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Exploring Strategies for Early Identification of Risks in Information Technology Projects

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Abstract

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MBA, City University, 2001

BA, University of Wisconsin-Milwaukee, 1993

Doctoral Study Submitted in Partial Fulfillment

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Abstract

Project managers must ensure risk management and business justification for their projects. Approximately, 53% of IT projects failed due to project managers not identifying risks early in the projects' lifecycle. The purpose of this single case study was to explore strategies IT project managers utilize to identify risks early in the project's lifecycle. The study population consisted of 5 lead IT project managers from a telecom company located in the Midwest region of the United States who had managed IT projects. The conceptual framework that grounded this study was the general systems theory. The data collection process involved semistructured interviews, a review of public documents, and member checking interviews to verify the authenticity of the participants' information. The data analysis process included the methodological triangulation, through interviewing and reviewing documents as well as using Yin's 5-step process for analyzing data to identify codes and themes. After the data analysis, the themes that emerged were self-development tools and risk identification (inputs, project tools and techniques, and output). The findings indicated it is crucial that the project team and all stakeholders who have an interest in the project continuously address risk management throughout the project's lifecycle. The implications for positive social change may help individuals understand risks better, interpret situations, and prevention of risk, which are essential to encourage economic inclusion, social protection, and environmental building.

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Dedication

With God, all things are possible (Matthew 19:26). I dedicate this doctoral study to my Lord and Savior, Jesus Christ, for he is the author and the finisher of my faith. To my wonderful, supportive husband Woodrow W. Cain II, who encouraged me to continue with my doctorate and not to give up. To my son, Jeremy Mack, who stood by me during high school and as a graduate receiving his bachelor's degree. To my mother, June Kelly-Gray and my stepfather, Willie Gray, for encouraging me that I can accomplish my doctorate, just keep going. To my sister, April Johnson, who kindly provided support to me. To my late grandfather, Joseph Kelly, this degree is for you. To my late father, Gerald J. Kelly, who said you can do it. He gave me a graduation card when I received my MBA. On it are these words of encouragement: "The world will always need young people who care─ people with the vision, energy, and compassion to make life better for all of us. You are a young woman with a lot of creative energy─ a person who cares deeply about life and about other people. You have the power to make a wonderful difference in the world. May the passion you bring to living each day always enrich your own life and the lives of everyone around you." He signed it, "from your father, with all my love." The written word of encouragements rings in my mind and heart today. I miss you, dad.

Acknowledgments

I acknowledge the Lord and Savior Jesus Christ and thank him for seeing me through this doctoral journey. I would like to give a special thank you to my husband, Woodrow W Cain II for sacrificing many times that we did not spend together. Thank you to my son, Jeremy Mack; my sister, April Johnson; and my parents, Willie Gray and June Kelly-Gray for all of your support over the years.

I would like to thank and extend my gratitude to Dr. Ify Diala, my committee chair, for your guidance, understanding, and provide mentoring on how to improve my doctoral study. I could not have achieved this goal without your thorough assistance. I express a sincere thank you to Dr. Natalie Casale, committee member, and Dr. Rocky Dwyer, university research reviewer, for your extensive review and feedback of my work. I also would like to thank those who participated in this research. I could not have completed my study without your participation.

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Section 1: Foundation of the Study

Information technology (IT) project managers face challenges to produce accurate results, avoid exceeding the budget, and avoid delivering the project late in the lifecycle (Raith, Richter, Lindermeier, & Klinker, 2013). IT project managers may encounter negative and positive risks in projects that could affect the success or failure of a project (Tallon, Ramirez & Short, 2013). Identifying risks early in projects might minimize late delivery, save time and costs, and improve quality (Badewi, 2016). Project managers must ensure they are managing risks, supplying adequate business justification for their projects, and keeping their efforts in alignment with the business cases (Mir & Pinnington, 2014). Risk identification process determines what might affect the success of a project (Teller & Kock, 2013). Additionally, having risk identification process is necessary to ensure that the team has acknowledged all risks (Project Management Institute [PMI], 2013). Using project tools and techniques, the project manager and the team would follow the risk identification process described in the risk management plan to document potential vulnerabilities (Teller & Kock, 2013).

The purpose of this study was to explore strategies IT project managers use to identify risks early in the project's lifecycle. A qualitative single case study was the choice for this research on a telecom industry headquarters located in Dallas, TX. Using a qualitative case study allows a researcher to focus on exploring processes, describing the meaning in lived experiences, or seeking to understand culture or themes (Yilmaz, 2013). The challenges of IT project managers are to understand how risks in their project can

become an opportunity when strategizing and managing the success of projects that will add value to the organization's goals.

Background of the Problem

Risk management developed in the second decade after World War II, from 1955-1964 (Dionne, 2013). Early in the 1970s, the concept of financial risk management revolutionized larger companies as a part of corporate risk management in governance (Dionne, 2013). In 1993, IT governance first appeared as a discipline of corporate governance (Henderson & Venkatraman, 1993). Technology governance practitioners and leaders manage and facilitate IT plan changes, validate IT checklists, manage funding issues, and minimize any hindrance in the decision-making process of projects (Bergeron, Croteau, Uwizeyemungu, & Raymond, 2015). According to Joslin and Muller (2015), IT governance functions include the performance on IT systems and performance on risk management associated with IT. Although IT governance may have best practices in place for risk management during a software development cycle, there still may be risks in IT projects.

IT project risks may include (a) project scope change, (b) late project delivery into the lifecycle, (c) over budgeting, or (d) not meeting the user expectations (Mir & Pinnington, 2014). In 2015, the CHAOS Manifesto report listed projects that take more than one year to move through the systems lifecycle as having the potential to fail (Sanchez & Terlizzi, 2017). One of the training skills for project managers' is how to apply risk management in identifying risks early in a lifecycle and planning how to manage those risks (PMI, 2013). The project manager and the team would document the

risks using project tools and techniques (Teller & Kock, 2013). Risk identification process is necessary to help the team identify all risks in a project's lifecycle (PMI, 2013).

Problem Statement

Risks surrounding IT projects can affect the success or failure of projects (Felderer & Ramler, 2014). These risks can affect the projects' costs, delivery of the outputs, and quality (Felderer & Ramler, 2014). Approximately 52% of IT projects failed due to project managers not identifying risks early in the projects' lifecycle costing companies billions of dollars (Sanchez & Terlizzi, 2017). The general business problem was that IT project managers are having challenges identifying risks in the project lifecycle, which negatively affects quality and project costs. The specific business problem was that some IT project managers lack strategies for identifying risks early in the project lifecycle.

Purpose Statement

The purpose of this qualitative single case study was to explore strategies IT project managers used to identify risks early in a project's lifecycle. The targeted population consisted of five IT lead project managers from a telecom company located in the Midwest region of the United States who had managed IT projects. The participants also had experience using the risk management process in managing IT projects. The data from this study may influence project managers and other practitioners to use sound business practices for the risk identification process, techniques and tools that can aid in identifying risks early for the success of IT projects. The contributions for positive social

change include the potential to help managers better understand risk management, protecting organizations investments by providing practical solutions for reducing the intensity of risk in the environment.

Nature of the Study

A qualitative method was the choice for this study. Yilmaz (2013) noted that a qualitative method is used for exploring processes, describing the meaning in lived experiences, or seeking to understand culture or themes. Therefore, the qualitative method was appropriate for this study because in this study I sought to explore a process, elicit comments, and obtain documents from the participants. Alternately, in the quantitative approach, researchers rely on the statistical (i.e., numerical) aspect of measuring the data (Frels & Onwuegbuzie, 2013). Thus, the quantitative method was not appropriate for this study because I did not measure any data numerically. Researchers in applied business studies seldom conduct mixed method approach studies (Dubois & Gadde, 2014). Mixed method approach is the combination of quantitative and qualitative methods (Frels & Onwuegbuzie, 2013). Since this study was for applied business, the mixed method approach was not appropriate for this study.

In the qualitative method, a single case study was the choice for this research. In a case study, the researcher focuses on single organizations or single units within organizations (Houghton, Casey, Shaw, & Murphy, 2013). A single case study was appropriate for this research because I focused on a single unit within an organization. Other designs, such as the grounded theory, phenomenology, ethnography, and narrative design were not appropriate for this study. Grounded design includes building theory

from actions or interactions among a large group of people (Ruppel & Mey, 2015). Using the grounded design was not appropriate for this research because the exploration of strategies is among a small group of individuals and does not include contstructing a theory. The phenomenology design is appropriate for studies that identify the fundamental nature of human experiences and requires face-to-face interviews (du Toit & Mouton, 2013). My research involved a process, and there were no face-to-face interviews. In the ethnography design, researchers emphasize the examination of organizational culture or themes through observation and interviews (du Toit & Mouton, 2013). The ethnography design was not appropriate for this research since the emphasis was on exploring strategies. Lastly, narrative designs deals with understanding issues through the personal stories of participants (Benson & Dresdown, 2013). Using a narrative design was not appropriate for this research because I did not focus on the lives of participants.

Research Question

What strategies do IT project managers use to identify risks early in the project's lifecycle?

Interview Questions

I used the following related open-ended interview questions to explore during this research effort:

1. What certifications or training did you receive as a project manager?
2. What strategies have you used to identify risks early in your projects?

3. What risk management tools did you use during the project lifecycle to help identify risk?
4. How did risks affect your project?
5. What techniques have you used to prioritize risks in your projects?
6. What method did you find worked best to report risks during the projects' lifecycle?
7. What challenges did you experience when identifying risks in your projects?
8. What best practices did you use for managing risks in your projects?
9. What additional information could you share that I have not already addressed with these questions?

Conceptual Framework

The conceptual framework for this study was general systems theory (GST). Von Bertalanffy (1972) was an Austrian biologist well-known as one of the contributors of GST who first verbalized the GST framework in 1930, later presented it in 1949, and Ashby expanded the theory further in 1956 (Rousseau, 2015). During the 1940s, Von Bertalanffy (1972) defined general GST as, "a logico-mathematical field whose task is the formulation and derivation of those general principles that are applicable to *systems* in general" (p. 411). As GST moved towards a general approach, the open system concept underwent further development that included technology, management, and engineering as well as other disciplines (Rousseau, 2015). GST can apply to a form of open systems. Such form can involve a theory of information, evolution, and behavior (Barile, Lusch, Reynoso, Saviano, & Spohrer, 2016). The key concepts from the GST theory as it relates

to this study are process information, technology, and management (Rousseau, 2015). Using the GST will help project managers understand the strategies needed in identifying project risks early in the systems development lifecycle.

Operational Definitions

The following definitions of terms are relevant to this research study.

Ex ante: Ex ante is a financial term regarding forecasts of future returns on investment (Onat, Kucukvar, & Tatari, 2016).

Idiosyncratic risk: Idiosyncratic risks can be specific, residual, or diversifiable affecting change at a small margin of profitability that can eliminate selected assets (Schober, Schaeffler, & Weber, 2014).

Information technology (IT): IT is the collection of processes, software, tools, and the associated hardware devices for storing, retrieving, and sending information (Sanchez-Morcilio & Quiles-Torres, 2016).

Project: A project is a temporary one-time effort in creating a product or service limited by cost, time, and specific requirements (Eastham, Tucker, Varma, & Sutton, 2014; PMI, 2013).

Project lifecycle: Project lifecycle refers to stages that are prudent in all projects, which may include defining the project, planning for the project, executing the project, and delivering the project (Eastham et al., 2014; Kutsch, Browning, & Hall, 2014).

Risk: A risk is an identifiable event or phenomenon that will have negative or positive consequences (Cagliano, Grimaldi, and Rafele, 2015).

Schism: Schism is a division between groups of people within an organization resulting from a disagreement on something (Kahn & Lemmon, 2016).

Assumptions, Limitations, and Delimitations

Assumptions

An assumption is a fact considered true without providing evidence (Simon, 2011). The first assumption was that the participants would be open and truthful in their responses to the survey questions. The next assumption was that the participants comprehended the confidentiality of the study and provided their honest perspectives concerning this research. The third assumption was that lead project managers have certifications or training to manage IT projects. The fourth assumption was that the literature review would support this study, provide sufficient background data, and consist of research on which this study could expand. The last assumption was that the sample size of the population was sufficient to ensure creditability for the study.

Limitations

A limitation pinpoints possible weaknesses of the study (Connelly, 2013). Limitations can be factors, elements, or issues beyond the researcher's control that might exist (Brutus, Aguinis, & Wassmer, 2013). A limitation included project managers from different business units performing risk identification for IT projects, in which the processes were slightly different. Another limitation of this study was the time available to collect the data for the study. The plan was to collect the data from this research within two months after interviewing the participants. A third limitation of this study was that

participation from the participants was voluntary, which meant that the participants could have withdrawn from the study at any time.

Delimitations

Delimitations refer to "those characteristics that limit the scope and define the boundaries of the study" (Simon, 2011, p. 2). The delimitations were within my control. In this study, I focused on risk identification of the risk management process. I narrowed the participants for this study to five project managers who either are or once employed at a telecom company in the Midwest region of the United States.

Significance of the Study

This research study is of value to project managers because risk management is a relevant part of the technical process in mitigating risks in a business project. Because these risks can affect the projects' costs, delivery of the outputs, and quality (Felderer & Ramler, 2014), mitigating them can potentially save a company considerable time, money, and other resources. In corporate finance businesses, risk management is a technique for measuring, monitoring, and controlling the financial value at risk when calculating capital requirements (Cagliano et al., 2015). In the pharmaceutical area, risk management is practical in the quality control systems of biotechnological products such as manufacturing, inspection, and distribution throughout the lifecycle, as well as for reducing risks in drug products (Haleem, Salem, Fatahallah, & Abdelfattah, 2015). Hence, this study is valuable to businesses because risk management is a practice of systematically selecting cost-effective approaches for minimizing threat realization to the organization.

