the reliability of their research by addressing the dependability of the research process. Dependability refers to the stability and consistency of data over similar conditions and time (Fusch & Ness, 2015). By using the dependability criterion, researchers could assess the reliability of their studies and demonstrate that the research findings are consistent among researchers over time (Hays, Wood, Dahl, & Kirk-Jenkins, 2016). Some strategies qualitative researchers use to address the dependability of a research study include audit trail, coding, member checking, peer review, triangulation, and reflexivity (Hadi & Closs, 2016; Squires & Dorsen, 2018; Yin, 2018). To enhance the dependability of this study, I used the audit trail, member checking of data interpretation, interview protocol, and triangulation. Also, I used data saturation to assure the dependability of the study findings.

Validity

Researchers should ascertain the validity of their study findings. Validity implies the degree to which inferences made in a study are accurate (Morse, 2015). Therefore, researchers employ the concept of internal and external validity as a means of fortifying and informing the readers of the accuracy of their research study. Yin (2018) argued that the criterion for determining research quality is to ascertain validity, which consists of internal and external components. According to Pound and Ritskes-Hoitinga (n.d.),

external validity is the extent of reliably applying research findings from one setting, population or species to other contexts, people, and species. The value of internal validity to a qualitative case study allows realistic events to match research findings (Yin, 2018). Consequently, before considering the outcome of research to be valid, the researcher must determine the extent of the reliability of both the internal and external constructs of the examination. Marshall and Rossman (2016) and Yin (2018) argued that validity in qualitative studies includes credibility, transferability, conformability, and the extent of data saturation. In the next subsection, I discussed the approach to address the validity of the study findings.

Credibility. For a qualitative research study to be credible, the researcher should investigate all aspects of the data and collection methods, as well as account for any observed and salient patterns (Marshall & Rossman, 2016; Yin, 2018). Member-checking provides support to participants regarding the validation of their experiences (Chang, 2014; Gonzalez & Campbell, 2018; Keeton, Kathard, & Singh, 2017; Ramji, & Etowa, 2018). I conducted member checking to ensure the credibility of the study. To establish trustworthiness and credibility of this study, I implemented steps to achieve a high level of academic research standards.

Qualitative researchers use triangulation to establish the credibility of their study (Abalkhail, 2018). The four types of triangulation are method triangulation, investigator triangulation, theory triangulation, and data triangulation (Marshall & Rossman, 2016; Pitre & Kushner, 2015). Method triangulation involves using multiple methods and data of similar phenomena, while investigator triangulation involves several researchers

working together on a study. Theory triangulation is the use of more than one theory to analyze and explain research data, while data triangulation is the collection of data from different sources for a broader perspective. I used data triangulation involving semi-structured interviews and archival documents in six cases to establish the credibility of the research findings.

Transferability. The concept of transferability of research outcomes and conformity involves the triangulation of different data sources to ensure accuracy in recording, description, and reporting the research outcomes (Marshall & Rossman, 2016; Yin, 2014; Yin, 2018). According to Pitre and Kushner (2015) and Yin, theoretical triangulation is the concept that draws on alternative theories as analytical frameworks to explore different viewpoints regarding research phenomena or events. Triangulation is the use of either multiple methods or data sources in qualitative research to build a comprehensive understanding of phenomena or regularly occurring events (Marshall & Rossman, 2016; Nancy, Alba, Jennifer, & Alan, 2014; Yin, 2018). Consequently, to establish transferability, the researcher should consider the accuracy of the results to ensure that the approach adopted is consistent with practices other researchers have used on different projects. To enhance the transferability of the research findings, I provided a detailed description of the research process. Qualitative researchers should establish the confirmability of their study. Burau and Andersen (2014) and Yin (2018) argued that to maintain conformity and rigor, maintenance of audit trails, triangulation, and reflexivity are crucial. Most qualitative researchers establish confirmability of their research by providing a detailed description of how they interpreted data and process of deriving the

study findings from the data collected (Squires & Dorsen, 2018). To establish the confirmability of this study, I used methodological data triangulation, reflective journal, audit trail, and quotes from study participants.

Data saturation. The inability of a researcher to ascertain the data saturation point would negatively impact the quality of the study, because it would be difficult to fully validate the study outcomes (Fusch & Ness, 2015; Yin, 2018). Similarly, a data saturation point for one research may not be the same for another or similar research study. The researcher should choose a study design that is specific and poignant regarding how to reach a data saturation point (Vasileiou et al., n.d.). According to Vasileiou et al., researchers reach data saturation point when there are no new data and no themes from the participant interviews. In this study, I achieved data saturation by adopting a purposeful sampling technique with a continuous comparative framework. I continued to collect primary data from six case organizations until no new themes, data, or information emerged, and used archival data for data triangulation to reach data saturation. By reaching data saturation, I assured the dependability, credibility, transferability, and confirmability of the study findings.

Transition and Summary

In section 2, I reaffirmed the purpose of the study, discussed my role as the researcher and participants of the study, presented the research method and design, and described the population and sampling strategies. In addition, in Section 2, I discussed the ethical considerations in research, data collection instruments, data collection and organization techniques, data analysis technique, and the validity and reliability in

research. In section 3, I provide an overview of the study and present data from the study findings, which included data from interviews, analysis of the interviews, and archival documents. Other topics discussed in Section 3 include the application of the findings to professional practice, implications for social change, recommendations for action and future research, reflection, and summary and study conclusions.

Section 3: Application to Professional Practice and Implications for Change

This section contains an overview of the study and presentation of the findings on the strategies some software managers use to improve the success rate and profitability of their projects in the District of Columbia, Maryland, and Northern Virginia. Using examples from the research participants, I linked the study findings with the conceptual framework involving contingency theory. Other topics discussed in this section include the application of the findings to professional practice, implications for social change, recommendations for action and future research, and my reflections on the research. The section ends with a summary and study conclusions.

Overview of Study

The purpose of this qualitative multiple case study was to explore strategies software managers use to improve the success rates and profitability of their projects. The conceptual framework and the overarching question was, What strategies do managers use to improve the success rate of software projects and profitability? Six software managers, who have successfully implemented strategies to improve software project success rate and profitability from firms in the District of Columbia, Maryland and Northern Virginia, participated in this study. The participants provided me with the primary data to answer the overarching research question. The sources of secondary data included company archival documents, field notes, and observations. To achieve data saturation, I continued the data collection process until no additional information emerged from the document review and interview process. Based on the participants' responses to the interview questions, I identified four themes: (a) stakeholder

requirement; (b) testing, evaluation, and training; (c) communication; and (d) project management process. The contingency theory provided a better understanding of the strategies some software managers use to improve software projects' success rates and profitability. The findings from this study illustrate that some software managers use a combination of strategies to improve software projects' success rates and profitability.

Presentation of the Findings

The overarching question was, what strategies do managers use to improve the success rate of software projects and profitability? From 1994 to 2016, about 60% of software development projects failed globally, resulting in organizations operating below profitable levels (El Yamami et al., 2017; Shahzad et al., 2017). Managers and leaders in the software industry face the persistent problem of software project failure and poor quality (El Yamami et al., 2017; Maassen, 2018). Business leaders of software companies invest a significant amount of human capital, time, and funds for software innovation and effective quality management strategies (Bugnar et al., 2016; Shahzad et al., 2017), yet some software business leaders operate below a profitable level because they lack the strategies to improve software quality and reduce operational costs (Jindal et al., 2016; Shahzad et al., 2017; Yubin et al., 2018). Leaders of software firms should understand that having an array of efficient strategies could positively impact profitability and add value to their business (Malaquias, & Albertin, 2018; Shahzad et al., 2017). The four themes I identified in this study are (a) stakeholder requirements; (b) testing, evaluation, and training; (c) communication; and (d) project management process. In the following

subsections, I will present the four themes that emerged from the thematic analysis of the participants' responses to the interview questions.

Theme 1: Stakeholder Requirement

The first theme pertained to requirements for stakeholders. As Davis (2017) noted, project managers should understand project stakeholders' requirements to improve project performance. Thus, the strategy of involving various stakeholders greatly influences project performance (Eskerod & Larsen, 2018). Project management success is a measurement of stakeholder and client satisfaction (Blaskovics, 2016). Software leaders should formulate ideas and strategies to fulfill customer needs and requirements (Muschevici et al., 2016). The first theme to emerge was the stakeholder requirement, which includes meeting and exceeding the customers' requirements and expectations. The theme stakeholder requirements emerged from Interview Questions 1-7. All participants affirmed meeting stakeholders' requirements as a strategy to improve software project success rate and profitability.

By fulfilling specific customer needs, business managers could improve business performance (Zancul et al., 2016). Participants agreed that meeting stakeholders' customer requirements is critical to improving the success rate and profitability of software projects. P2 and P6 explained the importance of adopting strategies that will provide more opportunities to meet stakeholders' requirements and specifications. Responding to Interview Question 1, P1 said, "We often adopt strategies we deem practical enough and feasible that allow us to meet our stakeholder requirement specifications." Answering a follow-up question, P1 explained, "The strategies we adopt

for any software project should allow us to incorporate the stakeholder views and feedback in an on-going project, so that the outcome will meet the needs of the client." In response to Interview Question 1, P2 stated, "We often combine any practical strategy that allows us to meet our stakeholder requirement specifications … model that accommodate stakeholder's input during improvement development." The company archival documents that P1 and P2 provided validated their statements. P1 and P2 provided archived organizational operations journals and schedules of operation, respectively. These two archival documents helped the software project manager to ascertain the intensity of the organization's regular activity, which allows us to design more user-friendly software.

Researchers have advised leaders of software firms to develop ideas and policies to meet customer requirements (Muschevici et al., (2016). Responding to Interview Question 1, P3 remarked, "We often adopt strategies that will enable us to interact with the stakeholders and possibly the end-users, if possible." Providing further narrative, P3 affirmed, "We deliberately seek the critical stakeholder's views and input, and we make every effort to incorporate their feedback into our process." In conclusion to Interview Question 1, P3 opined, "This strategy has enabled us to improve our software projects and meet our stakeholder requirement specifications." Participant P6 added, "Before we start any software project, we have to understand the requirements specifications thoroughly." The participants acknowledged the importance of understanding and meeting stakeholder requirement specifications to improve software project success rate and profitability.

Some researchers have demonstrated that meeting stakeholders' requirements is one of the factors that affect the success of projects (Montequin, Cousillas, Alvarez, & Villanueva, 2016; Ozguler, 2016; Yalegama, Chileshe, & Ma, 2016). In response to Interview Question 2, P2 attested, "The strategies we implement in improving software projects often allow incorporation of stakeholders' input to ensure we meet their requirement specifications during the development and execution process." Responding to Interview Question 2, P3 noted, "The method we use has been highly effective for us in producing a working model that meets the stakeholder's required specifications." In response to Interview Question 2, P5 said, "In my experience, when we adopt a strategy, we always ensure that it is feasible to use the strategy to fulfill the stakeholder requirement specifications." Responding to Interview Question 2, P6 affirmed, "In my experience, when we adopt a strategy, we always ensure that it is feasible to use the strategy to fulfill the stakeholder requirement specifications." According to P6, "Applying the strategies have helped us to meet our stakeholder requirement specifications." Deducing from P6 indicated that meeting the stakeholder requirements plays a significant role in software project success and profitability.

