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Effective Risk Management Strategies for Information Technology Project Managers

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This is to certify that the doctoral study by

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Walden University
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Abstract

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MBA, Keller Graduate School of Management of DeVry College, 2016

MS, International Institute of Management of Brazzaville, 2008

(Institut International de Management, Brazzaville)

Doctoral Study Submitted in Partial Fulfillment

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Abstract

A high rate of information technology (IT) projects in the telecommunication industry fail because of ineffective risk management strategies. Effective risk management strategies are important to IT project managers for the improvement of project success rates. Grounded in the actor-network theory, the purpose of this qualitative multiple case study was to explore risk management strategies used by IT project managers in the telecommunication industry for improving project success rates. Data were collected using semistructured interviews and reviews of companies' documentation on project risk management. The participants were 5 IT project managers in Dakar, Senegal, and had more than 8 years of IT project management experience with a risk management success rate of 70%. Data were analyzed using thematic analysis through 4 steps including data transcription, data organization, data coding, and data validation. The data analysis revealed 4 major themes: risk management culture, risk management framework, risk communication, and risk lessons learned. The key recommendation is for IT project managers to establish strategies to enhance risk-based decisions and use appropriate tools to communicate project risks to stakeholders. The implications for positive social change include the potential to use new and innovative telecommunication broadband networks to enhance the quality of life for individuals who work in the field of education, health, and agriculture.

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Dedication

I dedicate this work to my late father, Babacar SARR (May he rests in peace), my lovely mother who has been supporting me since childhood, and my lovely and supportive wife, Sokhna Soukeye Samb SARR. I also dedicate this work to my daughter Oumaima SARR, my sons Mohamed SARR and Babacar SARR.

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Section 1: Foundation of the Study

The telecommunication industry is a driving force of productivity across the economy and societies. Katz and Koutroumpis (2014) noted mobile infrastructures significantly influence the creation of market opportunities and contribute to increasing employment and economic growth. In 2017, more than 70% of information technology (IT) projects failed because of the use of ineffective strategies to manage project risks (Deshaw, 2017). IT project managers need to use effective risk management strategies to improve project success rates. The findings from this study may be used by IT project managers to increase project success rates.

Background of the Problem

Uncertainties generate risks in all projects (Project Management Institute (PMI), 2017), and the use of effective risk management strategies is essential for improving IT projects success rate in the telecommunication industry (Hartono, Sulistyo, Praftiwi, & Hasmoro, 2014; Taylor, Artman, & Woelfer, 2012). Risk is a key construct that influences IT project success (Joseph, Erasmus, & Marnewick, 2014; Pana & Ghibanu, 2013). Ratsiepe and Yazdanifard (2011) and Taylor et al. (2012) noted that because of ineffective risk management strategies, there was a 5% increase of IT projects that failed from 2006 to 2009, compared to 4% in 2004.

The Standish Group (2016) noted that in 2015, while 29% of IT projects were successful, 52% were challenged, and 19% failed. In 2015, 70% of IT projects failed or were challenged (Deshaw, 2017; Standish Group, 2016). Stoica and Brouse (2013) and Iijima (2015) also stated the failure rates within IT project management have been high

since its inception. The Standish Group (2016) and Iijima (2015) noted a significant number of IT projects that failed because of the use of ineffective risk management strategies. The rationale for this qualitative research study was to identify the risk management strategies telecommunication IT project managers use to improve project success.

Problem Statement

Ineffective risk management is one of the major causes of IT project failure (Pimchangthong & Boonjing, 2017). In 2017, more than 70% of IT projects failed because of the use of inappropriate strategies to manage project risks (Deshaw, 2017). The general business problem was that some IT project managers do not effectively manage risk for increasing project success rates. The specific business problem was that some IT project managers in the telecommunication industry lack effective risk management strategies for improving projects success rates.

Purpose Statement

The purpose of this qualitative multiple case study was to explore the risk management strategies used by IT project managers in the telecommunication industry for improving project success rates. The targeted population was five IT project managers from two telecommunication companies located in Senegal, a country in West-Africa. The targeted population was appropriate for the study because the participants had more than eight years of managing IT projects with a high rate of success. The implications for positive social change from the study's findings included the opportunity to use a modern

and innovative telecommunication broadband network to improve the quality of the life of people in the sectors of education, health, and agriculture.