Contribution to Business Practice

IT is an essential component in companies today. Managing IT projects is crucial to the success or failure of a company's strategic business initiatives (Tallon et al., 2013). The contribution of business practice could help practitioners in organizations control technologies that lead to developing innovative opportunities to improve in globalization, economic inclusion, and in the social sectors. Improved risk management could result in reduced costs, lower prices to customers, and allowing practitioners to experience the value of technology. This improvement could lead to improved quality of work, the higher success of projects for project managers, practitioners, and senior-level managers in other businesses such as construction, manufacturing, and operations.

Implications for Social Change

The outcome of this study contributes to positive social change may help people understand risks better by interpreting situations and minimizing risks. With the competitive challenges presented by globalization, it is becoming crucial for businesses to take a proactive approach to risk management (O'Brien, 2013). Additionally, risk management includes prevention, mitigation, and coping strategies to protect basic livelihoods and promote risk-taking (Rodríguez, Ortega, & Concepción, 2016). The implications for positive social change may be helping managers to understand risk better, proactively identify risk situations, and be able to apply standards of risk management effectively.

A Review of the Professional and Academic Literature

I used various databases, books, and professional websites for the literature search in support the problem statement and the research question. The discussion of the professional and academic literature includes the following categories: (a) the GST, (b) overview of project management, (c) overview of risk management, (d) identification of risks process, (e) project tools and techniques, (f) assessing project risks, (g) project stakeholders, (h) IT project failure, (i) IT investments, and (j) risk measurement.

Strategy for Searching the Literature

I extracted sources from the recommended research databases through the Walden University Library. These databases included ABI/INFORM Complete, Academic Search Complete, Business Source Complete/Premier, Computers & Applied Sciences Complete, ProQuest Central, SAGE Premier, ScienceDirect, Thoreau, and full-text sources from Google Scholar, a powerful search engine. The keywords used for searching the databases included *information technology*, *risk investments*, *risk returns, risk management, project management, PMBOK, project manager, project tools and techniques, IT project risks, IT project failure, IT project success*, *qualitative, case study,* and *general systems theory*. The total number of resources included in this research was 203, of which 186 were from research-based peer-reviewed journals. One article was published in 1972, one in 1993, one in 2009, five between 2011 and 2012, and 178 scholarly articles were published between 2013 and 2017. Additionally, I used 10 books, four conference proceedings, two websites, and one dissertation to support the research

topic. Table 1 shows a summary of the peer-reviewed articles and the articles published within five years from the anticipated completion date of CAO approval.

Table 1

Summary of Sources in the Literature Review

Reference type	Recent (2013-2017)	2012 & older	Total	% (Based on recent/total)
Research-based peer reviewed journals	178	8	186	88%
Dissertations	0	1	1	0%
Conference proceedings	3	1	4	1%
Books & online books	6	4	10	3%
Websites	1	1	2	1%
Total	188	15	203	93%

The purpose of this qualitative single case study was to explore strategies IT project managers used to identify risks early in a project's lifecycle. The goal of the conceptual framework is to convey ideas theories and to provide a broad explanation in understanding the relationships between variables and hypotheses (Kumar, Manrai, & Manrai, 2017; Torraco, 2016). Integrating the conceptual framework with research questions and the theory helps support the study (Torraco, 2016). GST focuses on the whole system, which consists of inputs, transformation, and the outputs (von Bertalanffy, 1973). GST aligns to this study based on (a) the input, which was process information and project managers; (b) transformation, which was technology and management; and (c) the output, which were IT financial budget.

General Systems Theory

Von Bertalanffy (1973) described GST as "the organism as a whole or system, and sees the main objective of biological sciences in the discovery of the principle of organisation at its various levels" (p.10). GST deals with a system as a whole rather than its individual entities (Lee & Green, 2015). Adams, Hester, Bradley, Meyers, and Keating (2014) stressed that a system could be biological, physical, or symbolic in nature. Pouvreau (2014) further argued that GST is concerned with a system's perceptible transformation over the time in terms of steady state, growth, or decay. Time acts as a central variable to understand the relative dynamics in GST (Pouvreau, 2014). In contrast, some researchers (Arnold & Wade, 2015; O'Brien, 2013) claimed the development of a conceptual framework for GST includes a system as a unit to comprehend its contents, relative dynamics, and changes.

Zenko, Rosi, Mulej, Mlakar, and Mulej (2013) claimed that a holistic and interdisciplinary approach deals with system complexity, elucidates system dynamics and changes, defines the relationship between the micro and macro level of analysis, and has an ability to integrate both natural and social sciences. Lee and Green (2015) suggested that GST provides practitioners and researchers a logical structure to understand the relationship and interaction between various parts of an organization or a system. Furthermore, Azderska and Jerman-blazic (2013) asserted that GST includes the framework of *tree organization* that influences the structure of the system.

According to Barile et al. (2016), a system can be open, closed, or isolated to the environment regarding its interaction. Based on a system of interaction and GST, Barile

et al. also noted the development of different approaches, such as open system theory (OST) and viable system model. Rousseau (2015) stated that OST deals with the relationship between system and environment to transfer information and energy and uses feedback for coordination with various components of the system or its sub-organizations. Moreover, Guimaraes, Korn, Shin, and Eisner (2013) added that OST deals with how a system adapts in specific environmental conditions. Stokols, Lejano, and Hipp (2013) assumed organization as a social, technical system. Stokols et al. referred to people as a social component and technology or machines as a technical component of an organization.

Viable system. Hildbrand and Bodhanya (2015) described viable system model (VSM) as a regulator or cybernetic system that deals with system changes and dynamics in term of feedback for sustainable functioning. Within VSM, the conceptual framework works with system complexity and for system redesigning via change management and evaluation of critical factors for coordination and implementation (Mugurusi & Boer, 2014). Conversely, Liu and Wang (2014) focused on a viable system approach (VSA), which takes under consideration subsystem and supra system. Subsystem deals with the relationship analysis of an internal component of an enterprise while supra system focuses on the relationship between companies and other influencing systemic entities in their context (Liu & Wang, 2014).

GST and technology. Adams et al. (2014) claimed GST as a holistic approach, in which GST has wide applicability in technology, management, and organizational design. In 1960, John Von Neumann used GST to form the basis of structural design and analysis

in computing and information technology field. Whitney, Bradley, Baugh, and Chesterman (2015) suggested that IT designers use GST as a design model to help in decision-making as the project goes through the design process. Moreover, Eisenbart, Gericke, and Blessing (2011) noted that the design process helps the designers consider creative techniques to enhance the design model to mitigate project failure. Through GST, Bertalanffy introduced managerial systems and organizational designs for effective management practice (von Bertalanffy, 1972). Sturmberg, Martin, and Katerndahl (2014) noted that GST could apply to the large or small-scale organization. These researchers have dealt organizational system as a whole that consists of organization employees, customer, innovation, business practices, and social perspective to meet the organization's goal (Rousseau, 2015).

Project managers use GST to identify and comprehend variables of interdependence, self-regulations mechanism, and feedback to operate the system as a whole (Lee & Green, 2015). GST is a system that offers a realistic approach to finding out a mechanism through which organizations, machines, people, and societies operate (Arnold & Wade, 2015). Shaw (2009) described four set of elements that are a prerequisite for system performance in an organization are (1) the process describes as input and output model, (2) hierarchic structural system, (3) goal or function of a system and (4) feedback mechanism to complete a project goal effectively.

GST in management and marketing. Applications of GST in management and marketing particularly focus on the relationship, quality, knowledge, environment, complexity, and adaptation (Zenko et al., 2013). Katina, Keating, and Jaradat (2014)

anticipated system as a learning organization by focusing on thinking method, mental models, shared vision, and team building for generating learning capabilities to comprehend the complexities and for value generation. Through this system theory, it shows complex integration between elements of the subsystem and supra system (Katina et al., 2014). Business value creation depends on quality management, internal auditing, research and development activities, continuous feedback and research, asset improvement, cooperation logics, and adaptive aspects (Barile et al., 2016). For instance, Alter (2013) argued that systematic perspective permits information transfer from single unit to the whole system by involving various stakeholders, that is, individual, firms, customers, and markets. However, Saunila and Ukko (2013) claimed that in management and marketing, managers are responsible for devising a structural adjustment plan to ensure the stability of whole systems. Gobble (2012) suggested that this proactive and adaptive behavior is part of GST conceptual pillars to accelerate sustainability and long-lasting system performance.

GST and managing risks. Theorists use the GST for holistic risk assessment and management in various sectors of social sciences (Azderska & Jerman-blazic, 2013). Ahmed, Khan, and Raza (2014) pointed out that risk assessment refers to a systematic approach to identifying the nature and magnitude including extends of risk associated with health and environmental hazards. Furthermore, Janssen, Voort, and Veenstra (2015) suggested that risk management provides practical solutions to reduce the intensity of risk. In the meaning of risk assessment and management, practitioners considered a system as a complex adaptive system (CAS), which has a complex network

of elements and their actions are highly interconnected (Janssen, Voort, & Veenstra, 2015).

In a complex adaptive system, a large number of components interact in a dynamic way with great exchanges of information. Rousseau (2015) emphasized that these complex systems be mainly open systems with a positive and negative feedback loop. They have a constant flow of energy and undergo continual change. Due to system complexity, it is hard to identify actions or the effect of a single element to the whole system (Sturmberg et al., 2014). Ahmed et al. (2014) claimed that one could determine risk impact in three different levels: (a) user or individualistic level, (b) environmental level, and (c) economic level because of the conceptual framework for risk assessment and management. According to Azderska and Jerman-Blazic (2013), GST conceptual framework takes each component of the environment and human health into consideration to assess the degree, magnitude, nature, and extent of risk to provide a practical solution for risk management.

Overview of Project Management

In the 1980s, there was a broad acceptance of controlling strategic and organizational change through project management methodologies, which required a change in stakeholder identification, environmental impacts, and lifecycle costing (Garel, 2013). Garel (2013) stressed that the acceleration of change developed in the 1990s, followed by the introduction of the personal computer, providing the technology to manage a variety of project management tools, and techniques across organizations. Badewi (2016) argued that more organizations are adopting and applying project

management practices, tools, and techniques to its various operations. Advanced Internet and computer technology are assisting project managers in organizations to support the needs of project management (Badewi, 2016).

With globalization come additional challenges and the need for increased speed-to-market with products and services (O'Brien, 2013). According to Janssen et al. (2015), projects are becoming larger, more complex, and progressively hard to administer, especially since teams are more diverse and spread across the world. Ahmed et al. (2014) noted that the economic crisis pushes work offshore to low-cost countries, which itself presents several concerns. New tools, techniques, and better practices will arise as technology push the boundaries of what is possible and new challenges facing organizations to help improve in the way project managers manage projects (Rostami, 2016).

Overview of Risk Management

Risk management is probably the section most often IT practitioners reviewed as not important (Fadun, 2013). Dionne (2013) identified risks as those events or outcomes, which threaten the delivery of the planned objectives and goals. However, Keil, Rai, and Liu (2013) suggested project managers should measure identified risks and quantifiable risks regarding the impact of the project and probability of occurrence. Once the project manager has identified and ordered the risks, the project manager should identify a plan of measures, and respond appropriately in managing those risks (PMI, 2013). Alexandrova (2015) contended that one advantage of explicitly setting out the risk structure is that the plan can stimulate valuable and positive feedback from reviewers.

Janssen et al. (2015) concluded that large-scale projects might have some stakeholders' name listed in the plan and their interests defined to determine how the project manager's plan would come together. Alternately, Badewi (2016) found that if a project is multi-institutional, there might be a need to identify control and coordination mechanisms to ensure secure project management.

An IT project is likely to fail due to specific characteristics, in which risk management is becoming one of the critical elements in IT project management (Eastham et al., 2014). In the project management body of knowledge (PMBOK) guide, the definition of project risk management is "the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control of a project" (PMI, 2013, p. 273). PMBOK is a project manager's guide that illustrates how to manage projects using nine knowledge areas (Eastham et al., 2014). The risk management process is repeatable until the project has completed the project lifecycle (Eastham et al., 2014). According to Brookfield, Fischbacher-smith, Mohd-Rahim, and Boussabaine (2014) identifying risks are one of the stages of the risk management process.

Identification of Risks Process

In the early phase of the process, Teller, Kock, and Gemünden (2014) stated that the project manager is to ensure that the project team clearly understands the project's objective. During the planning stage, project managers would need to determine what approach to use to identify risks (Brookfield et al., 2014; Kutsch et al., 2014; PMI, 2013). Furthermore, Janssen et al. (2015) stressed that a project manager identifies risks by

determining which risks might cause a delay or possible failure in the project. Researchers claimed that project manager would need to review the project and attempt to analyze the risks on the overall project numerically (Brookfield et al., 2014; Janssen et al., 2015; Kutsch et al., 2014). Additionally, assign a numerical value to those risks that might affect the project and record them on the risk register (Brookfield et al., 2014; Janssen et al., 2015; Kutsch et al., 2014).

Rostami (2016) claimed that the implementation of risk management and ensuring practice of it would contribute to the enhancement of project performance. Additionally, Kutsch et al. (2014) agreed that a project manager and project team would need to identify new risks, describe those risks, and assign an owner to the risks during the planning of risk responses. Johansen et al. (2016) argued that the project team could monitor the risks during scheduled meetings to assess new and existing risks in the project.

Addressing project risk. Cagliano et al. (2015) analyzed the model of project risk management. The model shows the success of projects emphasizes the fit of risk exposure with risk management. According to Allen, Carpenter, Hutchins, and Jones (2015), two primary options exist for addressing project risks discounting the project's net cash flow and mitigation. Espinoza (2015) noted that discounting is an appropriate response to minimal levels of probability, low loss magnitude, or a combination of both. Whereas, Didraga (2013) stressed that some risks simply are either not economically rationale to mitigate against or have extremely low probabilities of occurrence.