Project managers should meet stakeholders' requirements to improve the project success rate and performance (Eskerod & Larsen, 2018; Yalegama et al., 2016). In response to Interview Question 3, P2 acknowledged encountering "challenges from the clients (stakeholders)" in implementing strategies to improve software project success rate and profitability. Responding to Interview Question 3, P3 noted, "The second challenge we encounter is the introduction of changes to the original requirement

specifications by the stakeholder.” In response to Interview Question 3, P4 said, “The second challenge we encounter is the stakeholder's abrupt introduction of new element changes to the original requirement specifications.” Responding to Interview Question 3, P5 noted, “The other challenge we often encounter is our ability to maintain an agreed-upon schedule when the stakeholders request changes to the original requirement specification. The changes requested by the stakeholder were expected, and we made accommodations for them as they helped improve our project outcomes.”

Firm leaders adopt approaches to satisfy specific customer needs (Barquet et al., 2016). Responding to Interview Question 4, P5 said, “The strategies we use are structured to fulfill the stakeholder requirement specifications to improve the possibilities of our work being accepted.” Answering Interview Question 4, P6 responded, “The strategies we used to improve software project quality result in increased profitability, by enabling us to produce high-quality software, meeting all requirements specifications required by our client.” In response to Interview Question 5, P4 explained, “We comply with requirement specifications and are open-minded to comply with clients' requested changes, and our customer base and profit have steadily improved.” Responding to Interview Question 5, P5 noted, “… we make every effort to produce zero error software that always meets all of our client's requirements specifications.” In response to Interview Question 5, P6 stated, “We start every software improvement project by studying and understanding the client's requirements specifications.Then, we work to meet all of them with the client's input and certification.” The company archival documents that participants P5 and P6 provided validated their statements.

In response to Interview Question 6, some participants said:

- "The critical metrics we used to measure software project success rates in our company is the satisfaction of our customers in our project execution, products, and services." (P1)
- "The critical metrics we used to measure software project success rates in our company is the satisfaction of our clients in our project execution, products, and services." (P2)
- "The critical metrics we used to measure software project success rates in our company are the satisfaction of our clients in our project execution, products, and services, and compliance with the requirement specifications." (P3)
- "The critical metrics we used to measure our software project success rates are met requirement specifications – our software improvement should meet clients' specifications requirements, and customer acceptance." (P5)
- "The critical metrics is to meet requirement specifications from the client, and did the client certify and accept the product." (P6)

Responding to Interview Question 7, P4 noted, "The auditing practices we use to measure improvement in our software project and profitability is to ensure that all project reporting requirements are met." In response to Interview Question 7, P5 stated, "The auditing practices we use to measure improvement in our software project and profitability is uniform audit standards - specify specific elements that must be audited."

The participants' responses to the interview question aligned with Davies (2017), Eskerod and Larsen's (2018), Montequinet et al.'s (2016), and Yalegama et al.'s (2016)

statements that project managers meet stakeholder requirements to improve software project success rate and profitability. The study findings demonstrated that managers used stakeholder requirements as a strategy to improve software project success rate and profitability. As applied in this study, 100% of the participants attested using stakeholder requirements as a strategy to improve software project success rate and profitability.

Theme 2: Testing, Evaluation, and Training

Research indicates that having a skilled workforce, practical strategies, and production of quality software could generate higher profits and market share and increased longevity (Dawson, 2015; Ebert, 2014). Researchers should focus on using an error checking process to explore the possibility of producing a quality product outcome that would address as much as possible the concerns of clients (Hyatali & Fai Pun, 2016). The theme testing, evaluation, and training emerged from Interview Questions 1-3, 5, and 7-8. During the interview, all participants attested using testing, evaluation, and training as a strategy to improve software project success rate and profitability.

According to Carlton (2017) and Ebert (2014), the outcome of the software project innovation process depends on the skill set of firm employees. Responding to Interview Question 1, participant P1 said, “We test early and test often. Early testing ensures that any defects do not become compounded, broader, more complicated issues because the more significant the defect, the more expensive it becomes to resolve.” The testing document that P1 provided validated the statement. In response to Interview Question 1, P5 noted, “Any strategy we use in software project improvement, we always include provision for training and testing at every stage of the project development

process." The training document that P5 provided validated the statement. Responding to Interview Question 1, P6 attested, "The most important strategy we use to improve our software projects is the final comprehensive test that has to be done in a test environment, review, and analysis."

Seago (2017) argued that organization engagement objectives should focus on using appropriate criteria to evaluate governance, risk management, and controls of a project. In response to Interview Question 2, P3 stated, "One strategy for me is to test each module we completed in our project for errors. The method of modulating and testing as we go along has been highly effective for us in producing a working model." Responding to Interview Question 2, P4 attested, "Applying the strategies and testing our product error rate and notice drastic reduction to almost a zero-error convinced us that our policies are effective." In response to Interview Question 2, P5 explained, "Applying the strategies and analyzing the outcome and testing helps to indicate the quality of the end product." Responding to Interview Question 3, P2 said, "The challenges we encountered during the implementation of strategies involve knowledge-based training, change of office culture, and team building, which takes a lot of training and resources."

Sato and Yamada (2016) contended that it is essential to confidently review and test, to assure software quality and review design requirements. Responding to Interview Question 5, P3 posited, "We have also adopted the policy of developing our software in modules, as well as testing each developed module and resolving all issues before moving to any new modules." In response to Interview Question 5, P4 said, "We have incorporated a lot of testing and review, using industry-standard software tools, include

the stakeholders and customers in our testing and review process." Responding to Interview Question 5, P5 stated, "We also include several testing and evaluation strategies in our software development process using industry-standard software testing tools." In response to Interview Question 5, P6 affirmed, "We also use industry-standard software testing tools and maintain transparency at all levels of the project testing and review process."

Sadowski et al. (2018) indicated that some researchers had analyzed the use of bug-detection capabilities in producing functional quality software. Responding to Interview Question 7, P2 noted, "We use the software project auditing practices to measure improvement in the software project and profitability by taking into consideration peer-to-peer learning sources for each other." In response to Interview Question 7, P3 stated, "We make learning source activities available to employees. The consultant learning model helped us ensure improved software projects and increase our profitability." Responding to Interview Question 7, P6 said, "We rely on application of uniform audit standards (specify specific elements that must be audited and the technique of testing) and use industry-standard auditing tools to achieve consistent evaluation standards." In response to Interview Question 8, P3 advised, "In project implementation, constant testing is essential." The software project testing document that P3 provided validated the statement.

The participants' responses to the interview questions aligned with Carlton's (2017), Hyatali and Fai Pun's, (2016), Sadowski et al.'s (2018), and Seago's (2017) statements that project managers use testing, evaluation, and training to improve software

project success rate and performance. The study findings demonstrated that managers used testing, evaluation, and training as a strategy to improve software project success rate and profitability. As applied in this study, 100% of the participants attested using testing, evaluation, and training as a strategy to improve software project success rate and profitability.

Theme 3: Communication

Communication management affects the success of projects (Ozguler, 2016). According to Sarhadi (2016), consistent communication establishes trust amongst the project team members and improves project performance. Project managers should use communication effectively to enhance project performance (Ahmed, 2017; Browne, Dreitlein, Ha, Manzoni, & Mere, 2016). The theme of communication emerged from Interview Questions 1-3, 5, and 7. All participants recognized the importance of communication in improving software project success rate and profitability.

Responding to Interview Question 1, P1 noted, “We maintain continuous communication with all of the team to ensure uniformity.” In response to Interview Question 2, P5 remarked, “We must also maintain an open communication channel with all teams working on the other modules of the software project.” Responding to Interview Question 2, P6 attested, “We must also maintain an open communication channel with all teams working on the other modules of the software project.”

Responding to Interview Question 3, P1 said, “The second challenge we encounter is communication, since we have to communicate with all the stakeholders, end-users who are located all over the world and time zones.” In response to Interview

Question 3, P2 stated, “Because of the clients’ lack of clarity, open communication is essential, and they are often willing to provide and meet as often as necessary.” Responding to Interview Question 3, P3 noted, “The first challenge we encounter is that of effective communication between the stakeholder and our organization.” In response to Interview Question 3, P4 remarked, “As most of our clients are outside the USA, the first challenge we often encounter is that of effective communication between the stakeholder that speaks a foreign language other than English and non-software professionals.” Responding to Interview Question 3, P5 attested, “Effective communication between our company and the clients. If our company is dealing with an international organization that speaks another language than English, the communication challenge magnifies.” In response to Interview Question 3, P6 affirmed, “Lack of effective communication channels between our company and the clients. This is important as we need time to have to clarify the terms clients used in preparing the requirement specifications.”

Responding to Interview Question 5, P5 noted, “Before I joined this company, it was explained to me that open communication and client input during the software development process is incredibly essential and mandatory.” In response to Interview Question 7, P3 remarked, “The auditing practices we use to measure improvement in our software project and profitability take into consideration the level of team building within the project teams, including communication.” A review of the company documents indicated that all participants use effective communication to routinely engage

stakeholders and project team members during planning and execution of software development projects.

The participants' responses to the interview question aligned with Ahmed's, (2017), Browne et al.'s, (2016), Ozguler's (2016), and Sarhadi's (2016) statement that project managers use communication to improve software project success rate and profitability. The study findings demonstrated that managers used communication as a strategy to improve software project success rate and profitability. As applied in this study, 100% of the participants attested using communication as a strategy to improve software project success rate and profitability.

Theme 4: Project Management Process

Leaders should study and understand the correct application of different concepts (Hyatali & Fai Pun, 2016). Managers of the software innovation project should be decisive and use intervention tools, which could help adjust key deficient variables and improve software quality (Camio et al., 2018; Jackman et al., 2017). Project managers should adhere to the project management process to improve project performance (Hashim, Yusof, & Alamen, 2018). By adhering to project management processes, project managers could manage constraints to improve performance by minimizing risks (Odimabo & Oduoza, 2018). The theme project management process emerged from Interview Questions 1-3, 5, and 7. Five participants acknowledged using the project management process as a strategy for improving software project success rate and profitability.

Tomanek and Smutny (2014) proposed a shift to the Agile method, which they contend could improve the success rate of projects and mitigate some of the typical issues when using other methods of project development and management. Sunyaev (2013) reviewed the agile principles from a framework perspective and agreed with Tomanek and Smutny's proposition to create a new and more suitable framework for software development. Responding to Interview Question 1, P1 noted, “We often adopt strategies we deem practical enough and feasible that allow us to use the agile method in combination with other steps.” In response to Interview Question 1, P2 remarked, “We often combine any practical strategy with an agile development model that allows us to meet our stakeholder requirement specifications.” Responding to Interview Question 1, P6 said, “We often combine elements of the agile development model in software development projects because of its iterative provision.” The company archival documents that P1 and P2 provided validated their use of agile development model in software development project.