Nature of the Study

Patton (2015) noted that the qualitative methodology is the appropriate method researchers can use for exploring how organizations improve effectiveness. Yin (2018) stated the qualitative method is appropriate for exploring thoughts and opinions, and for gaining deeper insights into problems' solutions. When the researcher does not examine the relationships or differences among variables, it is appropriate to use the qualitative method (Yin, 2018). Because I was not interested in examining the relationships among variables, the qualitative method was appropriate for the research study. The quantitative method is not appropriate when the researcher does not seek to test a hypothesis about variables for examining a phenomenon (Saunders, Lewis, & Thornhill, 2015). The use of the mixed method is not appropriate when the researcher does not conduct an analysis of a business problem with both an objective and subjective methods while combining quantitative and qualitative methods (Stentz, Plano Clark, & Matkin, 2012).

Qualitative research design involves (a) narrative research, (b) phenomenology, (c) grounded theory, (d) ethnography, and (e) case study (Yin, 2018). Using a multiple case study design, researchers can obtain a deeper understanding of the researched topic (Yin, 2018). Yin (2018) also explained researchers could use a multiple case study design for exploring complex problems within a real-world situation. The researcher can use narrative research to describe the lives of individuals through participants' stories (Lewis, 2015), but not for exploring a real-life phenomenon. The use of phenomenology is not

appropriate when the researcher does not attempt to understand or explain the meaning of individuals' life experience (Saunders et al., 2015). Moreover, when the researcher aims at exploring the participants' experiences with the ability to analyze data across cases, it is appropriate to use a multiple case study (Maxwell, 2012). Additionally, the grounded theory is not applicable when researchers do not seek to develop a theory for explaining a phenomenon (Saunders et al., 2015; Yin, 2018).

Research Question

The central research question for the proposed qualitative research study was:

RQ: What risk management strategies do telecommunication IT project managers use for improving project success rates?

Interview Questions

The following were the questions the participants responded to, during an open-ended interview:

1. What strategies does your organization employ to conduct risk management activities for an IT project?
2. As an IT project manager, what is your role in managing IT project risk in your organization?
3. What strategies has your organization used to manage IT projects' risks?
4. How has your organization addressed the key barriers to implementing effective IT project risk management strategies?
5. What else can you share with me about your organization's successful IT risk management strategies?

Conceptual Framework

Researchers use the actor-network theory as a conceptual framework for a deeper understanding of IT project processes and outcomes (Mpazanje, Sewchurran, & Brown, 2013). Awie and Dawie (2014) shared that social relationship is one of the significant aspects IT project managers must consider for the successful implementation of IT projects. The greatest threat to IT project success is the failure to communicate (Awie & Dawie, 2014). IT project managers can use the actor-network theory to conduct a useful analysis of the risks inherent to the project, and effectively manage stakeholders' interests and expectations (Floricel, Bonneau, Aubry, & Sergi, 2014). The actor-network theory is a powerful lever an IT project manager can use to build a social relationship and strengthen trust with and among project team members and stakeholders (Floricel et al., 2014). Awie and Dawie (2014) shared that IT project managers can use the actor-network theory to resolve conflicts and gain a high level of control.

In a like manner, it is essential to acknowledge both the social aspects of the organization and stakeholder knowledge influence project success rates (Liu, 2016). The research findings of Liu (2016) showed that both the end-users and the management of risks influence the performance of IT projects. Pollack, Costello, and Sankaran (2013) agreed it is appropriate to use actor-network theory as a conceptual framework when researchers aim at analyzing the social aspects of project management while focusing on the risk management tools and techniques. Using the actor-network theory, I expected to understand risk management strategies IT project managers use to improve project performance and quality effectively.

Operational Definitions

In this section, I provided definitions of key terms used throughout the research study.

Project manager: A project manager is defined as the person who has the overall responsibility to perform the project tasks within schedule, budget, and quality (Vittal, 2010). The PMI (2017) and Vittal (2010) noted the project manager uses leadership competencies to improve project performance.

Project performance criteria: The project performance criteria concern the project schedule, cost, quality, and functionality (Zavadskas, Vilutienė, Turskis, & Šaparauskas, 2014).

Project risk: Project risk is an uncertain situation, if it occurs, that might constitute a threat or an opportunity for achieving the project objectives (PMI, 2017).

Project risk management: Project risk management involves the process of identifying, evaluating, and responding to risk throughout the project lifecycle and to the benefit of achieving project objectives (Pimchangthong & Boonjing, 2017)

Project stakeholder: A project stakeholder is any internal or external individual, group or company that may influence, be influenced by or consider itself to be influenced by a decision, activity, or end product of a project (PMI, 2017).