Mitigation strategies take the form of specific actions designed to minimize the probability and loss magnitude (Alexandrova, 2015). Although Alexandrova (2015) noted that mitigation strategies are numerous, the most common remedies help diminish rather than eliminate risk. Carvalho and Rabechini (2015) argued that these risk reduction strategies include training, standardizing practices, improving development methodologies, reducing scope, and adding resources (time, money, or people). Similarly, Badewi (2016) found that when project managers used standard practices, determinant factors were on the size of the project, time, cost, and the number of people involved in the project. Additionally, Barnes, Katta, Sanford, Staigers, and Verish (2014) reviewed that mitigating known risks enhances project management, changes technologies, puts pressure on outside providers (litigation, financial, or threats to withdraw), and obtains new help or abandons the project. One of the most cited sources of project risk is an overly optimistic estimate leading to a lack of time to deliver a quality product (Barnes et al., 2014). Walker, Davis, and Stevenson (2017) claimed that the most cited comparable mitigation strategy is adding time to complete the project.

Detecting risks with previous experience. Samantra, Datta, and Mahapatra (2014) described IT as a plan to provide project managers with a risk assessment and management resource based on previously captured project experiences. The resource features links to information and content experts as well as a database of risk suggestions (Cooper, 2014; Uzzafer, 2015). The suggestions are a historical collection of over 3,000 documents providing background, risk reduction, and mitigation strategies (Allen et al., 2015). The resultant knowledge represents the company's endeavor to capture its

collective expertise in identifying and managing IT project risks (Teller et al., 2014). The project manager then stores the resultant knowledge in the database as a combination of static and dynamic links (Teller et al., 2014). Information content includes technical reports, briefings, and over 1,000 links to risk-topic web addresses (Allen et al., 2015). Content owners' task is to maintain and update knowledge in the database (Allen et al., 2015). An interview process appears to be the most efficient way for soliciting and selecting valuable content (de Bakker, Boonstra, & Wortmann, 2011).

Tuunanen and Govindji (2016) created a query into the database and requested the key descriptive attributes of the project including proposed technology. Their study showed that the project manager present selected similar projects retrieved from the database to the user based on a matching algorithm. Supplied to the user for each matching project are potential risk areas, risk information templates, and expert contacts (Tuunanen & Govindji, 2016). Thamhain (2013) stressed that project managers use risk information template types for project-specific as well as general information. Once the risk profile completion for the new project is completed, the user saves this information to the database to benefit future queries (Tuunanen & Govindji, 2016).

Identifying risk. Bachlechner, Thalmann, and Manhart (2014) noted on an average that IT auditors spend about 15.6% of resources monitoring IT projects to assist in identifying projects that are at risk. Elzamly and Hussin (2014a) criticized that risks are inevitable and can cause consequences to the projects' objectives. Two types of consequences can occur when determining risks in a project lifecycle based on strengths, weaknesses, opportunities, and threats (SWOT): (a) positive/opportunities, and (b)

negative/threats events (Cagliano et al., 2015; PMI, 2013). Whereas, Teller et al. (2014) indicated that identifying risk early in a project lifecycle is essential and part of the risk management plan. Carvalho and Rabechini (2015) contended that the process for identifying risks is essential in effectively managing risks before problems occur in the project.

Morgan and Ngwenyama (2015) presented a way to identify risk by pricing for software development using the Cocomo model. According to Walker et al. (2017), the risk factor forms the basis of an expert system that employs two elements, risk weighting with nonlinear probabilities of occurrence and an effort-based cost consequence. Morgan and Ngwenyama (2015) tested a software project using Cocomo cost estimate. Based on the project size, they found a 0.67 correlation between the system's calculated risk and the actual projects' cost per 1,000 source instructions (Morgan & Ngwenyama, 2015). Efforts to validate the results of the expert system were ongoing.

Bolton, Chen, and Wang (2013) outlined three elements of risk pricing framework: (a) a linear multifactor risk-return model that defines the return generating process (RGP), (b) an operationalization of the RGP using arbitrage pricing theory (APT) from financial economics, and (c) a methodology for estimating pricing parameters of IT risk factors. IT investors used all three elements, in finance research in the context of traded financial assets (Franklin, 2015). Respectively, upon presenting the risk-return model and its operationalization, Mclean and Zhao (2014) examined their underlying assumptions and their suitability for the IT investment context. Importantly, Savor and Wilson (2016) would probably argue that financial research is exclusively on the

measurement and pricing of systematic risks. Schober et al. (2014) reviewed financial economics research recognizing the growing importance of measuring and managing firm-specific *idiosyncratic* risks.

Idiosyncratic risk. Researchers, (Schober et al., 2014) suggested that idiosyncratic risk can be a variance of residuals of the market model to minimize the diversification of portfolios. Babenko, Boguth, and Tserlukevich (2016) claimed that financial economics theorists traditionally argue that only systematic risks matter in asset pricing models. The rationale given is that a publicly traded firm need not worry about diversifying its idiosyncratic risks (Savor & Wilson, 2016). Schober et al., 2014 argued that it is less costly for anyone of its investors to diversify their exposure to the company's idiosyncratic risks such as holding an equally weighted portfolio of 20 to 50 tradable assets. Benoit, Colliard, Hurlin, and Pérignon (2016) proposed that others opposed systematic risk because it may not hold if some investors cannot hold the market portfolio. For instance, if one group of investors fail to hold the market portfolio for exogenous explanations, other investors will also not be able to hold the market portfolio (Paquin, Tessier, & Gauthier, 2015).

Additionally, Savor and Wilson (2016) described idiosyncratic risk priced to compensate prudent investors for an inability to hold the market portfolio. Moreover, Bali, Brown, and Caglayan (2014) contended that empirical researchers suggested that even large portfolios have a significant exposure to firm-specific idiosyncratic risk. For example, Schober et al. (2014) noted that an investor holding an equal weighted portfolio of 50 stocks could experience on average 18% of the firm-specific risk. Furthermore, an

analytical simulation shows that it may require 100 stocks to create a naive portfolio yielding a 99% reduction in firm-specific risk (Turan, Metin, & Sencer, 2014).

Guillén, Jarner, Nielsen, and Pérez-Marín (2014) explained the existence of expanded multifactor models that include industry-specific and firm-level risk factors that apply to all assets in a specific target economic space (e.g., industry). Babenko et al. (2016) suggested that the significance of idiosyncratic risks is visible not just from the investor's perspective but also from the firm's perspective. Franklin (2015) pointed out that companies can be in consideration as a collection of tradable and non-tradable capital assets, some combination of which produces the output for customers and returns for its stockholders. Following this view, financial economists advanced the view of pricing certain non-tradable assets, such as the human capital of a firm, by enhancing the market model (Espinoza, 2014).

For example, Roussanov and Savor (2014) argued that this thinking might inform managers towards developing risk management strategies for idiosyncratic risks. In practice, Bali et al. (2014) believed most managers seem to agree that conventional asset pricing models do not account for various firm-specific risks. Suppose an owner has a small firm that is a closely held public corporation or a private company. The owner of private companies and the investors in the small public corporations will probably have significant shares of their wealth invested in the business, and they will have exposure to both market and firm-specific risk (Chapman, 2014).

Project Tools and Techniques

The risk management process includes identifying risks in determining which risk might affect the project in succeeding or failing (de Bakker et al., 2011). According to Thamhain (2013), the key players that might be involved in identifying risks are the project manager, project team, end users, stakeholders, and risk managers. Kutsch et al. (2014) asserted that new risks might occur as the project proceeds through the project lifecycle. The project manager would assign risks to members of the project team (Fadun, 2013). Thamhai (2013) stressed that member would then become the owner or responsible for the risks and any associated risks response.

Program logic models. One set of tools that can be very useful in spreading out complex and large scale projects are program logic models (Eisenbart et al., 2011). These models offer a systematic process for analyzing the complete project chain from resources and activities through short and longer-term outcomes to change (Garel, 2013). Program logic models provide a complete overview of a complex project (Rostami, 2016). Ko and Kirsch (2017) stressed that to manage the detail of the models; it will be necessary to use tools to design the model to bring out alignments and conflicts between activities. It will be substantial for project managers to know how to use these tools as part of initial planning (Rostami, 2016). Most importantly, Badewi (2016) argued to reorganized, rescheduled, and redesigned projects' activities.

The project manager and the team would follow the risk identification process describe in the risk management plan to document the risks using project tools and techniques (Rostami, 2016). According to Brustbauer (2016), risk identification process

is essential to the success of managing risk in a project. Here are possible indicators that risks might occur in a project: (a) quality of the plan, (b) project requirements, and (c) assumptions made at the beginning of the project lifecycle (Brustbauer, 2016). Cagliano et al. (2015) pointed out that identifying risk involves five methods that project managers might consider using in their projects. The five methods are (a) documentation reviews, (b) information gathering techniques such as brainstorming, Delphi technique, interviewing, and SWOT analysis, (c) checklist analysis, (d) assumptions analysis, and (e) diagramming technique (PMI, 2013). The project manager and the project team could use the techniques to help them identify risks in a project (Rostami, 2016).

Documentation reviews. Mir and Pinnington (2014) highlighted that documentation reviews are a structured review that can include project management and risk management plans, project files, and assumptions made from the overview of the project, as well as other artifacts. Information that is missing from the project requirements can lead to risk in a project. Rostami (2016) conducted a study to show 75% of organizations (441 out of 453) were familiar with the documentation review method and they preferred to use the method to identify risks as opposed to the other methods. Therefore, project managers and project teams might like to use the documentation review method to avoid ambiguity in the project. Stanciu and Tinca (2013) believed that disseminating the need for asynchronous discussion boards to provide a platform for project review, management would be made more critical.

Information gathering techniques. In this method, the project team can use the brainstorming technique, the Delphi technique, interviewing technique, analysis

technique, and SWOT. Rasheed, ChangFeng, Yaqub, Rafique, and Di (2014) showed in their study that brainstorming and interviewing are the most common techniques for identifying risks. Furthermore, Luko (2014) suggested that the main purpose of the brainstorming technique is gathering possible risks that can occur in a project. Jeong, Bae, and Jeong (2015) stressed that the project team verbalizes risks identified in the project that will help build upon each member's ideas. After obtaining those risks, Walker et al. (2017) affirmed that it is then a good idea to categorize those risks using a risk breakdown structure.

Another technique the project team can use in gathering information is the Delphi technique. It is a good way to reach other experts that are familiar with project risks (Keller & Heiko, 2014). According to Keller and Heiko (2014), the experts that participate in the Delphi technique are anonymous. Rasheed et al. (2014) indicated that a facilitator distributes a questionnaire to those anonymous experts asking for their professional ideas about the project risks. After the facilitator gathers the responses, the facilitator distributes those responses back to those experts for any additional comments (Rasheed et al., 2014). Experts review the comments again and eventually reach an agreement (Rasheed et al, 2014). Using the Delphi technique reduces bias that might occur in the data as well as keeping one from being an influence on the outcome of the decision making of the risks (Sourani & Sohail, 2015).

Checklist and assumptions analysis. A third method is to use a checklist to help identify risks. The checklist can be a predefined checklist outlined in the risks management process (Cagliano et al., 2015). Furthermore, the checklist can be

straightforward and quick for the project team to use when identifying risks during the close of a project (Elzamly & Hussin, 2014a; PMI, 2013). Using a checklist can be an aid to a project manager and project team in improving identifying risks in future projects (Luko, 2014). According to Marcelino-Sádaba, Pérez-Ezcurdia, Lazcano, and Villanueva (2014), a completed checklist can help provide lessons learned for future projects. A fourth method is analyzing assumptions to determine the validity in the projects (Liu & Deng, 2015). Kremljak, Palcic, and Kafol (2014) denoted that using the assumptions analysis could identify the project risks from incorrectness, uncertainty, variation, or incompleteness of assumptions.

Diagramming technique. The last method is to use a diagramming technique to identify risk by exposing and exploring the risks' causes (PMI, 2013). An individual can use diagram techniques to help determine risk in a project, including cause and effect diagrams, system or flowchart diagrams, and influence diagrams (de Bakker Abu Shikhah, Alomari, & Alkhatib, 2011; PMI, 2013). A cause and effect diagram displays a pictorial list on the linkage between factors or causes to potential problems in understanding why the problem happened (Elzamly & Hussin, 2014a). Another diagram technique is a system or flowchart diagram (PMI, 2013). Boritz, Carnaghan, and Alencar (2014) described a flowchart diagram as an element of a system and the way it interconnects in the logical flow of a process. The last example of a diagramming technique is diagrams, which according to Elkarmi et al. (2011), are a graphical representation of situations that illustration relationships between various variables and outcomes, such as causal influences and time ordering of events.

Assessing Project Risks

The project manager might use a predefined checklist to help identify risks, which outlines the risks management process (Luko, 2014). The checklist can be straightforward and quick to review risks during the close of a project to help improve for a future project as well as providing a lessons learned for future projects (PMI, 2013). While risk detection checklists typically help establish the probability of a risk becoming an issue in need of attention, risk assessment adds a second element of loss, and its expected magnitude (Elzamly & Hussin, 2014a). Rao et al. (2014) showed the extent of potential loss influence managers rather than its probability. Furthermore, Bloom, Garicano, Sadun, and Van Reenen (2014) emphasized that the full value of risk detection be to realize that the *magnitude of loss* determines two elements (probability and size), which is the combination of a full measurement of the risk. Rodríguez et al. (2016) addressed another method project managers could use to assess project risks, namely fuzzy logic. Fuzzy logic is useful for processing subjective evaluations and dealing with group decision making; as well as the implementation of mathematical models for the analysis of uncertain and imprecise circumstances (Qian, Wang, & Feng, 2013).