Henriksen and Pedersen (2017) argued that the use of agile development methodologies affords more flexibility than other software development models. Strode (2016) argued that agile practice would be a suitable choice for organizing and collaborating on various software projects. Responding to Interview Question 2, P2 stated, “We often combine any practical strategy with an agile development model that allows us to improve the quality of our software projects.” In response to Interview Question 2, P5 affirmed, “We often use software development tools that we are familiar with so that we do not have to spend time learning how the tool work.” Responding to

Interview Question 2, P6 remarked, “We are never in any rush to choose a particular tool or tool because once the software project is produced, we do not want to switch tools or correct errors that emanate from using the wrong tool.”

Researchers observed that efficient planning and use of automated tools contribute to high-quality software products (Calp & Kose, 2018; Teslia et al., 2017). In response to Interview Question 3, P2 remarked, “The challenges we encounter from the clients are expected and not unusual and can be resolved during the software improvement process.” Responding to Interview Question 5, P4 noted, “We refer to the agile model. We have incorporated a lot of testing and review, using industry-standard software tools, include the stakeholders and customers in our testing and review process.” In response to Interview Question 5, P5 stated, “We include clients and stakeholders in our software project development process or refer to our strategy as a software agile development model.” Responding to Interview Question 5, P6 said, “We include clients, stakeholders, and customers in our software project development process.” My review of the company documents revealed that P4 and P5 use agile development model in software development projects.

Barki et al. (2015) developed an IRMF which outcomes are grounded in the concept of best-fit scenarios between project risk exposure and how risk is controlled and managed. The better the project management strategies that firms adopt, the higher the business performance, yielding increased profits (Muschevici et al., 2016). Responding to Interview Question 7, P4 noted, “Among the auditing practices we use to measure improvement in our software project and profitability is use umbrella of software auditing

tools." In response to Interview Question 7, P5 remarked, "We use industry-standard auditing tools and consistent evaluation standards to measure improvement in our software project and profitability." Responding to Interview Question 7, P6 attested, "we rely on the use of industry-standard tools for software tests to ensure objectivity in test result analysis."

The participants' responses to the interview question aligned with Calp and Kose's, (2018), Camio et al.'s (2018), Jackman et al.'s (2017), and Teslia et al.'s (2017) statements that project managers use project management process to improve software project success rate and profitability. The study findings demonstrated that managers used communication as a strategy to improve software project success rate and profitability. As applied in this study, 83.3% of the participants attested using project management process as a strategy to improve software project success rate and profitability.

Findings Related to Contingency Theory

The contingency theory was the conceptual framework for this study. The central premise of contingency theory is that a leader's success depends on leadership style and situation and extends to a service context (Williams et al., 2017). Zhang (2017) contended that contingency theory reflects contextualizing system utilization, focusing on the nature of the system, and identifying contingency factors which include the task, system, user, and leadership of the firm. The fundamental premise of contingency theory is its best-fit scenario aspect, which is that a leader could control factors such as employee's performance, software testing technology, and to an extent, the culture within

the organization, to help achieve the desirable outcome (Kim & Cameron, 2016; Tosi & Slocum, 1984). The study findings indicate that the managers in software firm could improve software project success rate and profitability by implementing strategies based on contingency theory. As applied in this study, all participants affirmed using a combination of strategies to improve software project success rate and profitability.

The fundamental construct underlying the contingency theory include intrinsic and extrinsic factors that impact the organization's employees. Joslin and Muller (2016) aligned with Fiedler and Mahar (1979) regarding the existence of a positive relationship between methodology and the characteristics of the project's success, noting the crucial role of environmental factors and governance. By adopting the tenants of contingency theory to guide the identification of best-fit scenarios, a leader could produce quality software, avoid failure, and clients' rejection of the products (Ellyson et al., 2012). As applied in this study, managers should establish strategies for improving software project success rate and profitability. All participants confirmed the contingency theory approach regarding the use of strategies to improve software project success rate and profitability.

Information Technology firms use contingency theory to examine initiatives, such as corporate standardization and tailoring of project management process tools and techniques (Tereso et al., 2019). Researchers have used contingency theory to evaluate leadership style, situation, and project improvements (Williams et al., 2017). The suitability of the contingency theory as a project methodology and design depends on the degree of alignment with the project environment (Fiedler & Mahar, 1979; Joslin & Muller, 2016). Previous research studies indicate that contingency theory model is a

useful framework that managers could use to establish strategies for improving software project success rate and profitability. As applied in this study, all participants' responses echoed Tereso et al.'s statements on using strategies based on the contingency theory model to improve software project success rate and profitability.

Leadership style is the underlying need-structure of individual leaders that motivate employees' behavior in distinct leadership environments (Choi et al., 2017). Lyons et al. (2018) posited that business leaders should make efforts to provide responsive and integrative leadership development curricula and experiences essential for developing future leaders. Burstrom and Wilson (2018) opined that the role of a manager is essential to the efficient operation of a firm in terms of planning, execution, and managing day-to-day activities and long-term objectives. As applied in this study, managers performed specific roles to improve software project success rate and profitability. All participants' responses echoed Burstrom and Wilson's assertions on the crucial roles managers play in improving project software project success rate and profitability.

According to Yan and Nair (2016), when adopting the contingency theory, researchers can explore whether the external context moderates' internal structure and the effect on project outcomes. Aruna (2016) demonstrated a positive correlation between management, project planning, and project performance. Software quality involves understanding and fulfilling the customers' desired requirements (Aruna, 2016; Rose & Furneaux, 2016). Researchers have demonstrated that Fiedler's (1967) contingency theory is a useful model for improving business processes and profitability (Chen et al., 2017;

Ericsson et al., 2015; Sapunar et al., 2016). All participants used a combination of strategies involving stakeholder requirement; testing, evaluation, and training; communication; and project management process to improve their software project success rate and profitability. As applied in this study, all participants applied the contingency theory principles to improve their software project success rate and profitability.

Applications to Professional Practice

The identification of strategies that managers use to improve software project success rate and profitability is crucial to business performance and sustainability. The impact of poor-quality software and project failure remains a persistent problem for firm managers and leaders in the industry (El Yamami et al., 2017; Maassen, 2018). Managers should improve their business performance and sustainability (Gauthier, 2017). Leaders of software organizations should have a myriad of efficient strategies to improve their business performance and profitability (Malaquias, & Albertin, 2018; Shahzad et al., 2017). The findings of this study could contribute to information sharing, teamwork, and collaboration among managers of software firms who are seeking strategies for improving software project success rate and profitability. Leaders of software firms with weak business strategies may use the findings of this study to improve software project success rate and profitability, improve business performance, and enhance their firm sustainability.

The review of software innovation process strategies may reveal whether an increase in software complexity could influence the probability of implementation failure

(Shahzad et al., 2017). Some software business leaders lack the strategies to improve software quality and reduce operational costs (Jindal et al., 2016; Shahzad et al., 2017; Yubin et al., 2018). Software project managers should understand the critical success factors for improving software project profitability (Chen et al., 2016; Rose & Furneaux, 2016; Scala et al., 2015). By publishing the results of this study, software business leaders could learn strategies for enhancing software project development, improve software project quality, and improve firm profitability. Based on the study findings, the most significant contribution to professional practice may be the provision of a practical model for managers to develop strategies for improving software project success rate and profitability. The practical model could serve as the basis for improving global business practice in software industries.

The critical issues for leaders are the improvement of the software project and the maximization of profitability (Hammer, 1990; Khan & Malik, 2017). Chen et al. (2016) advised managers to identify strategies to improve their firms' profitability. All the participants attested using a combination of strategies to improve software project success rate and profitability. The results of this study could aid managers of software firms to improve software project success rate and profitability. The findings from this study could significantly enhance software firm's performance on strategies to improve software project success rate and profitability. The study findings may contribute to the literature in project management and provide managers of software firms with new insights regarding strategies to improve software project success rate and profitability. New and upcoming managers in software firms may use the findings of this study to

understand the strategies and best practices for improving software project success rate and profitability.

Managers and business leaders should identify appropriate improvement strategies for their industry (Rose & Furneaux, 2016). According to Camio et al. (2018), most business leaders are increasingly recognizing the importance of deploying business software to improve their business performance and survival. Business leaders should enhance their competency and capability to promote creativity and innovation within the organization (Scala et al., 2015). This study's findings might contribute to better business practices by identifying software process improvements and quality management strategies that improve an organization's profitability. The findings of this study might add value to the software business community through the dissemination of information regarding the strategies for improving software project success and profitability. All participants acknowledged that meeting stakeholder requirement and communication were fundamental to improving software project success rate and profitability.

Implications for Social Change

A significant implication for positive social change of this study includes providing software managers with strategies to improve software project success rate and profitability. Software project managers could enhance the project development cost through the improvement of organizational operations, efficiency, and profitability, which may increase the software firms' competitive advantage (Khan & Malik, 2017; Dolata, 2019). Business leaders should employ strategies for improving skills, knowledge, and experience of employees (Garcia & Coltre, 2017; Stephan et al., 2016).

By studying the research outcomes and implementing excellent strategies, software project managers might influence the cost of software development projects and sustain their firms. The existing area software managers could use the information from this study to enhance the relationship with stakeholders and employees to improve software project success rate and profitability.

The study findings might significantly contribute to the economy of the local community. Researchers have demonstrated that business growth and profitability help to strengthen local economies, create jobs, and sustain small businesses (Stephan et al., 2016). Adopting strategies to improve software project success rate and profitability might assist managers to increase firm performance, thereby boosting economic growth for local communities. With improved business performance, the software firms would pay more corporate taxes, which the municipal government could use to provide social amenities to the local community. New aspiring software entrepreneurs could use the information gained from this study findings to establish new businesses which could create job opportunities to local citizens, thereby promoting socioeconomic growth in the local community. As illustrated in this study, improving software project success rate and profitability might assist managers to complete software projects, increase customer base, and continue to provide job opportunities to the local community.

Software business growth and profitability could contribute to social change by strengthening local economies, sustaining small businesses, and creating job opportunities, thereby improving the welfare and amenities for the local communities. By improving software project success rate and profitability, leaders of software firms could

accomplish their corporate social responsibilities to the local citizens through sponsorship of local events, awards of scholarships, and building of social amenities such as healthcare, libraries, and schools. The general public might learn from the strategies managers use to improve software project success rate and profitability.

Recommendations for Action

An effective leadership strategy is essential to improve software project success rate and profitability. According to Shahzad at al. (2017), 60% of software development projects failed, resulting in organizations operating below profitable levels. Some software business leaders lack strategies to improve software quality and reduce operational costs (Jindal et al., 2016; Shahzad et al., 2017; Yubin et al., 2018). I recommend that managers of software firms should implement strategies to improve software project success rate and profitability.

An effective strategy is crucial to the successful implementation of the software project and business performance. According to the Office of Management and Budget (2019), the US government spent $81 billion annually on software and IT development projects. Leaders of software organizations should understand that having a myriad of efficient strategies could positively impact profitability and add value to their business (Malaquias, & Albertin, 2018; Shahzad et al., 2017). I recommend that managers should implement strategies involving meeting stakeholder requirements and effective communication to improve software project success rate and profitability.