Project success: Project success is a multidimensional construct (Carvalho & Rabechini, 2017). According to Wit (1988), the traditional project success approach is related to the compliance with scope, time, and cost objective. Shenhar and Dvir (1996) believed project managers could deploy project success into more strategic dimensions

including project efficiency, impact on the project team, and impact on the customer and business.

Project success criteria: The project success concerns the project schedule, cost, and quality (Márta, Bálint, & Ákos, 2018). The PMI (2017) and Márta et al. (2018) noted the project manager could define project success by assessing the stakeholder satisfaction and considering the effectiveness criterion.

Assumptions, Limitations, and Delimitations

Assumptions and limitation affect the inferences the independent researcher can draw from a study (Myers, 2013). I described the assumptions, limitations, and delimitations of the research study in the following subsections.

Assumptions

Assumptions serve as the primary foundation of any proposed research (Leedy & Ormrod, 2015) and thus constitute what the researcher takes for granted. Berg (1998) noted there is no research study without a basic set of assumptions. As a qualitative researcher, the primary assumption for this study was the participants would answer all the interview questions honestly and accurately. In addition to the truthfulness of the participants' responses, I also assumed the participants would use their knowledge and past experiences in managing telecommunication projects to explain their view on IT project risks.

Limitations

Limitations are potential study weaknesses that the researcher cannot address (Saunders et al., 2015). The researcher should acknowledge that the research study has a

set of limitations (Leedy & Ormrod, 2015). Edwards (2005) shared that most ethics committees that review research protocols require potential research participants to have the absolute right of withdrawal at any time and without giving any justification. One of the limitations was that a participant could withdraw from the interview at any time, thus impacting the research process. Additionally, the fact I considered five IT project managers for the study and restricted the research to two telecommunication companies located in Dakar, Senegal was a part of the study's limitations. Moreover, the lack of information on this study was also a significant limitation.

Delimitations

Leedy and Ormrod (2015) defined delimitations as what the researcher is not going to accomplish. In other words, the delimitations are those elements that limit the perimeter of the researcher's study. The delimitations of my study were by (a) geographic location, (b) population size, (c) industry, and (d) target population's experience. My study targeted five IT project managers from two telecommunication companies located in Dakar, Senegal. The targeted population had more than eight years of managing IT projects with a high rate of success. All the selected participants to this study met the criteria to participate in this study.

Significance of the Study

Weak risk management may increase the failure rate of IT projects (Joseph et al., 2014). However, some telecommunication IT project managers lack effective risk management strategies to improve project performance and project success. The focus of

this qualitative research study was to contribute to business practice and in some ways to positively influence social change.

Contribution to Business Practice

Effective risk management contributes to improving IT project performance and success (Didagra, 2013; Hamza, Faizul, & Wang, 2012). Deshaw (2017) shared that in 2017, more than 70% of IT projects were unsuccessful because of ineffective risk management strategies. Therefore, conducting this research study enabled me to explore the risk management strategies telecommunication IT project managers used to increase projects' success rates. For instance, telecommunication IT project managers could use or adapt the findings' relevance for improving the performance of future projects.

Implications for Social Change

The scholar should act as change agents by promoting positive social change (Wittmayer & Schapke, 2014). The improvement of IT project success rates in the telecommunication industry could help to improve the lives of the populations. The implications for positive social change from my study's findings included the opportunity to use a modern and innovative telecommunication broadband network to enhance the quality of the life of the populations in the sectors of education, health, and agriculture. Moreover, the improvement of IT project success rates in the telecommunication industry could contribute to strengthening employee information exchange in West-Africa, increase the opportunity to conduct job interview remotely, and make eLearning programs available for all.

A Review of the Professional and Academic Literature

Many organizations devoted significant financial means, time, and expertise in developing software solutions to help IT project managers effectively manage projects (Ramos & Mota, 2014). However, IT projects success rate remains low (Standish Group, 2016). The goal of this research study was to explore the risk management strategies used by some IT project managers in the telecommunication industry for improving the project success rates. In this section, I shared published research on risk management strategies used by IT project managers.

The selected literature of peer-reviewed articles consisted of qualitative, quantitative, and mixed methods studies dealing with IT project risks management strategies. I used several databases and search engines, including ProQuest Central, SAGE Premier, Google Scholar, EBSCOhost, and IEEE Xplore digital library. The key search terms I used for locating the articles *included information technology, IT project, project risk, IT project manager, IT project success, IT project failure, risk management strategies,* and a combination of these keywords.