Measuring risk and its' impact. Underlying concepts of IT project risk management are a probability of a loss and size of the loss (Keil et al., 2013). The probability of loss is akin to the likelihood of incurring a negative outcome (Zhang, Shi, & Diaz, 2015). The size of loss measures the size of a negative consequence given a negative result (Liu & Wang, 2014). The calculation of risk exposure is to multiply loss probability by loss size due to the risk (Jeon, Kim, & In, 2015). Allen et al. (2015)

pointed out that the timing could be simply the number of days or months until the adverse impact of risk is encounter. Similarly, the description of risk concepts can be either quantitative or qualitative variable (Kremljak, Palcic, & Kafol, 2014; Zschocke, Mantin, & Jewkes, 2014). Saputra and Latiffianti (2015) argued that the probability of loss assigned to each risk be on a quantitative scale measuring the probability distribution in percentages from zero to one hundred. Kremljak et al. (2014) stated that probability might also mean a qualitative indicator ranging from low to high. The measurement of size and loss is in dollars or a subjective rating of impacts to various aspects of the organization's operations given a project failure (Kremljak et al., 2014).

Zschocke, Mantin, and Jewkes (2014) did not recommend precise quantitative estimates of probability and size of the loss, instead they suggested the computation of development risk as project uncertainty multiplied by the magnitude of loss. Alternatively, Elzamly and Hussin (2014b) stressed that uncertainty measurement is a series of risk variables. Wherein, Richardson, Marion, and Onu (2015) defined the magnitude of loss as a subjective evaluation of adverse consequences from a failed project. Moreover, Teller et al. (2014) asserted that risk timing is descriptive based on the number of months until the risk can become a problem, immediate for less than three months, soon for three months to six months, and later for greater than six months.

Using cost drivers to assess project risks. Chandra (2014) described a risk management method based on a coupling of risk identification with cost drivers utilized by the constructive cost model (COCOMO). de Andrés Suárez, Fernández-Lanvin, and Lorca (2015) noted that the user determines elements of risk by using COCOMO from

the combination of multiple cost drivers. Knowledge-based tables indicated risk values for predetermined cost driver interactions (de Andrés Suárez, Fernández-Lanvin, & Lorca, 2015). Extreme cost driver values lead to the identification of risk-prone situations (de Andrés Suárez et al., 2015). However, Yang and Wang (2015) pointed out that the standard COCOMO is not a good model to use in cost estimation to assess a project's risk because there is not enough historical data to emphasize the feasibility of adapting financial economics to the IT investment context. Morgan and Ngwenyama (2015) summarized two empirical instantiations of the proposed risk measurement framework. Given the diversity of IT risks and recognizing that data reflecting economic effects of these risks may come in various forms and from different sources, the two empirical instantiations are designed to target two different types of IT risks (Morgan & Ngwenyama, 2015). In summary, the overall objective was to show why and how the proposed risk measurement framework could use estimate risk-pricing parameters for individual IT risks.

Contingency based on risk assessment. Cooper (2014) focused on measuring the probability and magnitude on a scale of one to five with a value of one assigned to the lowest and five to the highest using the contingency model. According to Bloom et al. (2014), the calculation of risk exposure is by using probabilities and magnitudes of both direct events and numerous potential outcomes. A given project's total contingency reflected the additive effects of each risk's exposure (Cooper, 2014). Boritz et al. (2014) compared effort and duration estimates to a stand-alone cost estimate tool and combined the contingency tool with the cost estimate tool. Carvalho and Rabechini (2015) study

indicated a similar gain in accuracy for contingency tools performance with bounded estimates using various over and under ranges.

Project Stakeholders

Some researcher has shown that having business stakeholders in IT projects is a key to success or failure if the involvement of business leaders are not present (Vrhovec, Hovelja, Vavpotič, & Krisper, 2015). Davis (2016) defined stakeholder as individuals or a group who supply resources that are critical to a project. Even more importantly, stakeholders have the power to withhold resources and derail projects (Chapman, 2014). Additionally, Chapman (2014) stressed that stakeholders could affect a project through their involvement and lack of participation. Carvalho and Rabechini (2015) argued that communications within projects sometimes not aim appropriately at stakeholder. Tyssen, Wald, and Spieth (2014) stressed that it is essential to the success of projects to adjust communications regarding business issues, critical needs, and developments with senior stakeholders, as opposed to technical broadcasts.

In a 2014 survey, Elzamly and Hussin (2014b) conducted interviews with employees who were material in the development, use of the systems over a two-year period to obtain their impressions from before, during, and after the implementation of the system. There were five dominant themes regarding elements of consequence to these studies (Elzamly & Hussin, 2014b). These themes were the organizational commitment, project management, process, technology, and business consequences to the organization (Elzamly & Hussin, 2014b). Furthermore, a strong commitment and a champion or management resource characterize a simple process, technical design, and strong project

management for a successful implementation (Elzamly & Hussin, 2014b). Joslin and Müller (2016) stated that there are an art and science of communication with business project stakeholders on a complex project and the impact of this communication could affect the success of a project.

Drawn from the perspective of benefits realization and business theory researchers (de Bakker et al., 2011; Teller et al., 2014) pointed out regarding the realization of benefits of a technology project, project managers, and teams should not solely focus on the technology. Instead, they should focus on how the client will benefit from a delivery of a perceived successful IT project (Teller et al., 2014). De Bakker et al. (2011) developed a competency-based model to describe the fundamental dynamics of the partnerships required for benefits realization. De Bakker et al. (2011) reviewed the literature of project success, failure, and developed their categorization schemes based primarily on 25 successful projects. According to de Bakker et al. (2011), stakeholders would want to view business benefits and not solely depend on technology for satisfactory outcomes of a project.

Successful organizational dynamics required for business benefits realization included an ongoing commitment from project managers and teams during the project lifecycle (Guimaraes et al., 2013). This commitment is a shared responsibility with clients managers to address the strategy of the corporation, and the effect that these changes will have on the culture because of the project implementation (Guimaraes et al., 2013). Ultimately, Espinoza (2014) noted that business managers or stakeholders play a

more pivotal role in this responsibility than technology partners and the business stakeholder will need to take ownership of the systems put in place.

Davis (2016) asserted that this partnership has become more critical as consultancies as opposed to *in-house* staff have become more of the rule in the implementation of IT. Liu and Deng (2015) pointed out this lack of partnership between consultants and their clients, and ownership of business benefits, realization are a significant part of the reasons why technology projects continue to disappoint clients. Furthermore, Eskerod, Huemann, and Savage (2015) asserted that business stakeholders need more involvement in the purpose of the success or failure of a project. Bergeron et al. (2015) claimed for a project to be strong, organizational attention and change need to be components of the project. A phenomenon is that a project manager monitors the initial implementation of the project during a project lifecycle (Barnes et al., 2014).

Information Technology Project Failure

Managing IT projects are important for the success or failure of a company's strategic business initiatives (Tallon et al., 2013). Jeon et al. (2015) mentioned that 18% of the projects fail due to budget, lateness, or cancellation. Liu and Wang (2014) noted the ability to recognize when IT was required is important in any decision-making process and strategic management. Davis (2016) argued that measures contribute only a slight role in a success of a project. For example, Davis (2016) stressed that *closing* a project (formal evaluation) centers only on administrative and contractual issues, and not on the assessment. Whereas, Janssen et al. (2015) claimed that stakeholders observed an

increased level of project complexity of acceleration of project failures, which suggest that the traditional project management tools and methodologies were inadequate.

However, Vrhovec et al. (2015) reported that as IT project managers increasingly address critical business and organizational issues, it is important that there be more focus on the project's relationship to organizational strategy and business value. While Badewi (2016) cited that key components of an assessment framework for projects should include usability, client satisfaction, value creation, and contribution to the knowledge process of the organization. Jeong et al. (2015) contended that even though it is critical to an IT project success to add value to the organization, this evaluation is rarely a consideration in project management.

Historically, IT projects that have failed cost companies billions of dollars annually (Sanchez & Terlizzi, 2017). During the NATO conferences in 1968 and 1969, researchers noted the term *software crisis* was the first indication of project failure (Payette, 2014). At the conference, the participants discussed projects that were late, over-budget, and of uncertain quality (Payette, 2014). In 1979, the General Accounting Office of the United States reported weighty issues with software development projects with 2% of project contracts in the delivered and another 3% waiting for delivery (Rahimi, Møller, & Hvam, 2016). Delivery took in effect after significant modifications needed for the original design of projects. These issues persisted between 2001 and 2008, 84% of projects failed, were lacking in critical functionality or canceled (Jorgensen, 2014).

Projects late. Bouras and Bendak (2014) distributed a questionnaire to 30 IT professionals with 24 questions on it to use to analyze the number of projects that have failed or delivered late. They found 27% of projects failed that might contribute to projects submitted late or that the cost estimates for projects exceeded the projected budget. Chapman (2014) argued that budget allocates the support of risk management from IT practitioners. Likewise, Raith et al. (2013) suggested that IT project managers face challenges to deliver accurate results, avoid exceeding the budget, and avoid delivering the project late in the lifecycle. Furthermore, Carvalho and Rabechini (2015) stressed that projects could fail to attain the preferred outcomes or projected goals.

Project leadership. Tyssen et al. (2014) found that project culture and the absent of project leadership in future IT project practitioners might lead to greater awareness of issues that can contribute to the outcome of IT project. However, Redick, Reyna, Schaffer, and Toomey (2014) asserted that the inference is that project leadership through project team could develop successfully in identifying and addressing the critical risk issues in projects. The focus of Tyssen et al. (2014) study is systematic biases; project and organizational cultures may contribute to IT project failure.

A different perspective Javani and Rwelamila (2016) noted that in IT organizations approximately 62% of projects failed without the structure of having project management. Sanchez and Terlizzi (2017) argued that projects might be failing because the project team might not be handling delayed projects or revisions, and they might not be setting realistic project schedules. Javan and Rwelamila (2016) concluded that a lack of communication between the developers and the project managers, minimal

team participation, and review among project stakeholders could potentially lead to IT project failure. According to Richardson et al. (2015), the impact of IT failure could directly influence one's assessment of whether reporting a project that is in jeopardy might exert an indirect influence on willingness to perform project management skills.

Technical risk. Vrhovec et al. (2015) dealt with the concept of technical risk, which is defining that the likelihood of failure would be on a technical project. Uzzafer (2015) noted that risk is harmful in a project that might likely fail and have opportunities within uncertainty that drive innovation. Furthermore, Biesenthal and Wilden (2014) outlined three objectives about the failure and the success of projects as (a) institutional, (b) secluded, or (c) at the project's level. Moreover, Cooper (2014) contended that failure of a project is an element to risk management and understanding those risks would provide knowledge of the technology and marketing for products. Davis (2016) noted that a survey from KPMG (an audit company) showed 86% of failures in projects were not because of technical risks, but it was due to the political culture of those project managers' experiences if they admit that a project failed. The name KPMG came about when KMG (Klynveld Main Goerdeler) merged with Peat Marwick; KPMG has been the company's name since 1999 (KPMG, 2017).

Cancellation. Jorgensen (2014) stressed that one of the early indications of failed IT projects reported in 2004 displayed the cancellation of 11.5% IT projects before the completion of the project lifecycle. Alternatively, Jeon et al. (2015) stated that about 15% to 35% of projects led to the cancellation. According to Lehtinen, Mantyla, Vanhanen, Itkonen, and Lassenius (2014), the percentage increase in IT project failure is due to

timing, financial planning, and scope of the project. Project managers would need to test their projects early and often to reduce the overall risks during the project lifecycle (Rodríguez et al., 2016). The financial spending Chen et al. (2016) noted that companies spent more than $2.3 trillion on IT projects.

Information Technology Investments

Researchers have adapted several measurement forms for examining return from IT investment for different contextual situations such as firm level and process level (Espinoza, 2014; Franklin, 2015). Coombs (2015) described IT investments as being visible to multiple risks during its lifecycle. IT research, however, does not yet offer any specific model for correlating IT returns with these risks. The risk of investment and reoccurrence of an asset occur in the financial economics literature (Coombs, 2015). Bontempi (2016) acknowledged that measurements of returns from IT investment could be in many different forms depending on the context under the study. Moreover, considering that the receptiveness of IT scholars to adapt these various measures for different contexts is leading to a *schism* in IT value research (Kahn & Lemmon, 2016). Hayne and Free (2014) stressed that IT returns loosely as the economic impact on firm performance at both the business process level (internal and external as well) and firm-wide level.

Resource-based view. Project applications of the resource-based view of the firm's IT investments and source of competitive advantage managers may not share information with external stakeholders (Espinoza, 2014). Rampini, Sufi, and Viswanathan (2014) further argued that, if managers' private information is positive or

negative, the information asymmetry between managers and market participants might result in undervaluation or overvaluation of the firm. Zschocke et al. (2014) asserted that all asset-pricing models in financial economics assume the existence of a frictionless market to arrive at an equilibrium condition for estimating risk premium. Conversely, the senior executives themselves could be such non-diversified investors because of their employee stock option based remuneration package (Kahn, & Lemmon, 2016).

Instead, Roussanov and Savor (2014) stressed to maintain the information asymmetry; managers will have to find necessary fund from internal resources to pursue the project. Futhermore, Roussanov and Savor (2014) concluded that the way financial economics research goes about pricing systematic (market) risks some idiosyncratic (firm-specific) risks are in line with the project. Samantra et al. (2014) described that pricing in IT risk factors are plausible, and it could offer valuable insights for evolving more informed IT investment and risk management practices.

Behavioral risk view. Researchers have traditionally viewed risk in IT investments, especially software projects, as having a negative consequence on success (Cagliano et al., 2015; Rampini et al., 2014; Tallon et al., 2013). Liu, Chen, and Lv (2014) argued that trust and risk are necessary for behavioral control because a person who is not trustworthy may cause significant problems. For example, if a project manager knows that a project is late but informs the stakeholders it will be on time, this could potentially jeopardize the project's budget. This concept of risk is implicit as the behavioral view of risk, where decision makers associate risk with a probability of an event and magnitude of an adverse outcome (Teller et al., 2014). Moreover, IT research

examining the impact of IT risk on firm performance and IT risk management view IT risk as *ex ante* uncertainty of payoffs from IT (Fadun, 2013). Paquin et al. (2015) compared this concept of risk to the critical decision-theoretic view of risk where managers are concerned about both upward and downward deviations of investment payoffs from expectation.