Business leaders should adopt effective strategies to improve business performance and sustainability. The impact of poor-quality software and project failure

remains a persistent problem for firm managers and leaders in the software industry (El Yamami et al., 2017; Maassen, 2018). Managers of software firms are expected to strategically manage the project process because of the increasing importance of software development in businesses (Camio et al., 2018). To sustain software firms, managers should implement strategies to improve software project success rate and profitability. I recommend that managers of software firms should adopt strategies to improve business performance and sustainability.

The study findings indicate that managers of software firms use a combination of strategies to improve software project success rate and profitability. I recommend that managers should have adequate skills and experience to identify the appropriate strategies for improving software project success rate and profitability. I will disseminate the findings of this study to interested stakeholders through knowledge sharing in my social media and workplace; presentation in seminars, training, and conferences; and publications in business and academic journals.

Recommendations for Further Study

The purpose of this qualitative multiple case study was to explore the strategies managers use to improve software project success rate and profitability. Researchers have advised leaders of software firms to develop a myriad of efficient strategies to positively impact business profitability and sustainability (Malaquias, & Albertin, 2018; Shahzad et al., 2017). A significant limitation of this study is the cross-sectional, qualitative multiple case study involving managers of software firms in the District of Columbia, Maryland, and Northern Virginia. I recommend future researchers should explore longitudinal,

quantitative or mixed methods, involving participants selected from varying levels of employees in diverse industrial sectors at different geographical locations.

The study provided rich information that future researchers could further explore regarding the strategies managers use to improve software project success rate and profitability. This study was limited to the small sample size of six software managers who have successfully implemented strategies to improve software projects resulting in profitability. Researchers could obtain different themes by using larger or smaller sample size. I recommend that future researchers should use a more significant sample size of participants with diverse roles and responsibilities in the software development project from many organizations.

I have limited knowledge and competency in doctoral research. The study was limited to my accurate interpretation and subjective evaluation of the participants' responses to the interview questions. Another limitation of this study was my professional background in software development and personal beliefs regarding strategies managers use to improve software project success rate and profitability. I recommend future study should involve research experts from multi-disciplinary fields in software development projects to capture some details that I might have missed in this doctoral study.

Reflections

The purpose of this qualitative multiple case study was to explore the strategies managers use to improve software project success rate and profitability. In compliance with research ethics, I attended online CITI Program training and obtained Walden

University IRB approval before engaging the participants, which improved my understanding of the requirements for using human beings in a research study. By using emails and telephone calls to contact participants, I had the opportunity to improve my negotiation, collaborative, creative, and inspirational skills. In conducting this doctoral study, I used purposive sampling technique to select six managers of software firms who had the relevant skill, knowledge, competence, and experience to answer the research question. The purposive sampling technique enabled me to improve my problem solving, ethical, and critical thinking skills.

By using the qualitative research method, I conducted semi structured interviews and interacted with the participants, which helped me to improve my listening, interpersonal, communication, and networking skills. During the interview process, I conducted the interview at participants' conducive date and time, which enabled the respondents to express themselves freely and offered me an opportunity to gain an in-depth understanding and knowledge of the research problem. The organization and analysis of data collected from participants to establish themes and patterns enabled me to understand the research problem and establish the study findings.

From the research findings, I obtained an in-depth knowledge of the research problem from six managers of software firms on the different strategies they use to improve software project success rate and profitability. I understood that managers of software firms use a blend of similar strategies to improve software project success rate and profitability. Of particular interest is the knowledge that most managers of software firms use customer requirements; testing, evaluation, and training; communication; and

project management process as significant strategies for improving software project success rate and profitability. The study findings changed my personal biases and preconceived ideas and values on the approaches for improving software project success rate and profitability, because I have gained knowledge and understanding from the six managers of software firms. Reflection on my experiences within the DBA doctoral study process, I gained a better understanding and knowledge of the research process, which improved my knowledge, competency, and skill in conducting academic research work.

Summary and Study Conclusions

Managers of software firms face challenges on how to improve software project success rate and profitability. This qualitative multiple case study aimed to use CT to explore the strategies that managers of software firms in the District of Columbia, Maryland, and Northern Virginia use to improve software project success rate and profitability. I administered eight open-ended questions through semi-structured interviews of six managers from six software firms to collect data to answer the overarching research question. Four themes emerged from the thematic analysis of the data indicating the strategies managers of software firms in the District of Columbia, Maryland and Northern Virginia use for improving software project success rate and profitability. The themes were (a) stakeholder requirement, (b) testing, evaluation, and training, (c) communication, and (d) project management process.

New and upcoming managers of software firms may gain useful insights and information on effective strategies for improving software project success rate and profitability. By improving software project success rate and profitability, managers

could sustain their business and continue to provide job opportunities, boost the economy, and accomplish their corporate social responsibilities to citizens in local communities. The use of contingency theory as the lens for this study may fill a gap in the literature on software project development process. The general public might learn from the strategies managers use to improve software project success rate and profitability. The study findings aligned with previous researchers' conclusions regarding the benefits and significance of using effective strategies to improve software project success rate and profitability.

References

Abalkhail, J. M. (2018). Challenges of translating qualitative management data. *Gender in Management, 33,* 66-79. doi:10.1108/GM-03-2016-0029

Ahmed, R. (2017). Significance of communication and project management processes in public sector projects. *Proceedings of the 33rd International Academic Conference*, 36-43. doi:10.20472/IAC.2017.33.002

Albano, R., Mancusi, L., Sole, A., & Adamowski, J. (2017). Floodrisk: A collaborative, free and open-source software for flood risk analysis. *Journal of the Association for Information Systems, 18*(11), 1812-1832. doi:10.1080/19475705.2017.1388854

Almutairi, S., & Weheba, G. (2018). Factors correlating with revisions of the ISO 9001 quality management standard. *Journal of Management & Engineering Integration, 11*(2), 25-36. http://hdl.handle.net/10057/15901

Alpi, K. M., & Evans, J. J. (2019). Distinguishing case study as a research method from case reports as a publication type. *Journal of the Medical Library Association: JMLA*, *107*(1), 1-5. doi:10.5195/jmla.2019.615

Ancveire, I., Gailite, I., Gailite, M., & Grabis, J. (2015). Software delivery risk management: Application of Bayesian networks in agile software development. *Information Technology & Management Science*, *18*(1), 62-69. doi:10.1515/itms-2015-0010

Anyan, F. (2013). The influence of power shifts in data collection and analysis stages: A focus on qualitative research interview. *Qualitative Report, 18,* 1-9. http://www.nova.edu/sss/QR/

Asamani, J. A., Naab, F., & Ofei, A. M. A. (2016). Leadership styles in nursing management: Implications for staff outcomes. *Journal of Health Sciences*, *6*(1), 23-36. doi:10.17532/jhsci.2016.266

Atkinson, P., & Morriss, L. (2017). On ethnographic knowledge. *Qualitative Inquiry, 23,* 323-331. doi:10.1177/1077800416655825

Babar, M. I., Ghazali, M., Jawawi, D. N. A., & Zaheer, K. B. (2015). Stake meter: Value-based stakeholder identification and quantification framework for value-based software systems. *PLoS ONE*, *10*(3), 1-33. doi:10.1371/journal.pone.0121344

Barki, H., Rivard, S., & Talbot, J. (2015). An integrative contingency model of software project risk management. *Journal of Management Information Systems, 17*(4), 37-69. doi:10.1080/07421222.2001.11045666

Barquet, A. P., Buchert, T., Galeitzke, M., Neugebauer, S., Oertwig, N., Rezenfeld, H., & Seliger, G. (2016). Sustainable product service systems: From concept creation to the detailing of a business model for a bicycle sharing system in Berlin. *Procedia CIPR, 40,* 524-529. doi:10.1016/j.procir.2012.127

Bergmane, L., Grabis, J., & Zeiris, E. (2017). A case study: Software defect root causes. *Information Technology and Management Science, 20,* 54-57. doi:10.1515/itms-2017-0009

Black, P., Badger, M., Guttman, B., & Fong, E. (2016). *Dramatically reducing software vulnerabilities*: *Report to the White House Office of Science and Technology Policy.* NIST Interagency/Internal Report (NISTIR) 8151, National Institute of Standards and Technology, December 2016. doi:10.6028/NIST.IR.8151

Blaskovics, B. (2016). The impact of project manager on project success – the case of ICT sector. *Society and Economy*, *38*, 261-281. doi:10.1556/204.2016.38.2.7

Boblin, S. L., Ireland, S., Kirkpatrick, H., & Robertson, K. (2013). Using stake's qualitative case study approach to explore the implementation of evidence-based practice. *Qualitative Health Research*, *23*, 1267-1275. doi:10.1177/1049732313502128

Bolemen, R., Amrit, C., Kuhlmann, S., & Ordonez-Matamoros, G. (2014). Innovation diffusion in open source software: Preliminary analysis of dependency changes in the Gentoo Portage Package database. University of Twente. The Netherlands.

Bons, P. M., & Fiedler, F. E. (1976). Changes in organizational leadership and the behavior of relationship- and task-motivated leaders. *Administrative Science Quarterly, 21(*3*), 453-473*. doi:10.2307/2391854

Bordieri, M. J., Kellum, K. K., Wilson, K. G., & Whiteman, K. C. (2016). Basic properties of coherence: Testing a core assumption of relational frame theory. *Psychological Record*, *66*(1), 83-98. doi:10.1007/s40732-015-0154-z.

Brear, M. (2019). Process and outcomes of a recursive, dialogic member checking approach: A project ethnography. *Qualitative Health Research*, *29*, 944-957. doi:10.1177/1049732318812448

Brown, G. (2012). Research ethics application: a guide for the novice researcher. British Journal of Nursing, 21(1), 38–43. http://stabler3010.pbworks.com/w/file/fetch/60346390Greeney%2520Sheehy%2520et%2520al%2520research%2520ethics.pdf

Browne, W., Dreitlein, S., Ha, M., Manzoni, J., & Mere, A. (2016). Two key success factors for global project team leadership: Communications and human resource management. *Journal of Information Technology and Economic Development, 7*, 40–48. http://www.gsmi-ijgb.com

Bubevski, V. (2013). A novel approach to software quality risk management. *Journal of Software Testing, Verification and Reliability, 24,* 124-154. doi:10.1002/stvr.1488

Bugnar, N. G., Mester, L. E., & Fora, A. F. (2016). Innovation and international competitiveness of a country. *Annals of the University of Oradea, Economic Science Series, 25*(2), 3543. https://ideas.repec.org/a/ora/journl/v1y2016i2p35-43.html

Burau, V., & Lotte, B. A. (2014). Professions and professionals: Capturing the changing role of expertise through theoretical triangulation. *American Journal of Economics & Sociology, 73*(1), 264-93. doi:10.1111/ajes.12062

Burchett, H. E., Mayhew, S. H., Lavis, J. N., & Dobrow, M. J. (2013). When can research from one setting be useful in another? Understanding perceptions of the applicability and transferability of research. *Health Promotion International, 28,* 418-430. doi:10.1093/heapro/das026

Burstrom, T., & Wilson, T. L. (2018). The texture of tension: Complexity, uncertainty and equivocality. *International Journal of Managing Projects in Business*, *11*(2), 458-485. doi:10.1108/IJMPB-01-2017-0005

Bustard, J. R. T., Bolan, P., Devine, A., & Hutchinson, K. (2019). The emerging smart event experience: An interpretative phenomenological analysis. *Tourism Review*, *74*, 116-128. doi:10.1108/TR-10-2017-0156

Cai, L., & Zhu, Y. (2015). The challenges of data quality and data quality assessment in the big data era. *Data Science Journal, 14*, 14-16. doi:10.5334/dsj-2015-002

Cairney, P., & St Denny, E. (2015). Review of what is qualitative research and what is qualitative interviewing. *International Journal of Social Research Methodology: Theory and Practice*, *18*, 117-125. doi:10.1080/13645579.2014.957434.