The literature review should be a description and critical analysis of what other researchers wrote (Marshall & Rossman, 2016; Saunders et al., 2015). Fink (1998) noted a literature review is a systematic approach the researcher could use to identify, analyze, and clarify the researcher's work. Chei-Chang (2009) noted researchers could use literature mapping to deal with a significant amount of data effectively and to synthesize major findings of their research. Additionally, the researcher can use the literature mapping to determine the relationship between themes and highlight research gaps (Chei-

Chang, 2009). Therefore, using a literature mapping, I structured my research into the four following topics: (a) actor-network theory, (b) IT project failure and success, (c) risk management strategies, and the (d) telecommunication industry.

Researchers should use the literature review to provide a summary of the proposed research, and identify applicable theories, methods, and gaps in the existing research (Marshall & Rossman, 2016). Saunders et al. (2015) noted the researcher should focus on the research question and objectives in the literature review. The literature review included major information about the risk management strategies IT project managers use to improve project success rate. For instance, the subsection on risk management strategies comprises information about (a) risk identification, (b) risk analysis, (c) risk response planning, (d) risk response implementation, and (e) risk monitoring.

As theory represents the foundation of most research efforts (Saunders et al., 2015; Turner, Baker, & Kellner, 2018), Rocco and Plakhotnik (2009) agreed theory also provides grounding for literature reviews. Turner et al. (2018) noted there should be a clear alignment between the theory and the research question. The literature review included information about the actor-network theory; the theory I selected for this study. I included alternatives theories such as the (a) theory of constraints, (b) utility theory, (c) contingency theory, and the (d) research-based theory. Additionally, the literature review included subsections on IT project failure and success, risk management strategies, and the evolution of the telecommunication industry.

Actor-Network Theory

The actor-network theory is a powerful tool researchers can apply to the sociology of science (Callon, 1986; Latour, 1987). Latour (1996) conducted later researches on the actor-network theory with a focus on IT. As a theoretical and methodological approach to social theory, IT project manager can use the actor-network theory to analyze sociotechnical processes, and interactions between humans and nonhumans during IT project execution (Floricel et al., 2014). Floricel et al. (2014) suggested IT project managers should treat both the social and technical aspects of the IT project inseparably. Latour also noted the IT project manager should analyze people and artifacts with the same conceptual apparatus. Using the actor-network theory, the IT project manager can effectively treat the social and the technical aspects of IT projects as inseparable (Floricel et al., 2014). Therefore, I used the actor-network theory as the conceptual framework for this research study.

The actor-network theory is different from other social approaches because it is a combination of theory and methodology (Latour, 1996). IT project managers can use the actor-network theory to conduct an analysis of the risk inherent to the project (Floricel et al., 2014). The IT project manager could use the actor-network theory as a concept to view elements in the real world and trace those elements in empirical work. IT project managers can use the actor-network theory to evaluate the motivation of project team members and key stakeholders, and stimulate individuals and project team to achieve project objectives (Walsham, 1997). Cresswell, Worth, and Sheikh (2010) also noted the IT project manager should consider using the actor-network theory to better appreciate

the complexity of reality and the active role of technology in this context. The IT project manager can use the actor-network theory to analyze the social aspects of project management while focusing on the management of risks (Cresswell et al., 2010). I used the actor-network theory as a conceptual framework to analyze the social aspects of IT project management, and the causes of IT project failure.

The IT project manager can use the actor-network theory to understand why IT projects fail (Gunawong & Gao, 2017). For instance, the IT project manager can use the actor-network to conduct an effective analysis of the risks inherent to the project (Floricel et al., 2014). Additionally, the actor-network theory is a powerful lever the IT project manager should consider using to deal with project stakeholders' interests and expectations (Floricel et al., 2014). Monteiro (2000) noted that the IT project manager could use the actor-network theory to analyze the origins and processes of IT projects failure after applying the theory to evaluate the development of IT project infrastructure by private and public companies. Gao (2007) used the actor-network theory to investigate the failure of a wireless local area network standard in China. Applying the actor-network theory as the conceptual framework for this study, I understood how IT project managers used risk management strategies to improve project success rates.