Risk-return model. Onat et al. (2016) research focused on defining a risk-return model for IT investments that used *ex ante* for investment decision-making. This research views IT risks as the variation in the attainment of IT investment payoffs (Onat et al., 2016). Furthermore, Coombs (2015) stressed that variability in IT payoffs (or return) is the result of an IT investment or its contextual environment having specific uncertain characteristics, known as risk factors. For example, *lack of experience* in developing a particular type of business applications may result in increased training, effort, and money, leading to over-budget and schedule slippage. Although this example looks at a negative impact of a risk factor, Fabricius and Büttgen (2015) considered operationalizing the idea of a risk factor as the variability in some underlying risk variable corresponding to an uncertain investment characteristic. Having defined the core constructs pertinent to this research, Barham, Chavas, Fitz, Salas, and Schechter (2014) presented a model of information system research focusing on IT value, IT risk definition, and IT risk measurement.

Risk Measurement

IT has shifted to risk measurement in the broader context of the IT investment lifecycle (Liu & Wang, 2014). An IT researcher relies on three essential but different

proxy measures of IT risk, all of which may find their place in IT investment decision-making (Johansen et al., 2016). In particular, Chang, Yen, Chang, and Jan (2014) investigated how wealth and risk affect IT, showing that investments in IT generate a significant impact on both the value and risk of firms. Coombs (2015) described IT investments as being visible to multiple risks during its lifecycle. IT research, however, does not yet offer any specific model for correlating IT returns with these risks (Coombs, 2015).

Another relevant body of work that Zschocke et al. (2014) suggested is the options-based approach to managing IT investment risk. Whereas, Franklin (2015) emphasized that different risks are often operational by assuming the availability of subjective estimates or benchmark estimates for the probability distribution of risk factors because of no availability of risk pricing information. Lawson, Krause, and Potter (2015) explored how such alternative measures could be useful, as long as the limitation of the number of underlying risk factors is the number of real options that are increasing dramatically with the number of risk factors. Nevertheless, this measure by design does not provide pricing information on IT risk (Henderson III, Davis, & Lapke, 2013).

Uzzafer (2015) noted that IT research has paid attention to risk measurement issues in two contexts: (a) the context of a software development project, and (b) the context spanning the entire lifecycle of an IT investment. Relative to the IT value generation process, a software project corresponds to the IT conversion process. Whereas, according to Espinoza (2014), an IT investment also encompasses the IT use process and the competitive process. The past IT research has traditionally focused on

nonfinancial measures enabling prioritization of the risks involved in software development (Liu, Chen, & Lv, 2014).

Tuunanen and Govindji (2016) introduced an example of a measure called risk exposure, commonly used to quantify risk as the product of the probability of an undesirable outcome and loss potential of the outcome. Efficient application of this measure requires accurate estimation of outcome probabilities, an arduous task that depends on having in place an extensive data collection and efficient metrics management program (Carvalho & Rabechini, 2015). Ernst et al. (2015) conducted a survey to illustrate that practitioners tracked 60% of technical risks within the risk process. More specifically, Saunila and Ukko (2013) proposed that the risk exposure measure lacks the capability of integrating with any well-established financial technique for evaluating and managing investment risk. Furthermore, Zhang et al. (2015) noted that planning, analyzing, identifying, and evaluating risks in a project could provide a consistent approach taking for IT practitioners within the IT organization.

The IT researcher is focusing on software development also develops quantitative software cost estimation models that are sensitive to risk factors known to affect development cost (Alexandrova, 2015). The better-known cost estimation models include Checkpoint, COCOMO, and SLIM (Sandhu & Salaria, 2014). The majority of these cost estimation models are proprietary, with COCOMO not being one of them (Sandhu & Salaria, 2014). According to Morgan and Ngwenyama (2015), the COCOMO model adjusts for risk, in which the multiplication of the expected cost of a project by the cost with specific scaling multipliers. Although the COCOMO model uses an economic

approach to account for the impact of risk factors, it is neither capable nor geared towards estimating risk measurement parameters suitable for pricing risk factors; e.g., parameters like the risk premium of and the sensitivity of a project to a risk factor (Chandra, 2014). With this approach, according to Valerdi (2015), cost estimation models like the COCOMO model could certainly play a major role in operational measures for pricing software development risks.

Transition

In Section 1, I provided a discussion on the foundation of the study, the exploratory of the problem, and the purpose of this research, which was to explore what strategies IT project managers use to identify risks early in the lifecycle of a project. I selected the qualitative method for this study because the intent was to explore a process, and elicit comments or obtain documents from the participants. I presented the GST, which was the selection for the conceptual framework. Additionally, I included the implications for positive social change, which will help people to understand risk management at an individualistic level, environmental level, and economic level. The conclusion of Section 1 was a discussion of the literature review that supported the research study of the risk identification stage outlined in the risk management process.

Section 2 began with the reinstatement of the purpose statement. I described the researcher role, a discussion of the selections of participants, and outlined the sampling technique used in the study. I also provided a detailed analysis of the systematic process of ethical research, the purpose of instruments needed for collecting data, along with the approach of collecting and analyzing the data. Lastly, in Section 2, I discussed member

checking and methodological triangulation for dependability, credibility, transferability, and confirmability. Section 3 contains a summary of the findings, application to professional practice, implications to positive social change, recommendations for action, recommendations for further research, reflections, and conclusion of the study.

Section 2: The Project

Section 2 includes a restatement of the study purpose and a brief description of the researcher's role in working with participants. I also discuss the data collection process and the procedures used to acquire the study's participants. Furthermore, this section contains a discussion of the confirmation of the ethical protection of the participants. Lastly, this section presents (a) the research method and design; (b) data collection, which includes the instruments and technique used for data analysis; and (c) reliability and validity of the data.

Purpose Statement

The purpose of this qualitative single case study was to explore strategies IT project managers used to identify risks early in a project's lifecycle. The targeted population consisted of five IT lead project managers from a telecom company located in the Midwest region of the United States who had managed IT projects. The participants also had experience using the risk management process in managing IT projects. The data from this study may influence project managers and other practitioners to use sound business practices for the risk identification process, techniques and tools that can aid in identifying risks early for the success of IT projects. The contributions for positive social change include the potential to help managers better understand risk management, protecting organizations investments by providing practical solutions for reducing the intensity of risk in the environment.

Role of the Researcher

The researcher is the key data collection instrument in a qualitative study (Kral, 2014). As a primary instrument, I collected data in a trustworthy manner. I am a system architect with 20 years of IT professional experience at a leading telecom company headquartered in Dallas, TX. I have no professional relationship with the participants involved with the risk management process. Furthermore, the participants employed at the telecom company are geographically located throughout the Midwest region of the United States. My role as a researcher was to follow the basic protocols when conducting research with human beings as outlined in the Belmont Report (Brakewood & Poldrack, 2013). Based on the protocols, I respected the participants' opinions, protected the participants, and ensured that the participants understood their part in the study (Brakewood & Poldrack, 2013).

Yin (2014) noted that a researchers could avoid incorrect assumptions during the research process by using an interview protocol. I asked each participant the same questions to avoid personal biases. Mcleod, Payne, and Evert (2016) suggested that the researcher could limit personal biases in the study through managing interaction bias. When sending an electronic message to participants, the goal was to not to allow the ethnic sound of a name (Mcleod et al., 2016) to affect any perception when collecting data. To manage negative bias, I interacted with participants to obtain a level of trust that might promote honest responses from them. My role was to connect with the participants using semistructured interviewing process and to do so over the telephone instead of conducting face-to-face interviewing; I did not have any physical contact with the

participants. I followed the interview protocol by obtaining consent from each participant before proceeding with the interviews. The semistructured interview method included scheduling initial interviews with the participants through e-mail, conducting the interviews using a fixed set of open-ended questions, and scheduling member-checking interviews with the participants. Schuster, Proudfoot, and Drennan (2015) stressed semistructured open-ended questions are appropriate for capturing information regarding an occurrence. Harvey (2015) stated that open-ended questions could serve to elicit information from the participants. Fusch and Ness (2015) argued that member checking provides evidence of the interview's integrity and begins the process of analyzing the interview data for real meaning.

Participants

The participants' eligibility criteria for this qualitative case study included (a) being a lead project manager for an IT department, and (b) having identified risks in their projects. In a qualitative study, a researcher can use a single unit with multiple participants or from a single person within the same setting (Grossoehme, 2014; Yin, 2014). Marshall and Rossman (2016) suggested that different criteria are acceptable, but researchers must present their selections based on the purpose of the research. I gained access to the prospective participants using LinkedIn, a professional public network. I contacted the participants using the messaging system through LinkedIn. Researchers can use professional networks to identify participants using selective eligibility appropriate to answering the research question (Maramwidze-Merrison, 2016; Patton, 2015). Moreover,

e-mail is one of the methods qualitative researchers can use to request access to the participants (Wolgemuth et al., 2015).

After accessing LinkedIn, I sent an e-mail to prospective participants, inviting them to participate in the research. The e-mail included an introduction to my role in the study, the purpose of the study, the criteria for the selection, and the benefit of the research (Appendix A). The goal was to communicate my intentions to the participants at the beginning in order to develop a collaborative working relationship with them. Building a working relationship with the participants is important in qualitative research (Dekking, van der Graaf, & van Delden, 2014; Kral, 2014; Muntanyola-Saura & Romero-Balsas, 2014). Furthermore, I requested that the participants complete a consent form and informed them that the study was voluntary. Additionally, I informed the participants that their identity would remain in confidence. One of my primary responsibilities as the researcher was to ensure the confidentiality of all participants. The criteria for the selection of the participants was those IT project managers that had identified risks in their projects and used risk management processes to identify therisks early in their projects.

Research Method and Design

The three choices of research methods are a qualitative, quantitative, and mixed method (Patton, 2015; Sandelowski, 2014; Yilmaz, 2013). The qualitative method was appropriate to address the research question in this study. In the qualitative research method, researchers can choose one of the following designs: (a) case study, (b) grounded theory, (c) phenomenology, (d) ethnography, or (e) narrative design

(Grossoehme, 2014; Lewis, 2015; Yin, 2014). The choice for this qualitative study was a single case research design.

Research Method

The chosen research method for this study was a qualitative method. A qualitative method is used when exploring processes, describing lived experiences, or seeking to understand culture or themes (Marshall & Rossman, 2016; Patton, 2015; Yilmaz, 2013). In qualitative studies, researchers can have direct contact with participants in their established setting, which is desirable when attempting to gain a general understanding of complex issues (Kral, 2014; Yin, 2014). Yardley, Watts, Pearson, and Richardson (2014) argued that the relationship between the researcher and the participants is crucial in a qualitative study because of trust involved in the sharing of information. The qualitative method was appropriate for this study because I focused on exploring a process, eliciting comments, and obtaining documents from the participants.

I reviewed the quantitative and the mixed methods approach for consideration. In the quantitative approach, researchers rely on the measuring statistical or numeric data to prove or disprove hypotheses (Frels & Onwuegbuzie, 2013; Sandelowski, 2014; Yilmaz, 2013). Moreover, the quantitative method involves researchers using closed-ended questions to test the hypotheses (Frels & Onwuegbuzie, 2013; Sandelowski, 2014; Yilmaz, 2013). Therefore, the quantitative approach was not appropriate for this study because I did not involve testing hypotheses in this study; instead, I used open-ended interview questions.

The mixed method approach combines both inductive (qualitative) method and deductive (quantitative) method (Frels & Onwuegbuzie, 2013; Martinez, Lewis, & Weiner, 2014). Sandelowski (2014) stressed that in mixed methods, researchers could use both open-ended and closed-ended interview questions. A mixed method was not appropriate because the quantitative characteristic of the method did not apply to this study.

Research Design

In the qualitative method, a single case study was the selection for this research. Case studies are the preferred strategy researchers employ when requiring an in-depth description that reveals significant characteristics of a condition or circumstance, such as an organizational and managerial process (Marshall & Rossman, 2016; Patton, 2015; Yin, 2014). Furthermore, a case study design can help the researcher explore single or multiple organizations, or one or more individuals (Houghton et al., 2013; Lewis, 2015; Yin, 2014). A single case study was appropriate for this research because I focused on a single unit within an organization with one or more individuals.

Other qualitative research designs were in consideration for this research, such as (a) grounded theory, (b) phenomenology, (c) ethnography, and (d) narrative design. Grounded research design involves building theory from actions or interactions among a large group of people (Lewis, 2015; Marshall & Rossman, 2016; Ruppel & Mey, 2015). The use of grounded research design was not appropriate for exploring risk identification strategies because I interviewed a small group of participants. Researchers choose a phenomenological design when exploring the lived experiences of participants

(Grossoehme, 2014; Lewis, 2015; Moustakas, 1994). The purpose of this research was to explore strategies IT project managers use for risk identification. Thus, the phenomenological design was not appropriate for this study. The ethnography research design involves an investigator observing organizational culture instead of events or issues (Grossoehme, 2014; Lewis, 2015; Prior & Miller, 2012). In this study, I did not observe an organizational culture. Therefore, the ethnography research was not appropriate for this study. The narrative research design deals with understanding issues through the personal stories of participants (Benson & Dresdown, 2013; Lewis, 2015; Marshall & Rossman, 2016). Using this design was not appropriate for this research because the aim of this study was not to study the lives of participants in a storytelling narrative chronology but to explore IT project managers' strategies using risk identification processes in a single unit within an organization.