Calp, M. H., & Kose, U. (2018). Planning activities in software testing process: A literature review and suggestions for future research. *Gazi University Journal of Science, 31*(3), 801-819. http://dergipak.gov.tr/gujs

Camio, M. I., Romero, M. C., Alvarez, M. B., & Rébori, A. J. (2018). Distinctive innovation capabilities of Argentine software companies with high innovation results and impacts. *Administrative Sciences*, *13*(8), 1-22. doi:10.3390/admsci8020013

Caridi, Z. O., Carmeli, A., & Arazy, O. (2016). The influence of CEOs' visionary innovation leadership on the performance of high-technology ventures: The mediating roles of connectivity and knowledge integration. *Journal of Product Innovation Management*, *33*(3), 356-376. doi:10.1111/jpim.12275

Carlton, D. (2017). Competence versus confidence in IT projects: Leadership and its impact on project outcomes. *Journal of Modern Project Management*, *5*(1), 38-45. doi:10.19255/JMPM01304

Carrillo de Gea, J. M., Nicolás, J., Fernández Alemán, J, L., Toval, A., Ebert, C., & Vizcaíno, A. (2012). Requirements engineering tools: Capabilities, survey and assessment. *Information and Software Technology*, *54(*10), 1142-1157. doi:10.1016/j.infsof.2012.04.005

Carrizo, D., & Alfaro, A. (2018). Quality assurance method in a software development methodology: A practice approach. *Ingeniare - Revista Chilena de Ingeniería*, *26*(1), 114-129. doi:10.4067/S0718-33052018000100114

Castleberry, A., & Nolen, A. (2018). Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in Pharmacy Teaching and Learning*, *10*, 807-815. doi:10.1016/j.cptl.2018.03.019

Chapman, R., White, N., & Woodcock, J. (2017). What can agile methods bring to high-integrity software development? Considering the issues and opportunities raised by agile practices in the development of high-integrity software. *Communications of the ACM*, *60*(10), 38-41. http://eprints.whiterose.ac.uk/149317/1/cacm_16_03_2507_File001.pdf

Chen, G., Ahunbay, E., & Li, X. A. (2016). Technical note: Development and performance of a software tool for quality assurance of online replanting with a conventional Linac or MR-Linac. *Medical Physics*, *43*, 1713-1719. doi:10.1118/1.4943795

Chen, K., Chen, H., & Chang, T. C. (2017). The construction and application of six sigma quality indices. *International Journal of Production Research*, *55*, 2365-2384. doi:10.1080/00207543.2016.1246763

Chen, S.-Y., & Lindo, N. A. (2018). The impact of kinder training on young children's on-task behavior: A single case design. *International Journal of Play Therapy*, *27*(2), 78-91. doi:10.1037/pla0000066

Chenarani, A., Druzhinin, E. A., Kritskiy, D. N. (2017). Simulating the impact of activity uncertainties and risk combinations in R & D projects. *J. Eng. Sci. Technol. Rev.*, *10(*4), 1-9. http://www.jestr.org/downloads/Volume10Issue4/fulltext11042017.pdf

Choi, S.B., Kim, K., & Kang, S.-W. (2017). Effect of transformational and shared leadership styles on employees' perception of team effectiveness. *Social Behavior and Personality*, *45*(3), 377-386. doi:10.2224/sbp.5805

Ciftci, S. (2019). Metaphors on open-ended question and multiple-choice tests produced by pre-service classroom teachers. *International Electronic Journal of Elementary Education*, *11*, 361-369. doi:10.26822/iejee.201945079

Clark, K. R., & Vealé, B. L. (2018). Strategies to enhance data collection and analysis in qualitative research. *Radiologic Technology*, *89*(5), 482CT-485CT. *Retrieved from* http://www.radiologictechnology.org/content/89/5/482CT.extract

Coetzee, M., Marx, A. A., & Potgieter, I. L. (2017). Examining the construct validity of the positive coping behavioral inventory. *South African Journal of Industrial Psychology*, *43*, 1-8. doi:10.4102/sajip.v43i0.1433

Cote, R. (2017). A comparism of leadership theories in an organizational environment. *International Journal of Business Administration, 8*(5), 28-35. doi:10.5430/ijba.v8n5p28

Coveilli, P. J., & Mason, I. (2017). Linking theory to practice: Authentic leadership. *Academy of Strategic Management Journal, 16*(3), 1-10. https://www.abacademies.org/articles/linking-theory-to-practice-authentic-leadership-6786.html

Currier, B. P., (2015). Jurisdiction over agency ordering decisions in standardized software procurement under the Federal Acquisition Streamlining Act: The Case for statutory reform. *Air Force Law Review, 72*, 59-83. https://go.gale.com/ps/anonymous?id=GALE%7CA421523708&sid=googleScholar&v=2.1&it=r&linkaccess=fulltext&issn=00948381&p=AONE&sw=w

Dahl, K., Larivière, N., & Corbière, M. (2017). Work participation of individuals with borderline personality disorder: A multiple case study. *Journal of Vocational Rehabilitation, 46*(3), 377-388. doi:10.3233/JVR-170874

Daneault, S. (2018). The essential role of qualitative research in building knowledge on health. *Anaesthesia Critical Care & Pain Medicine, 37*, 105-107. doi:10.1016/j.accpm.2018.02.00

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

Dawson, P. (2015). In search of freedom: The legacies of management innovations for

the experience of work and employment. *Employment Relations Record, 15*(1), 4-26. https://abdn.pure.elsevier.com/en/publications/in-search-of freedom-legacies-of-management-innovations-for-the-e

Deasy, D. (2018). IT dashboard. *GAO Reports*, 1-73. https://itdashboard.gov/drupal/summary/007

Dhir, S., & Dhir, S. (2017). Adoption of open-source software versus proprietary software: An exploratory study. *Strategic Change*, *26*(4), 363-371. doi:10.1002/jsc.2137

Dolata, M. (2019). The sources of competitive advantage from the perspective of project management: Results of empirical studies. *Management Sciendo, 23*(1), 75-89. doi:10.2478/manment-2019-0005

Drummond, A. (2017). Feasibility and pilot studies: Why are they important? *British Journal of Occupational Therapy, 80*, 336-336. doi:10.1177/0308022617697743

Ebert, C. (2014). Software Product Management. *IEEE Software, Software, IEEE, IEEE Softw*, *31*(3), 21-24. doi:10.1109/MS.2014.72

Ebneyamini, S., & Moghadam, M. R. S. (2018). Towards developing a framework for conducting case study research. *International Journal of Qualitative Methods, 17*, 1-11. doi:10.1177/1609406918817954

Eito, B. R., & Sicilia, M. (2017). An innovation activity model for very small entities in the software sector: an empirical study. *R&D Management*, *47*(5), E13-E25. doi:10.1111/radm.12226

El Yamami, A., Ahriz, S., Mansouri, K., Qbadou, M., & Illousamen, E. H. (2017). Representing IT projects risk management best practices as a metamodel. *Engineering, Technology & Applied Science Research*, *7*, 2062-2067. https://doaj.org/article/a96c4975a8a443929044d6f058c359d0

Ellyson, L. M., Gibson, J. H., Nichols, M., & Doerr, A. (2012). A study of Fiedler's contingency theory among military leaders. *Allied Academies International Conference: Proceedings of the Academy of Strategic Management (ASM), 11*(1), 7-11. https://www.abacademies.org/Public/Proceedings/Proceedings30/ASM%20Proceedings%20Spring%202012.pdf#page=11

Elzamly, A., & Hussin, B. (2015). Classification and identification of risk management techniques for mitigating risks with factor analysis technique in software risk management. *Rev. Comput. Eng. Res*., *2(*1), 22-38.http://www.pakinsight.com/?ic=journal&journal=76

Ericsson, E., Gingnell, L., & Lillieskold, J. (2015). Implementing design for Six Sigma in large Swedish product developing organizations: An interview study. *Total Quality Management & Business Excellence*, *26*(5/6), 648-660. doi:10.1080/14783363.2013.870782

Eskerod, P., & Larsen, T. (2018). Advancing project stakeholder analysis by the concept 'shadows of the context'. *International Journal of Project Management*, *36*, 161-169. doi:10.1016/j.ijproman.2017.05.003

Fabregues, S., & Molina-Azorin, J. F. (2017). Addressing quality in mixed methods research: A review and recommendations for a future agenda. *Quality & Quantity*, *51*, 2847-2863. doi:10.1007/s11135-016-0449-4

Feng, H., Morgan, N., & Rego, L. (2017). Firm capabilities and growth: The moderating role of market conditions. *Journal of the Academy of Marketing Science*, *45*(1), 76-92. doi:10.1007/s11747-016-0472-y

Fiedler, F. E., & Mahar, L. (1979). The effectiveness of contingency model training: A review of the validation of leader match. *Personnel Psychology*, *32*(1), 45-62. doi:10.1111/j.1744-6570.1979.tb00468.x

Fisher, J., Kim, Y-M., & Cummings, J. N. (2018). Abandoning innovations: Network evidence on enterprise collaboration software. *Academy of Management Annual Meeting Proceedings*, *2018*(1), 1-6. doi:10.5465/AMBPP.2018.175

Foidl, H., & Felderer, M. (2018). Integrating software quality models into risk-based testing. *Software Quality Journal*, *26*(2), 809-847. doi:10.1007/s11219-016-9345-3

Fourie, L., & de Vries, M. (2017). Exploring enhancements to the agile approach for mid-sized enterprises in the services sector. *South African Journal of Industrial Engineering*, *28*(3), 29-39. doi:10.7166/28-3-1837

Fusch, P., Fusch, G. E., & Ness, L. R. (2018). Denzin's paradigm shift: Revisiting triangulation in qualitative research. *Journal of Social Change*, *10*(1), 19-32. doi:10.5590/JOSC.2018.10.1.02

Fusch, P., & Ness, L. (2015). Are we there yet? Data saturation in qualitative research.