The development of a telecommunication project, such as a broadband network, includes different actors with different expectations. Stalder (2002) noted that actors and networks are connected in the sense that a network shapes and defines the actors that align with the network. Callon (1986) defined this process of actor-network formation and maintenance as the translation and separated it into four parts including the (a)

problematization, (b) interessement, (c) enrollment, and (d) mobilization. Gunawong and Gao (2017) described the stage from project initiation to collapse as a failure in translation. Uncertainties generate risks in all projects (PMI, 2017). Therefore, an inability to effectively manage IT project risks might not only lead to the translation process to fail but also to the actor-network to collapse (Greener, 2006).

The IT project manager can use the actor-network theory to build a social relationship and strengthen trust with and among project team members and stakeholders (Floricel et al., 2014). The IT project manager should understand the process of actor-network formation and maintenance (Callon, 1986). Additionally, the IT project manager should know that translation involves the creation of a transition from one stage to the other (Sarker, Sarker, & Sidorova, 2006). For instance, at the problematization moment, the IT project manager should establish and control an actor-network, create the project, and identify other active stakeholders (Gunawong & Gao, 2017). Moreover, the IT project manager could use the actor-network theory to resolve conflicts and gain a high level of control (Awie & Dawie, 2014). Liu (2016) noted that both the end-users and the management of risks influence the performance of IT projects. Pollack et al. (2013) suggested IT project managers should use the actor-network theory as an approach to analyze both the social aspects of project management and risk management. I used the actor-network theory as the conceptual framework for this study to understand how IT project managers in the telecommunication industry used risk management strategies to improve project success rates.

Alternative Theories

The actor-network theory was the theory used as the conceptual framework for this study. The alternative theories I explored for this study included the (a) theory of constraints, (b) utility theory, (c) contingency theory, and the (d) research-based theory.

Theory of constraints. Goldratt and Cox (1984) developed the theory of constraints (TOC) based on finite programming software for the optimization of production systems. The primary goal of the TOC was to (a) determine the system limiting factor that could be a constraint in achieving a goal, (b) decide how to optimize the system's constraint, (c) subordinate all other processes to the constraint (d) decide how to get rid of the system's constraint and then (e) return to the first step for identifying the next constraint and not allow inertia to become the next constraint (Ikeziri, Souza, Gupta, & de Camargo Fiorini, 2019; Johnson, Creasy, & Fan, 2016). Rand (2000) and Steyn (2002) noted the system's constraint is the component of the system that hampers the objective of the system. Goldratt and Cox (1984) noted organizations' main goal is to increase and sustain profitability over the long-term. The first step project managers should consider when using the theory of constraints is to identify the system's constraint (Goldratt & Cox, 1984). Rand (2000) noted the system's constraint constitutes the bottleneck. Project managers should identify the part of the system that constitutes its weakness to focus on improvement efforts, and exploit the system's constraint (Ikeziri et al., 2019; Johnson et al., 2016). To effectively exploit the constraint, Goldratt and Cox (1984) suggested project managers should use the constraint to its fullest capacity. Additionally, Ikeziri et al. (2019) and Johnson et al. (2016) noted that project managers

should focus on eliminating the downtime of bottleneck operations to exploit the constraint. In the third stage of the theory of constraints, Goldratt and Cox (1984) suggested project managers should subordinate everything else to the above two decisions. Project managers must work on adjusting the non-constraint parts of the system to a point that will enable the constraint to perform at the maximum value (Rand, 2000; Steyn, 2002). If the previous stages were successful, project managers should elevate the constraint by taking all necessary actions to remove the constraint (Goldratt & Cox, 1984). Rand (2000) noted that after elevating the constraint, the initial bottleneck may no longer be impeding the system. Therefore, project managers should return to the first stage to identify the new bottleneck and then reproduce the process.

Project managers can apply the TOC as a conceptual framework to develop a variety of management techniques (Steyn, 2002). Project managers can use the TOC to effectively manage project scheduling (Goldratt, 1997; Johnson et al., 2016). Shu-Shun and Shih (2009) indicated that project managers can use the TOC to manage project schedules and risks more effectively. Additionally, de Souza and Pires (2010) and Zhang, Song, and Diaz (2016) indicated organizations can use the TOC to leverage performance to build and sustain competitive advantage. Sabbaghi and Vaidyanathan (2004) noted that IT project managers can use the TOC as an approach in the planning and implementation of IT projects. Project managers could apply the TOC to fast track project schedule and improve project control and monitoring (Steyn, 2002). However, though fast tracking the project schedule may not lead to an increase in project costs, it increases project risks (PMI, 2017). Sabbaghi and Vaidyanathan (2004) and Ikeziri et al. (2019) indicated that