Data saturation in qualitative research is a way to ensure that a researcher obtained accurate and valid data in a study (Marshall & Rossman, 2016; O'Reilly & Parker, 2012). Fusch and Ness (2015) denoted that data saturation occurs when there is no new coding, no new themes, or no new information emerging, and the data is adequate to replicate the study's results. I ensured data saturation in this case study by using a list of open-ended questions to interview participants from a company and review documents. The interviewing process continued until no new information surfaced, constituting data saturation. O'Reilly and Parker (2012) stressed in a case study using a small census sample and multiple data collection methods that a researcher may reach

data saturation with one or a few participants. Reaching data saturation helps assure the validity of the findings (Fusch, & Ness, 2015; Marshall & Rossman, 2016).

Population and Sampling

I used the purposive sampling method to select the participants for this single case study. Researchers used purposive sampling method in qualitative research to determine the appropriateness and selection of groups of individuals or individuals to represent the target population (Gentles, Charles, Ploeg, & McKibbon, 2015; Palinkas et al., 2015). Yin (2014) denoted that purposive sampling method is suitable for the case study research design. The purposive sampling method was appropriate for my research because the technique helped me to determine the representative sample size from the target the population based on the purpose of this study.

The population is limited to those people meeting the participant criteria in the company or companies being studies (Cleary et al., 2014; Lewis, 2015; Robinson 2014). The targeted population for this research included 25 lead project managers (LPM) from the IT department in the telecom industry who used strategies to identify risks early in the project. Cleary et al. (2014) claimed researchers should target a sample from the geographical location or population. I have chosen 5 LPMs as an adequate sample size for this single case study to achieve saturation. Guidelines for qualitative study sample size vary among researchers: Marshall and Rossman (2016) suggested at least 5, Robinson (2014) recommended 6 to 10, and Yin (2014) proposed 5 to 12 as an adequate sample size for conducting qualitative analysis for a case study. Although the sample size in this study is small, I ensured data saturation using multiple data collection methods,

which included interviews and reviewing documents. Data saturation occurs when no new categories or additional information, themes, or explanations occur from the data (Fusch & Ness, 2015; Palinkas, 2014).

The eligibility of the participant included LPMs who have used strategies to identify risks early in their projects. The criteria are necessary for the selection of the participants to align with the research question. Different approaches are acceptable when researchers select their criteria based on the research method of the study (Marshall & Rossman, 2016; Palinkas, 2014; Yazan, 2015). Using the interview protocol, I sent an e-mail to participants to schedule a day that worked best for us to meet. Due to the geographical location of the participants, all interviews occurred via telephone. The interview protocol included the procedure for conducting the interviews along with nine open-ended interview questions (Appendix B). If needed, I conducted follow-up probing questions to obtain further information. Afterward, I concluded the interview by thanking the participants for their time.

Ethical Research

The researcher must prepare for any ethical issues that may occur during the research study (Yardley et al., 2014). The informed consent process is for participants to decide if they would choose to be a part of the research study (McKinney et al., 2015). Federal regulations require that each participant complete and sign an informed consent form before the start of the study (McKinney et al., 2015). The informed consent form included eight components, in addition to other information that the institutional review board (IRB) requested that they consider necessary to the study. The consent form began

with the invitation to the participants explaining the reason for the informed consent. The eight elements in the form included: (a) background information of the study, (b) procedures and length of time, (c) voluntarism, (d) minimal risks and benefits, (e) payments, (f) privacy, (g) questions and contacts information, and (h) obtaining the participant's consent.

Participation in this study was voluntary. Participation means it is the decision of the participants to choose or willing to be a part of the research study (Chenai, 2011). Therefore, I advised the participants that they could willingly withdraw from the study at any time by informing me they no longer are interested in participating in the study. There were not any incentive offered to the participants who volunteers in this study. I completed the Protecting Human Research Participant training in 2017, certification number 2175514, which requires the ability for me to understand ethical requirements during data collection. I safeguarded the names of participants by replacing their real names with fictitious names, such as LPM1 to LPM5 to represent the 5 lead project managers and a general description of the company will replace its' real name. The protection of names will secure their confidentiality. It is important that researchers carefully protect the rights and provide confidentiality of the participants during the study (McKinney et al., 2015). I will maintain the data in a safe place for 5 years on a password protected flash drive in a secure storage fireproof box. The final doctoral manuscript will include the Walden University IRB approval number 05-16-17-0198724.

Data Collection Instruments

I was the primary instrument in data collection. The researcher is the key instrument in a qualitative study for collecting data because the researcher listens, observes, and interprets the data (Houghton et al., 2013; Kral, 2014; Marshall & Rossman, 2016). The forms of data collected through case study can include (a) public documents, such as minutes of meetings, (b) artifacts, (c) interviews, can include face-to-face, interviews by telephone, group interviews, or e-mail interviews (Stake, 2010; Yin, 2014). Furthermore, Owen (2014) noted that at least two or more of the sources of evidence researchers should explore when using data collection. The two sources of evidence I included were semistructured interviews (Appendix B) and a review of public documents.

Semistructured Interviews

In a qualitative research case study, a researcher will typically use semistructured interview (Rubin & Rubin, 2012; Yin, 2014). Likewise, Olson (2016) argued that a semistructured interview could occur when the researcher is seeking relevant information focusing on the details that address the research question. In this study, the semistructured method included (a) scheduling initial interviews with the participants through email (Appendix A), (b) conducting the interviews by telephone, asking each participant nine fixed set of open-ended questions, and (c) scheduling member checking interviews with the participants.

Documentation Review

Documentation review is a structured review that can include project management and risk management plans, project files, and assumptions made from the overview of the project (Badewi, 2016; Mir & Pinnington, 2014). Rostami (2016) conducted a study to show organizations were familiar with the documentation review method, and they preferred to use the method to identify risks as opposed to the other methods. Reviewing such documents related to the research question included project plans, risk management plans, diagrams, and other related documents.

Member Checking

I enhanced the reliability and validity of the data collection instrument through member checking. Using member checking, the participant reviewed the summary of the interview notes and verified the authenticity of the information. Member checking is the researcher interpretation of what the participant said, and then the researcher takes the information back to the participant for their validation (Dekking et al., 2014; Fusch & Ness, 2015; Harvey, 2015).

Data Collection Technique

I used two data collection techniques in this study, which included interviews and reviewing documents. The researcher often relies on multiple sources, such as (a) interviews, (b) focus groups, (c) participant observation, or (d) reviewing documents to gather rich text for data collection (Marshall & Rossman, 2016; Palinkas, 2014; Yazan, 2015). The interview protocol included what occurred and the interview questions I asked the participants (Appendix B). The interviews were not face-to-face. Instead, I conducted

the interviews using FreeConferenceCall.com, and the interviews were audio-recorded with the consent of the participants. Muntanyola-Saura and Romero-Balsas (2014) considered using the telephone for the methodological tool for interviews rather than for reliability and validity. I asked nine fixed set open-ended questions to each participant who volunteers for the research (Appendix B). Semistructured interviews frequently include six to ten interview questions to allow time for follow-up questions (Rice et al., 2014). Harvey (2015) stated that open-ended questions could serve as eliciting the participants' information for the research.

After receiving consent from each participant, I followed the interview protocol, which was divided into two interviewing processes (a) the initial interview and (b) the member checking interview (Appendix B). The initial interview with the participants included (a) an introduction, (b) the interviewing questions, (c) closing the interview, and (d) scheduling follow-up member checking interview. The member checking interview included (a) sharing a copy of the interpretation from the first interview sent via e-mail, (b) briefly discuss each question, and the interpretation, (c) ask the participant if they would like to add anything, and (d) closing of the follow-up member checking interview. An interview protocol is a tool for one to use to avoid incorrect assumptions during the research and to increase the overall reliability of the study (Jacob & Furgerso, 2012; Yin, 2014).

An advantage of using interviews as a data collection technique is to obtain detail information, which is easier for coding and analyzing than comparing closed questions (Marshall & Rossman, 2016; Olson, 2016; Rowley, 2014). A disadvantage of using an

interviewing data collection technique in a qualitative study is that they could be time-consuming to complete for coding and examining the data (Olson, 2016; Rowley, 2014; Yin 2014). Therefore, the primary advantage of data collection technique in a qualitative study is the approach and the process of collecting data (Anyan, 2013; Marshall & Rossman, 2016; Olson, 2016).

After interviewing the participants, I reviewed documents relevant to the research. Document review is a structured technique in reviewing existing documents for data collection (Coombs, 2015; Mir & Pinnington, 2014; Rostami, 2016) The following documents I reviewed included (a) the project plan, (b) risk management plan, (c) risk log, (c) requirements plan, and (d) design documents. The documentation confirmed the information obtain from the participants' interviews.

An advantage of reviewing documentations is that one can review historical and present documents that the owners maintain. Additionally, using the documentation review is a structured review and support to avoid ambiguity (Coombs, 2015; Mir & Pinnington, 2014). Rostami (2016) conducted a study to show organizations were familiar with the documentation review method, and they preferred to use the method as opposed to the other methods. A disadvantage of reviewing documentations as a data collection technique is that potentially the number of documents one might need to review to explore the process (Houghton et al., 2013; Lewis, 2015). Furthermore, some owners of the documents might provide too much detail information in their documents (Coombs, 2015).

I enhanced qualitative reliability and validity of data interpretation data using member checking. Member checking is the researcher interpretation of what the participant said, and then the researcher takes the information back to the participant for their validation (Dekking et al., 2014; Fusch & Ness, 2015; Harvey, 2015). I conducted the initial interview using a fixed set of open-ended interview questions. After collecting the data, I reviewed and interpreted what the participant shared with me. Next, I scheduled a member checking follow-up interview to examine the summary of the results with each participant. I provided the participant with a copy of the summarization via e-mail of each question, and the interpretation from the initial interview. The summarization aided in verifying the authenticity of the information.

Data Organization Technique

I transcribed the information from the interviews into a Microsoft Word document. Furthermore, I organized and analyzed the data into a Microsoft Excel spreadsheet. I kept track of the data using one primary electronic folder and subfolders for each participant. Electronically organizing allows for quick access and management of data (Goben & Raszewski, 2015; Khan, 2014; Marshall & Rossman, 2016). I stored the interview scripts, the summary of member checking interviews, and any other supporting documentation relevant to this study in those electronic subfolders on my computer. I labeled the primary folder with the title of this research, month, and year and then moved the electronic research information from my computer to a USB flash drive. The file is password-protected on the USB flash drive; it will stay in a secure fireproof box and is available only to me. Extracting and storing the data on a USB flash drive will

remain for the duration of 5 years. After that time, I will permanently delete all the research data by dismantling the flash drive into pieces and then using a metal shredder to shred the metal piece that holds the data. According to Goben and Raszewski (2015), after 5 years, the researcher can continue utilizing the data or delete the data if no longer needed (Marshall & Rossman, 2016; Patton, 2015).

Data Analysis

The appropriate data analysis method for this single case study research design was the methodological triangulation. I used methodological triangulation through interviewing and reviewing documents. According to Yin (2014), methodological triangulation can benefit researchers in improving the validity of the study since a researcher can use more than one method for data collection. I analyzed the data by organizing the participants' responses from the interviewing questions and reviewing the documents related to the research question. After I arranged the data information, I used a qualitative software tool NVivo 11 to perform analysis of the data for coding, identifying themes, and to show their relationships between the categories.

Yin's 5-Step Process

I followed Yin's (2014) 5-step process for analyzing data to identify codes and themes through (a) assembling the data, (b) separating the data, (c) reassembling the data again, (d) interpreting the data, and (e) concluding the data. Analytical strategy for the qualitative case study is to make a detailed description of the case and determine how the case will fit into the setting (Davis, 2016; Grossoehme, 2014; Yin, 2014).

Assembling the data. I analyzed the participants' responses to the nine semistructured interview questions. I listened to the audio recordings and transcribed the data into Microsoft Word to capture the participants' responses from the interviews; there was a new document for each participant. I obtained public information from publicly available databases. I asked the participants if they have any publically available documents they were willing to release. I read and reviewed documents as another source of data collection to categorize them into groups. The researcher often relies on multiple sources such as interviews or reviewing documents to gather rich text for data collection (Marshall & Rossman, 2016; Palinkas, 2014; Yazan, 2015).

Separating the data. While in the separating the data step, I divided the data into groups, using keywords to identify the themes. The researcher identifies keywords before and during data analysis (Grossoehme, 2014; Yin, 2014). According to Davis (2016), the separation of data would involve dividing the compilation data into fragments and label the information.

Reassembling the data. During the reassembling of the data step, I regrouped the data, and categorized the labels into themes. The data collection technique includes organizing the interview scripts into codes, categories, and into themes (Gibson, Benson, & Brand, 2013; Morse & Coulehan, 2015; Pierre & Jackson, 2014).

Interpreting the data. I created a narrative of the responses to articulate the data for the participants to understand. The narrative data came from the open-ended questions, interviews, and documentation reviews. The narrative of the data is a form of

reporting, in which the researcher is preparing for the conclusion of the data results (Harvey, 2015; Sandelowski, 2014; Yin, 2014).

Concluding the data. Lastly, during the conclusion of the data step, I then developed a summarization of the data results. Analytic strategy for a qualitative case study is to make a detailed description of the case and determine how the case will fit into the setting (Houghton et al., 2013; Yazan, 2015; Yin, 2014).

Qualitative Software Analysis Method

The art of coding is very informative to help in correlating data within the interviewing questions (Ciriello & Richter, 2015; Fusch & Ness, 2015; Lewis, 2015). I assigned a unique alpha letters and a number to each participant, for each question, and for each response. For example, LPM1 was for lead project manager one to LPM5, IQ1 was for interview question one to IQ9, and RQ1 will be for response to question one to RQ9. In addition, I assigned an alpha letter, and a number for each document that was pertinent to this research, e.g. D1, denoted document one. The inductive approach is suitable when the researcher has prior knowledge regarding the phenomenon for a process (Cho & Lee, 2014; Davis, 2016; Lewis, 2015).