Q*ualitative Report*, *20*, 1408-1416. http://tqr.nova.edu/

Gama, F., Sjödin, D. R., & Frishammar, J. (2017). Managing interorganizational technology development: Project management practices for market- and science-based partnerships. *Creativity & Innovation Management*, *26*(2), 115-127. doi:10.1111/caim.12207

Garcia, O. P. G., & Coltre, S. M. (2017). Knowledge management as a determining factor in the retention of professionals in the industry: A case study in an organization in the furniture industry. *Brazilian Business Review (Portuguese Edition)*,14(2), 182-203. doi:10.15728/bbr.2017.14.2.3

Gauthier, J. (2017). Sustainable business strategies: Typologies and future directions. *Society and Business Review*, *12*, 77-93. doi:10.1108/SBR-01-2016-0005

Ghani, I., & Bello, M. (2015). Agile adoption in IT organizations. *KSII Transactions on Internet & Information Systems, 9*(8), 3231-3248. doi:10.3837/tiis.2015.08.029.

Ghani, I., Bello, M., & Bagiwa, I. L. (2015). Survey-based analysis of agile adoption on performances of IT organizations. *Journal of Korean Society for Internet Information, 16*(5), 87-92. doi:10.7472/jksii.2015.16.5.87

Gill, I. S., Advincula, A. P., Aron, M., Caddedu, J., Canes, D., Curcillo, P. G., 2nd, … Teixeira, J., (2010). Consensus statement of the consortium for laparoendoscopic single-site surgery. *Surgical Endoscopy, 24*(4), 762-768. doi:10.1007/s00464-009-0688-8

Gill, M. J., (2014). Research. *Organizational Research Methods, 17*, 118-137. doi:10.1177/1094428113518348

Gillespie, B., Otto, C., & Young, C. (2018). Bridging the academic-practice gap through big data research. *International Journal of Market Research, 60*(1), 11-13. doi:10.1177/1470785317744670

Gnyawali, D. R., & Song, Y. (2016). Pursuit of rigor in research: Illustration from coopetition literature. *Industrial Marketing Management, 57*, 12-22. doi:10.1016/j.indmarman.2016.05.004

Gok, K., Sumanth, J. J., Bommer, W. H., Demirtas, O., Arslan, A., Eberhard, J., Ozdemir, A. I., & Yigit, A. (n.d.). You may not reap what you sow: How employees' moral awareness minimizes ethical leadership's positive impact on workplace deviance. *Journal of Business Ethics*, *146*(2), 257–277. doi:10.1007/s10551-017-3655-7

Goldschmidt, R., Fernandes de Souza, I., Norris, M., Passos, C., Ferlin, C., Cavalcanti, M. C., & Soares, J. (2016). Memore: An environment for data collection and analysis on the use of computers in education. *Informatics in Education*, *15*(1), 63-84. doi:10.15388/infedu.2016.04

Gomes, S., & Duarte, V. (2020). What about ethics? Developing qualitative research in confinement settings. *European Journal of Criminology*, 17, 461-479 doi:10.1177/1477370818801305

González-Marcos, A., Alba-Elías, F., & Ordieres-Meré, (2016). An analytical method for measuring competence in project management. *British Journal of Educational Technology*, *47*(6), 1324-1339. doi:10.1111/bjet.12364

Gordon, A. J. (2016). The outsourcing function for human resources projects: A Path-Goal Theory Approach. *International Journal of Management and Humanities, 2*(4), 6-10. https://www.ijmh.org/

Görgens-Ekermans, G., & Herbert, M. (2013). Psychological capital: Internal and external validity of the Psychological Capital Questionnaire (PCQ-24) on a South African sample. *SAJIP: South African Journal of Industrial Psychology*, *39*(2), 1-12. doi:10.4102/sajip.v39i2.113

Green, S. B., & Salkind, N. J. (2017). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (8th ed.). Upper Saddle River, NJ: Pearson.

Gu, C., Ye, M., Wang, X., Yang, M., Wang, H., & Khoshnood, K. (2019). Nurse researchers' perspectives on research ethics in China. *Nursing Ethics, 26*, 798-808. doi:10.1177/0969733017720848

Gustafsson, J., (2017). Single case studies vs. multiple case studies: A comparative study. http://www.diva-portal.org/smash/get/diva2:1064378/ fulltext01.pdf.

Hadi M. A., & Closs, S. J. (2016). Ensuring rigor and trustworthiness of qualitative research in clinical pharmacy. *International Journal of Clinical Pharmacy*, *38*, 641-646. doi:10.1007/S11096-015-0237-6

Hahm, S. (2017). Information sharing and creativity in a virtual team: Roles of authentic leadership, sharing team climate, and psychological empowerment. *KSII Transactions on Internet & Information Systems*, *11*(8), 4105-4119. doi:10.3837/tiis.2017.08.020

Hammer, M. (1990). Reengineering work: Don't automate, obliterate. *Harvard Business Review*, 4, 104-112. https://hbr.org/

Han, Q. (2018). Trustworthiness measurement algorithm for TWFMS based on software behaviour entropy. *Entropy, 20*(3), 195-208. doi:10.3390/e20030195

Hartwell, C. A., Kinicki, A. J., Lambert, L. S., Fugate, M., & Doyle Corner, P. (2016). Do similarities or differences between CEO leadership and organizational culture have a more positive effect on firm performance? A test of competing predictions. *Journal of Applied Psychology*, *101*(6), 846-861. doi:10.1037/apl0000083

Hashim, E., Yusof, A. B. M., & Alamen, K. M. (2018). An integrated model of project managers' competencies through factor analysis. *International Journal of Innovative Science and Research Technology*, *3*, 335–342. Retrieved from http:/www.ijisrt.com

Henriksen, A., & Pedersen, S. (2017, May/August). A qualitative case study on agile practices and project success in agile software projects. Journal of Modern Project Management, 5(1), 62–72. doi:10.19255/jmpm230

Hays, D. G., Wood, C., Dahl, H., & Kirk-Jenkins, A. (2016). Methodological rigor in journal of counseling & development qualitative research articles: A 15-year review. *Journal of Counseling & Development*, *94*, 172-183. doi:10.1002/jcad.12074

Heyeres, M., Tsey, K., Yang, Y., Yan, L., & Jiang, H. (2019). The characteristics and reporting quality of research impact case studies: A systematic review. *Evaluation and Program Planning, 73*, 10-23. doi:10.1016/j.evalprogplan.2018.11.002

Hill, R. K., (2017). Assuring software quality by preventing neglect. *Communications of the ACM, 60*(9), 10-11. doi:10.1145/3121430

Hoffman-Miller, P. M. (2013). *Expectancy theory*. Salem Press Encyclopedia

Honig, B., Lampel, J., Siegel, D., & Drnevich, P. (n.d.). Special section on ethics in management research: Norms, identity, and community in the 21st century. *Academy of Management Journal Learning & Education, 16(1), 84-93.* doi:10.5465/amle.2017.0023

Hoque, Z., Covaleski, M. A., & Gooneratne, T. N. (2013). Theoretical triangulation and pluralism in research methods in organizational and accounting research. *Accounting, Auditing and Accountability Journal, 26*, 1170-1198. doi:10.1108/AAAJ-May-2012-01024

Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigor in qualitative case-study research. *Nurse Researcher*, *20*(4), 12-17. doi:10.7748/nr2013.03.20.4.12.e326

House, R. J. (1971). A path goal theory of leader effectiveness. *Administrative Science Quarterly*, *16*(3), 321-339. doi:10.2307/2391905

House, R. J. (1996). Path-goal theory of leadership: Lessons, legacy, and a reformulated theory. *The Leadership Quarterly, 7*(3), 323-352. doi:10.1016/S1048-9843(96)90024-7

Hummour, A. A., Athamneh, S., & Al-balas, S. (2018). TQM practices and their effect on Jordanian municipalities. *International Journal of Business & Public Administration, 15*(1), 129-147. https://www.eds-b-ebscohost-com.ezp.waldenulibrary.org/eds/pdfviewer/pdfviewer?vid=11&sid=cca0ab18-2583-4a48-87ab-e485c97a9aac%40pdc-v-sessmgr03

Hyatali, N., & Fai Pun, K. (2016). Aligning project quality and risks into business processes: A review of challenges and strategies. *West Indian Journal of Engineering, 38*(2), 81-92. https://sta.uwi.edu/eng/wije/vol3802_jan2016/documents/Vol38No2NHyatalJan2016.pdf

Iivari, N. (2018). Using member checking in interpretive research practice. *Information Technology & People, 31*, 111-133. doi:10.1108/ITP-07-2016-016

Jackman, P. C., Crust, L., & Swann, C. (2017). Systematically comparing methods used to study flow in sport: A longitudinal multiple-case study. *Psychology of Sport & Exercise*, *32*, 113-123. doi:10.1016/j.psychsport.2017.06.009

Johnson, J. S. (2015). Broadening the application of mixed methods in sales research. *Journal of Personal Selling and Sales Management, 35*(4), 334-345. doi:10.1080/08853134.2015.1016953

Joslin, R., & Muller, R. (2016). The impact of project methodologies on project success in different project environments. *International Journal of Managing Projects in Business, 9*(2), 364-388. doi:10.1108/IJMPB-03-2015-0025

Kegler, M. C., Raskind, I. G., Comeau, D. L., Griffith, D. M., Cooper, H. L. V., & Shelton, R. C. (2019). Study design and use of inquiry frameworks in qualitative research published in Health Education & Behavior. *Health Education & Behavior*, *46*, 24-31. doi:10.1177/1090198118795018

Khan, H. H., & Malik, M. N. (2017). Software standards and software failures: A review with the perspective of varying situational contexts. *IEEE Access*, *5*, 17501-17513. doi:10.1109/ACCESS.2017.2738622

Khatavakhotan, A. S., & Siew Hock Ow. (2015). Development of a software risk management model using unique features of a proposed audit component. *Malaysian Journal of Computer Science, 28*(2), 110-131. http://jummec.um.edu.my/index.php/MJCS/article/download/6858/4522

Kim., J., & Cameron, G. T. (2016). When cousin's feud: Advancing threat appraisal and CT in situations that question the essential identity of activist organizations. *International Journal of Communication, 10,* 19-34. https://ijoc.org/index.php/ijoc/article/viewFile/3431/1631

Kim, S.-Y., Graham, S. S., Ahn, S., Olson, M. K., Card, D. J., Kessler, M. M. … Bubacy, F. A. (2016). Correcting biased Cohen's Kappa in NVivo. *Communication Methods & Measures, 10*(4), 217-232. doi:10.1080/19312458.2016.1227772

Kostalova, J., Tetrevova, L., & Patak, M. (2017). Project management methods in projects co-financed by EU funds. *Engineering Economics*, *28*(3), 301-310. doi:10.5755/j01.ee.28.3.13651

Kramer, W. F., Sahinoglu, M., & Ang, D. (2015). Increase return on investment of software development life cycle by managing the risk - A case study. *Defense Acquisition Research Journal: A Publication of the Defense Acquisition University*, *22*(2), 174-191. https://apps.dtic.mil/dtic/tr/fulltext/u2/a622522.pdf

Lam, C. K., Walter, F., & Huang, X. (2017). Supervisors' emotional exhaustion and abusive supervision: The moderating roles of perceived subordinate performance and supervisor self-monitoring. *Journal of Organizational Behavior, 38,* 1151-1166. doi:10.1002/job.2193

Li, Z., Jing, X., & Zhu, X. (2018). Heterogeneous fault prediction with cost-sensitive domain adaptation. *Software Testing: Verification & Reliability*, *28*(2), e1658. doi:10.1002/stvr.1658.