the TOC applies to a project as a network of required activities that move toward some clear goals aimed at producing deliverables under budget and within schedule. To deliver project results under budget and within the project schedule, IT project managers should consider some prerequisites which are the precedents for the goal. Additionally, IT project managers should define all required dependencies between the predecessor and the successor (Johnson et al., 2016; Sabbaghi & Vaidyanathan, 2004). Though, IT project managers can use the theory of constraints as an approach in the planning and implementation of IT projects, it is not an appropriate conceptual framework for managing IT project risks effectively.

Project managers can use the TOC as a social theory to address resources, as well as scope, cost and time issues (de Souza & Pires, 2010; Steyn, 2002). Izmailov, Korneva, and Kozhemiakin (2016) indicated that the use of the TOC enables project managers to reduce non-productive multitasking people and implement tasks much more quickly and effectively. Zhang et al. (2016) noted that the TOC is based upon the opinion that even a single constraint can influence the outcome of a structure. Because the TOC treats every process or project as a system of interconnected link, Izmailov et al. (2016) suggested the use of the theory of constraints as a continuous improvement strategy for organizations to achieve a competitive advantage. Because the purpose of this study was to explore the risk management strategies used by IT project managers for improving project success rates, I chose not to use the TOC. Additionally, the main focus of the TOC is on continuous improvement, while risk management is applied to projects that have a known starting date and an explicit ending date. Moreover, using the TOC, IT project managers

could not build a social relationship and strengthen trust with project team members and stakeholders (Floricel et al., 2014). Therefore, I chose not to use the TOC as the conceptual framework for exploring the risk management strategies IT project managers within the telecommunication industry used for improving project success rates.

Utility theory. The utility theory originated from the concept of usefulness, and it characterizes personal happiness (Nathan, Todd, & Yang, 2016). Safari, Bagherpour, and Wang (2016) noted that Daniel Bernouilli first proposed the utility theory in 1738. The utility theory is a concept that focuses on individuals' choices by increasing a utility function (Brickley, Smith, & Zimmerman, 2015). Project managers can use the utility theory to identify stakeholders' preferences between complex alternatives with uncertain outcomes (Nathan et al., 2016). Shi and Wang (2019) noted that the utility theory is a consumer behavior theory IT project managers can use to assess the attitude of key stakeholders in dealing with risk. Nathan et al. (2016) and Shi and Wang (2019) defined utility theory as an evaluation theory influenced by key project stakeholders' psychological choice tendency. Therefore, project managers can use the utility theory to identify project stakeholders' preferences between complex alternatives with uncertain outcomes (Johnson et al., 2016).

Project managers can use the utility theory to evaluate the risk attitude of project stakeholders (Brickley et al., 2015; Nathan et al., 2016; Shi & Wang, 2019). Suda, Rani, Rahman, and Chen (2015) conducted a quantitative study to determine the relationship between creativity and attitude toward risk. The findings showed that a project manager with a risk aversion will be cautious in decision making and that the utility will be higher

(Suda et al., 2015). Unlikely, Suda et al. (2015) noted that decision-makers who are not reluctant towards risk-taking tend to take double risk than the risk aversion decision-maker, which will turn into a lower utility in decision making. Johnson et al. (2016) shared that IT project managers can use the utility theory as a rational approach to understanding the risk attitude of project stakeholders.

Piney (2003) suggested project managers use the expected utility values to assess stakeholders' opinion of risk concerning project risk propensities. Johnson et al. (2016) noted project managers can use the expected utility theory to evaluate situations in which stakeholders must decide in the event of uncertainty. Johnson et al. (2016) noted that Bernoulli attempted to formulate the criterion of maximization of expected utility in 1782. Brickley et al. (2015) suggested project managers should consider the criterion of maximization of the expected utility when analyzing and identifying stakeholders' attitudes towards risk. Additionally, Piney (2003) and Qazi, Quigley, Dickson, and Kirytopoulos (2016) noted that the project stakeholders generally select the act that results in the highest expected utility, which is the sum of the products of probability and utility over all possible outcomes. Johnson et al. (2016) believed that the decision-making processes depend not only on the project manager's risk aversion but also on the utility of other stakeholders. Therefore, project managers can use the expected utility theory to make the decision-making processes more objective, and to meet the expectations of project stakeholders (Piney, 2003).