NVivo 11 software was the choice to use for coding and identify the themes. NVivo 11 software included (a) importing and analyzing text-based data, (b) organizing information using themes and coding, (c) review coding and highlighting, (d) word frequency, and (e) exporting data analysis and findings (Sotiriadou, Brouwers, & Le, 2014; Woods, Paulus, Atkins, & Macklin, 2015; Zamawe, 2015). I exported the data

from NVivo 11 using Microsoft Excel. In the spreadsheet, it included the list of codes and themes, the frequency, and the in-text codes.

Once I have identified the categories, I reviewed the number of times certain themes appear and show their relationships between the categories. One of the simplest approaches to identify a theme is through repetition (Anyan, 2013; Davis, 2016; Lewis, 2015). Then, I exported the data from Microsoft Excel into Microsoft Word, and displayed the information in the form of a table for easy viewing of the findings. I aligned the data collection and data analysis with the conceptual framework, the GST, which aids in understanding the strategies that IT project managers use to identify risks early in the project's lifecycle.

Reliability and Validity

In this section, I addressed two criteria for qualitative research: (a) reliability, enhancing the accuracy of the data; and (b) validity, building trustworthiness. Elo et al. (2014) noted that trustworthiness in qualitative research is critical for a study's findings because one must have confidence in the study's findings for credibility, transferability, and confirmability (Marshall & Rossman, 2016; Noble & Smith, 2015). Furthermore, data saturation in qualitative research is a way to make sure that a researcher obtained accurate and valid data study (Fusch & Ness, 2015; Marshall & Rossman, 2016; O'Reilly & Parker, 2012).

Reliability

Reliability addresses stability or dependability, which emphasizes the need for the researcher to obtain repeatable results on the same sample size using a reliable tool (Elo

et al., 2014; Yardley et al., 2014; Yazan, 2015). I asked the participants the same set of questions outlined in the interview protocol (Appendix B). I enhanced the reliability of the data through member checking. Using member checking, the participant reviewed the summary of the data results and verified the reliability of the information. Member checking is the researcher interpretation of what the participant stated during the interview, and then the researcher provides that information to the participant for their authentication (Dekking et al., 2014; Fusch & Ness, 2015; Harvey, 2015).

Validity

Credibility. Credibility is the component that allows others to identify the experiences limited within the study through the interpretation of participants' experiences (Cope, 2014). The participants are the ones that can authenticate the results (Darawsheh, 2014; Noble & Smith, 2015). To establish credibility, I reviewed the participants' responses based on the semistructured interviewing questions by member checking of the data interpretation. Using member checking, I involved each participant that is part of the research to review my understanding of his or her response to the interview questions to ensure the results were accurate.

Transferability. Transferability in qualitative research is for the researcher to describe in detail the context of the research not generalizing the finding or transferring the finding (Cope, 2014; Marshall & Rossman, 2016; Noble & Smith, 2015). I will leave to others the determination of the transferability of my findings. However, I demonstrated transferability by providing detail descriptions of the population and geographical location for this study. The principle of transferability is dependent on the purpose of the

qualitative study and may only be appropriate if the intent of the research is to generalize about the participant or phenomenon (Cope, 2014; Elo et al., 2014; Noble & Smith, 2015).

Confirmability. Confirmability is ensuring that others can corroborate or support the data results and for the researcher to avoid personal biases (Cope, 2014; Marshall & Rossman, 2016; Noble & Smith, 2015). I established confirmability by describing the conclusion of the data and the interpretation of the data in the research. Additionally, I asked probing questions during the interviews and followed up with member checking interviews (Appendix B) to enhance the confirmability.

Data saturation. Data saturation is a way to confirm that a researcher obtained accurate and valid data study (Fusch, & Ness, 2015; Marshall & Rossman, 2016; O'Reilly & Parker, 2012). Data saturation occurs when there is no new coding, no new themes, and no new information during the process of the study (Fusch & Ness, 2015; Marshall & Rossman, 2016; O'Reilly & Parker, 2012). I ensured data saturation by continuing to interview participants using the same open-end questions until no new information surfaced from the participants. In addition to interviewing, I reviewed documentation relevant to the research. Using more than one source of data can benefit researchers in improving the validity of the study (Marshall & Rossman, 2016; Palinkas, 2014; Yazan, 2015).

Transition and Summary

In Section 2, I began with the restatement of the purpose of this qualitative single case study, which is to explore strategies IT project managers use to identify risks early in

the project's lifecycle. This section also included a brief description of my role as a researcher, the identification and justification of the research method, and the research design I had chosen in this study. I discussed the use of the purposive sampling method to select the participants for this study. Furthermore, Section 2 contained a discussion on (a) ethical research, (b) identifying and clarifying data collection instruments, (c) a description of the techniques for data collection and organization of the data using, and (d) determining the appropriate data analysis process for the research design. The conclusion of Section 2 was a discussion of addressing reliability using member checking and validity to ensure credibility, transferability, and confirmability to ensure data saturation. Section 3 contains the findings, contributions to professional practice, a brief discussion of implications for social change, recommendations for further study related to improving practice in business, reflections, and conclusion of this study.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative single case study was to explore strategies IT project managers used to identify risks early in the project's lifecycle. I used a purposive sampling method to select five participants to collect the data using telephone interviews. Additionally, I reviewed public documentation relevant to the research such as risk logs or registers, risk management plan, risk report, schedule management plans, and mitigation plans. The findings showed approaches that the project managers used to identify risks early in the lifecycle for the success of the project.

Presentation of the Findings

The overarching research question for this study was: What strategies do IT project managers use to identify risks early in the project's lifecycle? There were two separate interviews scheduled with each participant, (a) the initial in-depth interview, and (b) the follow-up or member checking interview (Appendix B). The interviews lasted between 45 minutes to 1 hour, which I conducted using audio conferencing. In the initial interview, the data obtained came from five lead project managers who responded to nine open-ended interview questions. I also reviewed documentation relevant to the research.

During the follow-up meetings for member checking, I shared a copy of the questions and the summary of the responses with the participants. Each participant reviewed and validated the information they provided to me to check for accuracy and provide feedback of my interpretation. After I transcribed the interviews from the five participants, I imported the interviews into a qualitative software tool NVivo 11 to

perform a data analysis for coding. Based on the interviewing transcriptions, I identified four themes using NVivo 11 to generate an analysis based on the interviews. The four major themes were (a) self-development, (b) risk identification inputs, (c) risk identification project tools and techniques, and (d) risk identification output. The themes are a result of the data from the participants' responses and reviewing documentation.

Theme 1: Self-Development

The first major theme that emerged from the participants' responses were the project managers' self-development tools to support strategies for identifying risks early in IT projects. The five participants indicated that they had obtained some form certifications, degrees, training, or professional development as depicted in Table 2.

Table 2

Educational Tools Participants Used for Self-Development

Educational tools	*n*	%
PMP certification	5	100%
Scrum master	1	20%
MBA in Project Management	3	60%
BA in Project Management	1	20%
Training and development	5	100%

Note. n = number of participants.

The five participants all stated that they had project management training and a PMP certification. Three out of five participants shared they have an MBA in Project Management. Furthermore, LPM1 shared, "I am a scrum master"; LPM5 also had a BA in project management. LPM2 added, "I have ongoing training professional development

credit hours to maintain certification and training within the organization; 19 years of experience in project management, since 1998." Specifically, LPM1 mentioned, "Assess your talent pool; protect your talent pool to determine if you need to outsource; cost effective by maintaining your talent." Furthermore, LPM5 noted, "Risks could affect scope, time, cost, and quality of a project." Additionally, LPM3 used training documentation to help improve standards practices.

The use of self-development is a finding that agrees with other studies. Ramazani and Jergeas (2015) noted that organizations are encouraging project managers to invest in their education, training, and development to increase the chance of having project success. Similarly, Carvalho and Rabechini (2015) argued that as an aid in reducing risk, practitioners should include training, improve developing methodologies, standardize practices, and add resources such as time, money, or people. Self-development is a finding that is in alignment with PMBOK; one of the training skills noted by participants for project managers is to apply risk management in identifying risks early in a lifecycle and planning how to manage those risks (Eastham et al., 2014). McCarty and Skibniewski (2017) reported that organizations promote training and professional development to improve managing of IT projects.

Theme 2: Risk Identification Inputs

The second major theme that emerged from the participants' responses was risk identification inputs. The project manager uses the risk management plan to (a) define the approaches and tools to perform risk management, (b) identify roles and to clarify the project team's responsibilities, (c) estimate funding for the project, and (d) determine

how often the team will perform the risk management process throughout the project's lifecycle (Paquin, Gauthier, & Morin, 2016). I identified three strategies the participants used for risk inputs. First, the participants used a risk management tool that included communication plan, mitigation plan, contingency plan, and schedule management plan. Second, the participants used the project scope document to document all tasks in the project, such as the delivery of the product, any assumptions, scheduling, documenting the requirements, and any changes in the project. The third risk inputs the participants used were project documents that included lesson learned, project reporting, and Gantt charts as shown in Table 3.

Table 3

Strategies Participants Used for Risk Inputs

Risks inputs	*n*	%
Risk management tools		
Communication Plan	4	80%
Mitigation plan	2	40%
Contingency plan	3	60%
Schedule management plan	1	20%
Project scope document	5	100%
Project documents		
Lesson learned	1	20%
Project reporting	1	20%
Gantt charts	1	20%

Note. *n* = number of participants.

LPM2, LPM4, and LPM5 emphasized that they used a formal risk management template to identify risk. The template included the description of the risk, risk trigger, mitigation plan, and contingency plan. LPM2 added that the project team focused on "the three legs, which are time, cost, and scope." LPM4 mentioned, "Reviewing the project scope document is an effective strategy the project manager and team used to identifying risks early in their project." All five participants mentioned using project scope to document risks. LPM2 and the project team would use a project document called lesson learned, which is "an internal company document that project managers use to identify what went well in the project. If there were any issues, we would add an early risk to the risk management tool." LPM1 stated, "Using Gantt chart [in MS Excel] provides a quick glance as to what is overdue in the project."

The use of risk identification is a finding that is consistent with other studies. According to Pimchangthong and Boonjing (2017), risk identification is a requirement for process performance for the success of IT projects. Using a risk management tool is a finding that confirms Rodríguez, Ortega, and Concepción (2017), who noted that risk management is important in IT projects because projects are likely to fail. Similarly, Thamhain (2013) stressed that project managers use risk information templates for project-specific goals as well as using them for general information. Identifying the scope of a project is a finding that aligns with researchers Shmueli, Pliskin, and Fink (2016). Shmueli et al. (2016) noted that the project team identifies the project scope early in the initiation phase of the lifecycle. The use of project documents to record risks is a finding that supports researchers Féris, Zwikael, and Gregor (2017). Féris et al. found that the

project team might use a lesson learned document to record risks and issues from past projects, review what went well, and determine what the team should do differently for future projects.

Theme 3: Risk Identification Project Tools and Techniques

The third major theme emerged from the participants' responses was risk identification tools and techniques. The project manager and the team would follow the risk identification process described in the risk management plan to document the risks using project tools and techniques (Juhasz, Varadi, Vidovics-Dancs, & Szaz, 2017). The three project tools I gathered from the five participants' responses were (a) documentation reviews (b) checklist analysis, and (c) assumption analysis. I categorized two techniques from the participants' responses to include (a) information techniques that included brainstorming and interviewing, and (b) SWOT analysis. In Table 4, I list three project tools and two techniques the five participants used in identifying risks in their projects.

Table 4

Strategies Participants Used for Project Tools and Techniques

Project tools and techniques	Number of participants	%
Documentation reviews	5	100%
Checklist analysis	2	40%
Assumption analysis	3	60%
Information techniques		
Brainstorming	3	60%
Interviewing	5	100%
SWOT analysis	2	40%

Project tools and techniques findings align with Rostami (2016), who claimed that the project manager and the project team could use the techniques to help them identify risks in a project. Similarly, Papke-Shields and Boyer-Wright (2017) stated that project tools and techniques are characteristics that have an exceptional impact on the success or failure of a project. Papke-Shields and Boyer-Wright noted that the tools are available to help practitioners perform their tasks.

Project tools. I performed a structured review of the project documentation that included issue logs, project process flow charts, risk management plans, project plans, checklists, and other pertinent information to support in identifying risks. LPM4 and LPM5 shared that the project team used documentation review and checklist analysis to view previous risks. LPM1 stated, "Using smart techniques, all tools, helps me identify risks in my projects." LPM2 and LPM3 mentioned applying assumptions analysis to their project. LPM4 noted, "The team identify assumptions (funding would be available) and finally, identify any risks; especially, risks associated with the project."

The use of project tools is a finding that confirms Féris et al. (2017), who noted that checklists could help project managers identify risks in future projects. The strategies used by of three of the five participants included the assumptions analysis, which finding is consistent with Kremljak et al. (2014). Kremljak et al. indicated that using the assumptions analysis could identify the project risks from incorrectness, uncertainty, variation, or incompleteness of assumptions.

Information techniques. One of the information techniques that I gathered from three of the five participants' response was brainstorming. LPM2, LPM3, and LPM5 shared that brainstorming with the project team is one of the strategies we use to identify risks early in our projects. The use of brainstorming techniques is a finding that aligns with Luko (2014) who suggested that the main purpose of the brainstorming technique is gathering possible risks that can occur in a project. The findings also confirm with Rostami (2016) who stated that using brainstorming technique helps project managers and project teams to obtain a comprehensive list of project risks. Furthermore, Rasheed et al. (2014) stressed that brainstorming and interviewing are the most common techniques for identifying risks.

Another information technique emerged from the participants' responses is interviewing subject matter experts (SME), project team, and stakeholders to help identify risks in the project. LPM1 said that, "stakeholders are aware of what is going on in the project." LPM3 noted, "All risks identified were outlined by category, and a recommendation/solution for each risk was provided along with the key stakeholders necessary to resolve the risk issue." LPM2 added that as a project manager "a kick-off meeting is held with subject matter experts of the workgroup and systems applications." LPM4 explained that,

> Once we know there is a risk, we have to be very clear on the problem, who owns it, what steps to take, a root cause of the issue that could be a potential risk and identify the workgroup. If you need leadership involvement, they want a summary not details of the risk.