Lindholm, C. (2015). Involving the user perspective in a software risk management process. *Journal of Software: Evolution & Process, 27*(12), 953-975. doi:10.1002/smr.1753

Locke, E. A., & Schattke, K. (2018). Intrinsic and extrinsic motivation: Time for expansion and clarification. *Motivation Science*, *5*(4), 277-290. doi:10.1037/mot0000116

Lyons, L. M., Buddie, A. M., & Purcell, J. W. (2018). Integrated student leadership development: A Qualitative case study on building the intercultural competence of first-year honors students. *Journal of Leadership Education, 17*(3), 98-120. doi:10.12806/V17/I3/R6

Maassen, M. A. (2018). Opportunities and risks of the agile software development management in the IT field. Case study: IT companies between 2009-2018. *Review of International Comparative Management / Revista de Management Comparative International*, *19*(3), 234-243. doi:10.24818/RMCI.2018.3.234

Malaquias, R. F., & Albertin, A. L. (2018). The value of being innovative in information technology. *Journal of Technology Management & Innovation*, *13*(1), 3-9. doi:10.4067/S0718-27242018000100003

Manojlovich, M., Harrod, M., Holtz, B., Hofer, T., Kuhn, L., & Krein, S. L. (2015). The use of multiple qualitative methods to characterize communication events between physicians and nurses. *Health Communication*, *30*(1), 61-69. doi:10.1080/10410236.2013.835894.

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

Mazza, T., & Azzali, S. (2018). Information technology controls quality and audit fees: Evidence from Italy. *Journal of Accounting, Auditing & Finance*, *33*(1), 123-146. doi:10.1177/0148558X15625582

Min, M., Anderson, J. A., & Chen, M. (2017). What do we know about full-service community schools? Integrative research review with NVivo. *The School Community Journal*, *27*(1), 29-54. https://files.eric.ed.gov/fulltext/EJ1146450.pdf

Minamino, Y., Inoue, S., & Yamada, S. (2016). NHPP-based change-point modeling for software reliability assessment and its application to software development

management. *Annals of Operations Research*, *244*(1), 85-101. doi:10.1007/s10479-016-2148-x.

Mohammadi, M. (2017). A Review of influencing factors on the quality of business process models. *International Journal of Economic Perspectives, 11*(3), 1833-1840. https://eds-a-ebscohost-com.ezp.waldenulibrary.org/eds/pdfviewer/pdfviewer?vid=2&sid=032c2653-026b-4d78-aeb2-3e334c24799e%40sessionmgr4008

Montequin, V. R., Cousillas, S. M., Alvarez, V., & Villanueva, J. (2016). Success factors and failure causes in projects: Analysis of cluster patterns using self-organizing maps. *Procedia Computer Science*, *100*, 440-448. doi:10.1016/j.procs.2016.09.180

Moqri, M., Mei, X., Qiu, L., & Bandyopadhyay, S. (2018). Effect of "following" on contributions to open source communities. *Journal of Management Information Systems, 35*(4), 1188-1217. doi:10.1080/07421222.2018.1523605

Moustakas, C.E. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.

Muschevici, R., Proença, J., & Clarke, D. (2016). Feature Nets: Behavioral modeling of software product lines. *Software & Systems Modeling, 15*(4), 1181-1206. doi:10.1007/s10270-015-0475-z.

Nakkash, R., Qutteina, Y., Nasrallah, C., Wright, K., El-Alti, L., Makhoul, J., & Al-Ali, K. (2017). The practice of research ethics in Lebanon and Qatar: Perspectives of

researchers on informed consent. *Journal of Empirical Research on Human Research Ethics*, *12*, 352-362. doi:10.1177/1556264617730643

Northouse, P. G. (2016). *Leadership: Theory and practice* (7th ed.). Thousand Oaks, CA

Novak, A. (2014). Anonymity, confidentiality, privacy, and identity: The ties that bind and break in communication research. *Review of Communication*, *14*(1), 36-48. doi:10.1080/15358593.2014.942351

Nusbaum, L., Douglas, B., Damus, K., Paasche-Orlow, M., & Estrella-Luna, N. (2017). Communicating risks and benefits in informed consent for research: A qualitative study. *Global Qualitative Nursing Research*, *4*, 1-13. doi:10.1177/2333393617732017

Odimabo, O., & Oduoza, C. F. (2018). Guidelines to aid project managers in conceptualizing and implementing risk management in building projects. *Procedia Manufacturing*, *17*, 515-522. doi:10.1016/j.promfg.2018.10.091

Office of Management and budget (2019). An American budget fiscal year 2019. US Government Publishing Office, Washington, DC 20402-0001.

Ogonowski, P., & Madziński, M. (2019). Project management maturity in companies operating on Polish logistics market. *Log Forum*, *15*(2), 223-235. doi:10.17270/J.LOG.2019.324

Ozguler, I. S. (2016). Increase the projects' success rate through developing multi-cultural project management process. *Procedia - Social and Behavioral Sciences*, *226*, 236-242. doi:10.1016/j.sbspro.2016.06.184

Paulus, T., Woods, M., Atkins, D. P., & Macklin, R. (2017). The discourse of QDAS: Reporting practices of Aplastic and NVivo users with implications for best practices. *International Journal of Social Research Methodology, 20*(1), *35-47.* doi:10.1080/13645579.2015.1102454

Paver, M., & Duffield, S., (2019). Project management lessons learned: The elephant in the room. *Journal of Modern Project Management*, *6*(3), 104-125. doi:10.19255/JMPM01807

Peeters, M. J., & Vaidya, V. A. (2016). A mixed methods analysis in assessing students' professional development by applying an assessment for learning approach. *American Journal of Pharmaceutical Education, 80*(5), 77. doi:10.5688/ajpe80577

Pound, P., & Ritskes-Hoitinga, M. (2018.). Is it possible to overcome issues of external validity in preclinical animal research? Why most animal models are bound to fail. *Journal of Translational Medicine*, *16*(1), 304-311. doi:10.1186/s12967-018-1678-1.

Pulley, J., Clayton, E., Bernard, G. R., Roden, D. M., & Masys, D. R. (2010). Principles of Human Subjects Protections Applied in an Opt-Out, De-identified Biobank. *CTS: Clinical & Translational Science*, *3*(1), 42–48. doi:10.1111/j.1752-8062.2010.00175.x

Ramakrishna, R. (2018). Using intuitive judgement in qualitative content analysis: Implications for research in varieties of English. *International Journal of Business*

and Society, 19(2), 262-273. http://www.ijbs.unimas.my/images/repository/pdf/Vol19-S2-paper6.pdf

Ramji, Z., & Etowa, J. (2018). Workplace integration: Key considerations for internationally educated nurses and employers. *Administrative Sciences* (2076-3387), 8, 2-N.PAG. doi:10.3390/admsci8010002

Rengi, O., & Polat, S. (2019). Practices related to cultural diversity in schools and students' views about these practices: Stuttgart, Baden-Württemberg, Germany. *Education and Science, 44*, 239-260. doi:10.15390/EB.2019.7613

Ridder, H.-G. (2017). The theory contribution of case study research designs. *Business Research, 10,* 281-305. doi:10.1007/s40685-017-0045-z

Roberts, T. (2013). Understanding the research methodology of interpretive phenomenological analysis. *British Journal of Midwifery, 21*(3), 215-218. doi:10.12968/bjom.2013.21.3.215

Rose, J., & Furneaux, B. (2016). Innovation driver and outputs for software firms: Literature review and concept development. *Advances in* Software Engineering, *1-25*. doi:10.1155/2016/5126069

Ross, M. W., Iguchi, M. Y., & Panicker, S. (2018). Ethical aspects of data sharing and research participant protections. *American Psychologist, 73*(2), *138-145.* doi:10.1037/amp0000240

Sadowski, C., Aftandilian, E., Eagle, A., Miller-Cushon, L., & Jaspan, C. (2018). Lessons from building static analysis tools at Google. *Communications of the ACM, 61*(4), 58-66. doi:10.1145/3188720

Salama, T., Salah, A., & Moselhi, O. (2018). Integration of linear scheduling method and the critical chain project management. *Canadian Journal of Civil Engineering, 45*(1), 30-40. doi:10.1139/cjce-2017-0020

Santos, R. E. S., Magalhaes, C. V. C., & da Silva, F. Q. B. (2017). *Member checking in software engineering research*: *Lessons learned from an industrial case study*. Paper presented at the ACM/IEEE International Symposium on Empirical Software Engineering and Measurement, Toronto. doi:10.1109/ESEM.2017.29

Sapunar, D., Grković, I., Lukšić, D., & Marušić, M. (2016). The business process management software for successful quality management and organization: A case study from the University of Split School of Medicine. *Acta Medica Academica, 45*(1), 26-33. doi:10.5644/ama2006-124.153

Sarhadi, M. (2016). Comparing communication style within project teams of three project-oriented organizations in Iran. *Procedia - Social and Behavioral Sciences, 226*, 226-235. doi:10.1016/j.sbspro.2016.06.183

Sato, T., & Yamada, S. (2016). Analysis of process factors affecting software quality based on design review record and product metrics. *International Journal of Reliability, Quality, & Safety Engineering*, *23*(4), 1-10. doi:10.1142/S021853931650011X

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2015). *Research methods for business students* (7th ed.). Essex, England: Pearson Education Unlimited. Thousand Oaks, CA: Sage. (6th ed.).

Savela, T. (2018). The advantages and disadvantages of quantitative methods in schoolscape research. *Linguistics and Education*, *44*, 31-44. doi:10.1016/j.linged.2017.09.004

Scala, E., Micalizio, R., & Torasso, P. (2015). Robust plan execution via reconfiguration and preplanning. *AI Communications*, *28*(3), 479-509. doi:10.3233/AIC-140629

Schober, M. M., Gerrish, K., & McDonnell, A. (2016). Development of a conceptual policy framework for advanced practice nursing: An ethnographic study. *Journal of Advanced Nursing*, *72*(6), 1313-1324. doi:10.1111/jan.12915

Schrape, J-F. (2017). Open-source projects as incubators of innovation: From niche phenomenon to an integral part of the industry. *Convergence: The International Journal of Research into New Media Technologies*, *23*, 409-427. doi:10.1177/1354856517735795

Seago, J. (2017). Climbing the scale: Many internal audit departments are turning to maturity models to deliver opinions about organizational performance. *Internal Auditor*, *74*(2), 38-43. https://eds-b-ebscohost-com.ezp.waldenulibrary.org/eds/pdfviewer/pdfviewer?vid=11&sid=b57b72df-45c0-4cc1-96b9-5b4b7251bc80%40pdc-v-sessmgr02

Sedaghatbaf, A., & Abdollahi, M. A. (2018). A method for dependability evaluation of software architectures. *Computing*, *100*(2), 119-150. doi:10.1007/s00607-017-0568-3

Shahzad, B., Awan, K. M., Lali, M. I.-U., & Aslam, W. (2017). Identification of patterns in failure of software projects. *Journal of Information Science and Engineering, 33*(6), 1465-1480. doi:10.6688/JISE.2017.33.6.5