The utility theory is a concept that project managers can use for making strategic decisions in managing project risks (Safari et al., 2016). Nathan et al. (2016) and Qazi et

al. (2016) shared that project managers can use the utility theory to better understand stakeholders' risk. Using the utility theory, project managers and project team members can apply techniques such as brainstorming for identifying and assessing risk and developing appropriate risk response strategies (Qazi et al., 2016; Safari et al., 2016). However, though project managers have applied the utility theory as a rational method for understanding and managing project risk, some concerns remain with the behaviors and tasks that interrupt the risk management process predicted by the utility theory (Nathan et al., 2016). Therefore, I chose not to use the utility theory because it would not be the appropriate theory to effectively explore the risk management strategies used by IT project managers in the telecommunication industry for improving project success rates.

Contingency theory. The contingency theory was developed in 1964 by Fiedler as a leadership model that focuses on organizational effectiveness (Suda et al., 2015). Fiedler (1964) shared that any organizational leaders' effectivness depends on two aspects including the leadership style, and the situation favorableness. Fiedler stated that the first step in using the contingency model is for the leader to identify the natural leadership style. Fiedler demonstrated this first step using a scale called the least preferred coworker. Leaders can use the least preferred coworker scale to determine whether they are relationship-oriented or task-orienetd. Fiedler (1964) concluded that leaders who score high on the scale are relationship-oriented, while those who score high are task-oriented. Project managers can use the contingency theory as a model to formulate strategic decisions and improve project performance (Sauser, Reilly, & Shenhar, 2009; Suda et al., 2015).

Projects are one form of transitory and temporary organizational endeavor undertaken to produce a unique service or result (Kendrick, 2015; Kerzner & Kerzner, 2017; PMI, 2017;). When analyzing project failure rates, most organizations focus their research on the engineering and technical factors, but not on the managerial reasons (Sauser et al., 2009). In many cases, the high rate of project failures is related to management's failure (Hanisch & Wald, 2012; Sauser et al., 2009; Suda et al., 2015). When addressing the project's success criteria, project managers generally take into account the project schedule, cost, and quality (Márta et al., 2018). Additionally, Márta et al. (2018) noted that project managers could define project success by assessing the stakeholder satisfaction and considering the effectiveness criterion. Project managers can use the contingency theory to address project low success rates (Joslin & Müller, 2016; Sauser et al., 2009). Hanisch and Wald (2012) and Sauser et al. (2009) suggested project managers should use of the contingency theory for optimizing project planning. Joslin and Müller (2016) and Hanisch and Wald (2012) noted that project managers can use the contingency theory to improve project planning and control factors.

Fiedler's (1964) contingency theory stated that the leader is someone in the group who manages and coordinates task-relevant group activities. To apply Fiedler's contingency model, the project manager should first identify their natural leadership style, then their situation leadership style. However, Fiedler's contingency model showed some limitations that need to be addressed. Fiedler (1972) acknowledged the inconsistencies in experimental conclusions concerning the interpretation of relationship-oriented versus task-oriented. Weill and Olson (1989) noted that one of the contingency's

limitations emanates from Fiedler's idea that there is a relationship between the leaders' style and their behavior. Additionally, Suda et al. (2015) noted that previously contingency theory has been applied to public projects, and not to private projects. Therefore, I chose not to use the contingency theory as the conceptual framework for this study.

Resource-based theory. Barney (1991) developed the resource-based theory in 1986 as a model organizational leaders can use to achieve long-term goals. The resource-based theory states that an organization that possesses strategic resources has a great opportunity to develop and sustain a competitive advantage over its competitors (Dzeng & Wen, 2005; Ferreira, Serra, Costa, & Almeida, 2016; Ghapanchi, Wohlin, & Aurum, 2014). Killen, Jugdev, Drouin, and Petit (2012) suggested that organizational leaders should apply the resource-based theory to increase profitability over time.

A firm's resources include all assets, capabilities, organizational processes, attributes, information, and knowledge (Barney, 1991; Killen et al., 2012). Ghapanchi et al. (2014) noted that organizational leaders could use the firm's resources to develop and execute strategies for improving its efficiency and effectiveness. According to Barney (1991), the firm's resources include the (a) human capital resources, (b) organizational capital resources, and the (c) physical capital resources. To achieve the firm's long-term goals, organizational leaders should invest more in the human capital resources, and in the organizational capital resources (Barney, 1991). Additionally, organizational leaders that invest in their firm's intangible resources are more successful when it comes to project planning, monitoring, and controlling (Barney, 1991; Killen et al., 2012).