The five responses from the participants were in synced that those involved in the project, help in the area using information techniques.

The use of interviewing technique is a finding that confirms with other researchers. Redick, Reyna, Schaffer, and Toomey (2014) indicated that project leadership through project team could succeed in identifying and addressing the critical risk issues in projects. Vrhovec et al. (2015) claimed that having business stakeholders involved in IT projects is a key to success or failure of a project. Furthermore, Johansen et al. (2016) argued that the project team could monitor the risks during scheduled meetings to assess new and existing risks in the project.

SWOT analysis. The project manager and team examined the project's strengths, weaknesses, opportunities, and threats (SWOT). Two of the five participants mentioned they used the SWOT analysis technique to identified risks in their projects. LPM1 described SWOT analysis as "identify internal strength; stakeholders identify internal threats; external, would be competition, research, and design; opportunities would entail market niche, an image of your product; the market would include threats, internal market, profit, and loss." LPM2 shared a risk report that covered SWOT analysis from the team and recommendation. The use of SWOT analysis is a finding that supports literature studies Cagliano et al., 2015 and PMI, 2013, and they defined two types of consequences can occur when determining risks in a project lifecycle based on SWOT: (a) positive/opportunities, and (b) negative/threats events.

Theme 4: Risk Identification Output

The fourth major theme emerged from the participants' responses was the risk identification output, that is the risk register or risk log. All of the five participants indicated that the key output is risk register or risk log to identify and enter risks. Once the project manager has identified and ordered the risks, the project manager should identify a plan of measures, and respond appropriately in managing those risks (PMI, 2013). LPM1 stated that risks are categorized based on priority, known and unknown risks. LPM2 commented that they use risk log to enter, "the description of the risk and to add detail information of all identified risks." LPM4 noted that "the team and I use risk log (or risk register) to identify, evaluate, track, and prioritize the risk to ensure the mitigation plan is in place, and all agree."

Using the risk register or risk log is a finding that confirms with the researchers Stosic, Mihic, Milutinovic, and Isljamovic (2017), they noted that project managers should measure identified risks and quantifiable risks regarding the impact of the project and probability of occurrence. Odzaly, Greer, and Stewart (2017) noted that the project team would use a risk register to list risks found in a project. Similar studies of project managers using risk register noted in Papke-Shields and Boyer-Wright (2017) research.

Link Findings: Conceptual Framework and Business Practice

The conceptual framework for this study was GST. The findings and reviewing of documentation from this research are consistent with the conceptual framework GST. The five participants noted they follow a process to identify and manage project risks. Best practices that the five participants highlighted were: (a) using the risk management

tool, (b) balance people skills, technology, (c) using time management, and (d) bring awareness to stakeholders regarding risks. The key concepts from the GST for this study were process information, technology, and management (Rousseau, 2015). The participants could use GST to identify and comprehend variables of interdependence, self-regulation mechanism, and feedback to operate the system as a whole (Lee & Green, 2015).

I contribute these findings to business practices as a holistic approach because the information from the participants revealed they use a process (risk management process), received direction from upper management, and used technology to identify potential risks in their projects. Adams et al. (2014) reported GST as a holistic approach that has wide applicability in technology, management, and organizational design. Azderska and Jerman-blazic (2013) stated that holistic approach is to solve a systemic problem that includes technical individuals to perform. Furthermore, Rousseau (2015) noted that researchers had dealt organizational system as a whole that consists of organization employees, customer, innovation, business practices, and social perspective to meet the organization's goal. The findings from this study might influence project managers to use business practices when using risk identification process, to use techniques and tools in identifying risks early for the success of IT projects.

Applications to Professional Practice

In this study, I focused on risk identification strategies. The findings from this small sample size might help practitioners in organizations control technologies efforts that lead to developing creative innovation opportunities to improve in globalization,

economics, and the social sectors. Improved risk management could result in reduced costs, lower prices to customers, and allowing a larger group of people to use and experience the values of technology. Identifying risks are in alignment with the risk management process. The findings might help to address the risk identification within the risk management process throughout the software lifecycle of the project. Thus, adding value to the business is a practice of systematically selecting cost-effective methods for minimizing the outcome of threat insight to the organization.

Various strategies the five project managers followed in identifying risks early in their projects may help decrease the cost, close the gaps, and resolve issues for future projects. Other strategies such as (a) reviewing the project scope, (b) identify impacted workgroups, (c) holding a kick-off meeting with subject matter experts of the workgroups and systems applications, (d) using the brainstorming technique, and (e) other project tools and techniques, may help mitigate the risk. Overall, the project manager could share with key stakeholders any positive or negative risks that could potentially affect the project's outcome. As I learned from the findings, positive and negative risks are opportunities and threats from the SWOT analysis. For a successful project, the project team would need the commitment from the organization to diligently identify risk and constantly address risk management throughout the project's lifecycle.

Implications for Social Change

The implications for social change in this study included education, development, and the risks identification strategies that emerged from the findings. Social implications with globalization are becoming part of each stream of human lives for people to deal

with risk element and preferably taking a proactive approach (O'Brien, 2013). The use of risk identification strategies may enhance organization employees in risk management training, customer, innovation, business practices, and social perspective to meet the organization's goal (Rousseau, 2015). Additionally, with technology involves the creativity, novel ideas, and the speed to hold things better in dealing with risks (Rodríguez et al., 2016). Furthermore, the findings in this study may benefit healthcare, pharmaceutical industries, financial institutions, insurance companies, and other organizations. The implications for positive social change may help individuals understand risks better, interpret situations, and prevention of risk, which are essential to encourage economic inclusion, social protection, and environmental building.

Recommendations for Action

The recommendation for action from the finding of this study is an important part of the business and technical process in mitigating risks in a project. Project managers, team, stakeholders, and other resources involved in projects should pay attention to the results of this study. I have two recommendations for action based on the results.

The first recommendation is having the education, self-development, training, or certification needed to understand the risk management process. Risk reduction strategies include training, standardizing practices, improving development methodologies, reducing scope, and adding resources, such as time, money, or people (Carvalho & Rabechini, 2015). Having the knowledge and skills requirements could help project manager achieve the business units' goals. Additionally, the skills could lead and identify resources for the project, knowledge in risk management process, and the performance to

accomplish the tasks in having a successful project. Furthermore, training can develop aptitudes and experiences of the project team members through mentoring and coaching, online training, technical or management training, in which the training could be in-house or external training.

The second recommendation is to follow the risk management process in identifying a risk that may affect the project and document those risks. Adopting project tools and technique in identifying risks governs the outcomes of the risk management process. The implementation of risk management and ensuring practice of it would contribute to the enhancement of project performance (Rostami, 2016). The dissemination of the results could occur in a webinars, project management conferences, professional publications, and online trainings. Additionally, I will distribute a copy of the results to the project managers who participated in this study.

Recommendations for Further Research

The focus of this study was to explore strategies IT project managers utilize to identify risks early in the project's lifecycle. I recommend that other researchers explore the following limitations outlined in this study. First, provide an explanation to the participant the importance needed in consenting to the study within a specified timeframe. Secondly, provide an outline of the time necessary to collect the data for the study. Finally, in addition to training, self-development, certifications, or degrees, to ask the project manager how many years of experience in managing risks in IT projects.

My recommendations for further research relating to the problem identifying risks early in a project's lifecycle include:

- Further studies could focus on quantitative studies of measuring identified risks and quantifiable risks regarding the impact of the project during the lifecycle.
- Further studies could expand on using the Delphi, root cause analysis, and the diagramming techniques in the risk identification process.
- Further studies could increase the number of participants to an extended range of results.
- Further studies could explore using other research methods and designs that could strengthen this qualitative single case study.

Reflections

I encountered three perceptible challenges during the data collection of this study. First, when I was trying to obtain the letter of cooperation (LOC) from the VP of Project Management, the sponsor verbally stated "yes" to signing the LOC. A month later, the sponsor of the department said that due to a busy schedule and locked down in a project; the sponsor opted out of committing to signing the LOC. At that point, I had to submit a change request form to the Walden University IRB. I contacted 12 potential participants, and five agreed to participate in the study. Next, one of the 12 participants was extremely upset that I was inviting them to participate in the research. I apologized to the person for any inconvenience, and I respectfully thanked the person for reading my invitation to the research. My last challenge was one of the five participants who agreed to participate in the study, rescheduled four times, which was almost two months for the initial date.

The opportunity to survey different works of literature and theories related to this research has enhanced my knowledge tremendously. Based on the many articles I have read to understand risk identification, risk management, and project management, the knowledge gain will be useful if I decide to teach those topics at a college or university. The qualitative tool NVivo was not an easy tool to learn. I viewed many YouTube videos to gain an understanding of the tool. Afterwards, I learned how to use a qualitative tool NVivo to code, organize rich text information, and non-numeric data. Without using a tool, analyzing the data, identifying themes, and organizing the participants' responses from the interviewing questions, would have been challenging.

As I reflect back at the beginning of my doctoral study, this has been a challenging journey for me. When I first began this journey, the DBA doctoral process was via email between the chair and me; the chair and the second committee member; the chair and the methodologist member, if the committee members did not give the proceed forward, the doctoral cycle repeated itself. The DBA doctoral process in the past was not a conducive process because the reviewers did not keep track of the emails among themselves. Currently, there is a tool for the DBA doctoral process to keep track of the student's progress. After numerous obstacles I have experienced in the past, obtaining a doctorate will be rewarding to me.

Conclusion

The purpose of this qualitative single case study was to explore strategies IT project managers used to identify risks early in the project's lifecycle. Risk management is probably the section most often IT practitioners reviewed as not significant (Fadun,

2013). I used methodological triangulation through interviewing and reviewing public documents in improving the validity of my study. After collecting and analyzing data to identify codes, four themes emerged to generate an analysis based on the participants' responses and reviewing documentation. The four major themes were: (a) educational and development, (b) risks identification inputs, (c) risks identification project tools and techniques, and (d) risks identification output.

Although a project risk is an uncertain event, it could have a positive or negative affect on the scope, cost, scheduling, delivery, and quality of a project. The findings indicated to have a successful project; project managers would need the commitment from all stakeholders who may have an interest in the project to diligently identify risk and continuously address risk management throughout the project's lifecycle. Once the project team has identified those risks, collaborate with key stakeholders to close gaps and resolve issues for a similar project in the future to eliminate common risk trends.

In summary, the five project managers indicated that they have at least a degree, training, or certification in project management. Through training, the project manager will be knowledgeable of the risk management process, which includes risks identification. Although the sample size in this study was small, the findings could help project managers and team to identify risks in the project using different tools and techniques. These tools and techniques could include (a) documentation reviews, (b) information gathering, (c) assumptions, and (d) SWOT analysis. In addition, improved risk management could result in reduced costs, lower prices to customers, and allowing a larger group of people to use and experience the values of technology. Lastly, the

findings could help practitioners in organizations actively commit to addressing risk management throughout the project's lifecycle.

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Appendix A: Invitation to Research E-mail

Dear [Recipient's name],

Hello, my name is Nina Mack-Cain, a doctoral candidate at Walden University. I am a Systems Architect within the Technology Development Department. I am conducting research on "Exploring Strategies for Early Identification of Risks in IT Projects". I would like to invite you to participate in a one-on-one interview with me for my study because you are a lead project manager who manages IT projects. The purpose of this study is to explore strategies IT project managers use to identify risks early in the project's lifecycle.

Please read the attached consent form for background information and procedure. I will follow-up with you within the next three days from the date of this e-mail to check if you have questions before giving consent. If you accept this invitation to participate in the study, please respond back to this e-mail with your approval based on the instruction on the consent form. Once I receive your approval, I will work with you to schedule an interview on a day and time that is convenient for you away from distractions.

Thank you.

Nina Mack-Cain

Appendix B: Interview Protocol

First Meeting: Interview

What I will do: Introductory and set the stage (via telephone away from distraction).

Script: Hello, my name is Nina Mack-Cain. I appreciate you for taking time out of your busy schedule to meet with me. As mentioned in the invitation e-mail, I am conducting research on "Exploring Strategies for Early Identification of Risks in IT Projects". The general business problem is that IT project managers are having challenges identifying risks in the project lifecycle, which results in negatively affecting the quality and cost of the project. The specific business problem is that some IT project managers lack strategies in identifying risks early in the project lifecycle. The purpose of this study is to explore strategies IT project managers use to identify risks early in the project's lifecycle.

What I will do: Ask nine questions and follow-up probing questions, if needed, to obtain more in-depth information.

Interview Questions:

1. What certifications or training did you receive as a project manager?
2. What strategies have you used to identify risks early in your projects?
3. What risk management tools did you use during the project lifecycle to help identify risk?
4. How did risks affect your project?
5. What techniques have you used to prioritize risks in your projects?
6. What method did you find worked best to report risks during the projects' lifecycle?

7. What challenges did the team experience when identifying risks in your projects?
8. What best practices did you use for managing risks in your projects?
9. What additional information could you share that I have not already addressed by this study?

What I will do: Wrap up the interview and thank the participant.

Script: This concludes our interview. Thank you for participating in my study. My next step will be to review and interpret what you have shared with me. I will schedule a follow-up meeting with you in a week to give you an opportunity to review your response. I will look at your calendar to schedule our next meeting. Again, thank you for your time.

Follow-up Meeting: Member Checking

Script: Thank you for agreeing to a follow-up meeting with me to review and validate the information you have provided to me.

What I will do: Share a copy of the questions along with the summary of the response to each question.

Script: Please take a couple of minutes to review each question and your responses. Afterwards, we will review each question and response together. If any responses need changing, I can modify them at this time.

What I will do: Walk through each question and read the interpretation.

Script: Did I miss anything?

What I will do: Conclude the follow-up meeting.

Script: Thank you for participating in my study and the time you spent with me. If you have any further questions or concerns about the study, please do not hesitate to contact me.