Shongwe, M. M. (2016). An analysis of knowledge management lifecycle frameworks: Towards a unified framework. *Electronic Journal of Knowledge Management, 14*(3), 140-153. http://www.ejkm.com

Squires, A., & Dorsen, C. (2018). Qualitative research in nursing and health professions regulation. *Journal of Nursing Regulation*, *9*, 15-26. www.journalofnursingregulation.com

Stephan, U., Patterson, M., Kelly, C., & Mair, J. (2016). Organizations driving positive social change: A review and an integrative framework of change processes. *Journal of Management, 42*(5), 1250-1281. doi:10.1177/0149206316633268

Strode, D. (2016). A dependency taxonomy for agile software development projects. *Information Systems Frontiers, 18*(1), 23-46. doi:10.1007/s10796-015-9574-1

Sunyaev, A. (2013). Effective quality management: Value- and risk-based software quality management. *IEEE software*, *31*(6), *79.* doi:10.1109/MS.2013.138

Taube, D. O., Scroppo, J., & Zelechoski, A. D. (2018). Nine risk management lessons for practitioners. *Practice Innovations, 3*(4), 271-283. doi:10.1037/pri0000078

Tereso, A., Ribeiro, P., Fernandes, G., Loureiro, I., & Ferreira, M. (2019). Project management practices in private organizations. *Project Management Journal*, *50*(1), 6-22. doi:10.1177/8756972818810966

Teslia, I., Yehorchenkova, N., Yehorchenkov, O., Kataieva, Y., Zaspa, H., & Khlevna, I. (2017). Development of principles and method of electronic project management. *Eastern-European Journal of Enterprise Technologies, 89*(3), 23-29. doi:10.15587/1729-4061.2017.109534

Tjaden, C. D., Mulder, C. L., van Weeghel, J., Delespaul, P., Keet, R., Castelein, S., … Kroon, H., (2019). The resource group method in severe mental illness: Study protocol for a randomized controlled trial and a qualitative multiple case study. *International Journal of Mental Health Systems*, *13*(1), N.PAG. doi:10.1186/s13033-019-0270-2

Tomanek, M., Cermak, R., & Smutny, Z. (2014). A conceptual framework for web development projects based on project management and agile development principles. *Proceedings of the European Conference on Management Leadership and Governance, 10,* 550-558. https://arxiv.org/pdf/1502.04297.pdf

Tonelli, A., Zambalde, A., & Jose de Brito, M. (2016). The theory of practice and the development of ambidexterity in software innovation process. *Brazilian Business Review*, *13*, 26-47. doi:10.15728/bbr.2016.13.3.2

Uhl-Bien, M., & Arena, M. (n.d.). Leadership for organizational adaptability: A theoretical synthesis and integrative framework. *Leadership Quarterly*, *29*(1), 89-104. doi:10.1016/j.leaqua.2017.12.009

Valerio, M. A., Rodriguez, N., Winkler, P., Lopez, J., Dennison, M., Yuanyuan, L., & Turner, B. J. (2016). Comparing two sampling methods to engage hard-to-reach

communities in research priority setting. *BMC Medical Research Methodology,* 16(1), 146-156. doi:10.1186/s12874-016-0242-z

Vanova, J., Paulová, I., Rusko, M., & Hekelová, E. (2017). Creating a corporate culture in context with standards ISO 9001: 2015. *Annals of DAAAM & Proceedings*, *28,* 274-279. doi:10.2507/28th.daaam.proceedings.037

Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. (2018). Characterizing and justifying sample size sufficiency in interview-based studies: Systematic analysis of qualitative health research over a 15-year period. *BMC Medical Research Methodology, 18,* 148-165. doi:10.1186/s12874-018-0594-7

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative multiple-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly*, *37*, 21-54. doi:10.35200/misq/2013/37.1.01

Venkatesh, V., Brown, S. A., & Sullivan, Y. W. (2016). Guidelines for conducting mixed-methods research: An extension and illustration. *Journal of the Association for Information Systems*, *17*(7), 435-495. https://aisel.aisnet.org/jais/vol17/iss7/2/

Walton, M. (2016). Setting the context for using complexity theory in evaluation: boundaries, governance, and utilization. *Evidence & Policy: A Journal of Research, Debate & Practice*, *12*(1), 73-89. doi:10.1332/174426415X14298726247211

Wang, C. C., & Geale, S. K. (2015). The power of story: Narrative inquiry as a methodology in nursing research. *International Journal of Nursing Sciences, 2,* 195-198. doi:10.1016/j.ijnss.2015.04.014

Waraporn, J. (2015). Using individual values of information technology professionals to improve software development management practices in Thailand. *Asian Academy of Management Journal, 20*(1), 49-69. http://web.usm.my/aamj/20012015/Art%203%20(49-69).pdf

Waters, R. D. (2013). The role of stewardship in leadership: Applying the CT of leadership to relationship cultivation practices of public relations practitioners. *Journal of Communication Management, 17*(4), 324-340. doi:10.1108/JCOM-05-2012-0041

Whitmore, C., Baxter, P. E., Kaasalainen, S., & Ploeg, P. (2018). Protocol for case study to explore the transition to practice of new graduate nurse in long-term care. *SAGE Open Nursing, 4*, 1-11. doi:10.1177/2377960818797251

Williams, P., Ashill, N., & Naumann, E. (2017). Toward a CT of CRM adoption. *Journal of Strategic Marketing, 25*, 454-474. doi:10.1080/0965254X.2016.1149211

Woods, M., Paulus, T., Atkins, D. P., & Macklin, R. (2015). Advancing qualitative research using qualitative data analysis software (QDAS)? Reviewing potential versus practice in published studies using Atlas.ti and NVivo, 1994-2013. *Social Science Computer Review, 13*, 1-21. doi:10.1177/0894439315596311

Xiaojun, Z. (2017). Knowledge management system and job performance: A multilevel contingency model. *MIS Quarterly, 41*(3), *811A5.* doi:*10.25300/MISQ/2017/41.3.07*

Yalegama, S., Chileshe, N., & Ma, T. (2016). Critical success factors for community-driven development projects: A Sri Lankan community

perspective. *International Journal of Project Management*, *34*, 643–659. doi:10.1016/j.ijproman.2016.02.006

Ybarra, O., Kross, E., & Sanchez-Burks, J. (2014). The "big idea" that is yet to be: Toward a more motivated, contextual, and dynamic model of emotional intelligence. *The Academy of Management Perspectives*, *28*(2), 93-107. http:/www. selfcontrol.psych.lsa.umich.edu/wp-content/uploads/2014/06/YbarraKrossSanchez-Burks...

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.) Thousand Oaks, CA: Sage.

Ying, M., Yichang L., Junwen L., Peng, S., Yu, S., & Xiatian, Z. (2018). Data complexity analysis for software defect detection. *International Journal of Performability Engineering*, *14*, 1695-1704. doi:10.23940/ijpe.18.08. p5.16951704

Yubin, Q., Xiang, C., Yingquan, Z., & Xiaolin J. (2018). Impact of hyper parameter optimization for cross-project software defect prediction. *International Journal of Performability Engineering*, *14*, 1291-1299. doi:10.23940/ijpe.18.06. p20.12911299.

Zancul, E. S., Takey, S. M., Barquet, A. P. B., Kuwabara, L. H., Miguel, P. A. C., & Rozenfeld, H. (2016). Business process support for IoT based product-service systems (PSS). *Business Process Management Journal*, *22*, 305-323. doi:10.1108/BPMJ-05-2015

Zhang, X. (2017). Knowledge management system use and job performance: A

multilevel contingency model. *MIS Quarterly, 41*(3), 811-840.

doi:10.5555/3177698.3177706

Appendix A: Interview Protocol

The interview protocol will consist of the following seven steps:

1. An opening statement with greetings and introductions;
2. The study participants should have read the consent form and provided their consent via e-mail, agreeing to participate in the research. I will thank the participant for agreeing to participate in the research study. I will also provide information regarding the member checking process that will follow the transcription and interpretation of the data. Following transcript interpretation, I will schedule time with the participants for member checking procedures to assist with ensuring the reliability and validity of the data.
3. Participants will be given a hard copy print out of the consent form for their records.
4. I will record and note the date, time, and location.
5. I will indicate the sequential representation of the participant's name, e.g., 'participant P01' on the audio recording, document on my copy of the consent form, and the interview will begin.
6. Each participant will be given the required time to thoroughly answer each predetermined interview question in detail (including any additional follow-up/probing questions).
7. At the close of the interview, I will thank each participant for their time.

Interview Questions

Participants will answer the following questions:

1 What strategies do you use to improve the quality of software projects in your company?

2 How effective were the strategies in improving software projects?

3 What challenges did you encounter in implementing the strategies?

4 How did the strategies you used to improve software projects result in increased profitability in your company?

5 How effective were the strategies in improving profitability?

6 What are the critical metrics you use to measure software project success rates in your company?

7 What software project auditing practices do you use to measure improvement in the software project and profitability?

8 What other information can you provide on strategies managers could use to improve software projects and increase profitability?

Appendix B: Introductory Letter

May 26, 2020

Re: A RESEARCH STUDY THAT MAY INTEREST YOU

Dear Executive,

My name is Sylvester Otiji, and I am a doctoral candidate at Walden University. I am pursuing a Doctor of Business Administration (DBA) degree with a specialization in Information Technology. *I am conducting a qualitative multiple, exploratory, case study titled: Strategies Managers Use to Improve Software Projects and Profitability*. The purpose of this study is to explore the strategies managers use to improve software projects and profitability. I am seeking an online video or telephone interviews with managers who meet the following criteria:

- Managers must have a minimum of 5 years of managerial experience.
- Manager must have experience implementing strategies to improve software projects and profitability.
- Manager currently employed in an IT position and or held a previous position in IT within the Washington Metropolitan Area.

I developed the study selection criteria to assure that study participant is likely to possess knowledge and information that are relevant to the purpose of the study. I understand that workers' participation is voluntary, and they may withdraw at any time, even after I have completed data collection for the study. I will protect the participants' identity, and individual responses to the interview questions will not be published or disclosed. All of the individual responses to the interview questions will be recorded for analysis and reported in the study with no information that identifies you or your organization. However, I will be asking the organizational representative to share company documents and to reproduce strategies use to improve software projects and profitability. At that time, I will disclose that you are participating in my study. I will share the findings from the study with study participants, other scholars, and the leaders within the participant's organization after all approvals and submission to ProQuest.

If you permit me to conduct the study using your organization, please review, sign, and email or scan the letter of Cooperation to me.

Sincerely,

Sylvester N. Otiji
Doctoral Candidate
Doctor of Business Administration Program

Appendix C: CITI Program Certificate of Completion

CITI PROGRAM

Completion Date 27-Mar-2020
Expiration Date N/A
Record ID 36077864

This is to certify that:

Sylvester Otiji

Has completed the following CITI Program course:

Student's (Curriculum Group)
Doctoral Student Researchers (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Walden University

Verify at www.citiprogram.org/verify/?w3ad8ce61-0ea3-46e6-a619-ddd5be5e4e45-36077864