Therefore, project managers can use the resource-based theory to improve project planning, monitoring, and controlling.

Organizations formulate strategies to achieve long-term goals and sustain a competitive advantage (Ghapanchi et al., 2014). The resource-based theory is an approach project managers can apply to project management and project portfolio management (Ferreira et al., 2016; Killen et al., 2012). Ferreira et al. (2016) noted that to sustain their competitive advantage, organizations need capabilities they can use to create value that rivals cannot copy. The alignment between strategy, project management, and project portfolio management contributed to improving project performance (Ferreira et al., 2016). Killen et al. (2012) suggested project managers should apply the resource-based theory to classify project management resources in terms of complexity and leverage. Project managers can use tangible project management resources such as project management methodologies, and intangible resources to effectively plan, implement, monitor, and control project activities (Killen et al., 2012).

The success of IT projects generally depends on several factors project managers should understand and manage (Ghapanchi et al., 2014; PMI, 2017). Ghapanchi et al. (2014) conducted a quantitative study to examine the influence of project resources on the defect-fixing process. Ghapanchi et al. (2014) targeted 427 open source projects. The purpose of Ghapanchi et al.'s research was to determine the open source projects that had the potential to affect defect-fixing effectiveness. The findings of Ghapanchi et al. (2014) showed that open-source projects that have a higher level of organizational communication than others are more likely to benefit from competitive advantage

through effective defect-fixing. Therefore, project managers should understand the need for valuable strategic resources to produce a competitive advantage for the firm.

The resource-based theory is a strategic management research that focuses on the firm's internal and external environment (Barney, 1991). Project managers can use the resource-based theory to evaluate project team performance (Ferreira et al., 2016; Killen et al., 2012). Dzeng and Wen (2005) used the resource-based theory to assess project teaming strategies in the construction industry. According to Dzeng and Wen (2005), the application of the resource-based theory enables project managers to determine critical resources required to implement construction projects. Additionally, project managers can apply the resource-based theory to assess the capacity of external stakeholders including contractors, and determine resource gaps (Dzeng & Wen, 2005; Killen et al., 2012). The resource-based theory is an effective approach project managers can use to examine how the firm's resources can increase competitive advantage. However, though the resource-based theory is effective to evaluate project teaming strategies, there is no evidence of its effectiveness for exploring the risk management strategies used by IT project managers to improve project success rates. Therefore, I chose not to use the resource-based theory for this study.

Information Technology Project Failure and Success

In the field of IT, there is a noticeable shift toward project failure (Aranyossy, Blaskovics, & Horváth, 2018; Iijima, 2015). IT projects failure can be in various forms. Deshaw (2017) noted more than 70% of IT projects fail because they did not meet three essential criteria that involve (a) schedule, (b) budget, and (c) quality. Márta et al. (2018)

indicated an organization could measure project success by considering the effectiveness criterion and stakeholders' satisfaction. However, the rate of IT project success remains low (Standish Group, 2016).

The Standish Group (2016) conducted a quantitative survey to investigate the causes of IT projects failure. The Standish Group used surveys as an instrument to target IT executive managers from different industries. The targeted industries included various sectors such as finance and insurance, manufacturing, wholesale trade, as well as public organizations. The overall sample consisted of 365 companies that had 8,380 software end-user programs under development. The Standish Group (2016) noted that 31.1% of the software applications were canceled before completion, while 52.7% cost 18.9% over the initial cost estimates. In addition to the quantitative study, the Standish Group conducted four surveys and several interviews to extend the study to the qualitative context. In their chaos report, the Standish Group (2016) stated in 2015, that while 29% of projects were successful, 52% were challenged, and 19% failed. Especially, 70% of IT projects in 2015 failed or were challenged (Deshaw, 2017; Standish Group, 2016). According to Deshaw (2017) and the Standish Group Chaos Report (2016), IT projects fail when there is no stakeholder involvement, top management support, and/or a lack of clear communication of requirements. Additionally, requirements changes could lead to cost growth and schedule interruptions (Deshaw, 2017; Iijima, 2015; Standish Group, 2016). In a like manner, the Standish Group reported that immature technology could hamper IT projects success by leading to cost growth.

Stoica and Brouse (2013) noted that there is a very high rate of IT project failure since its initiation stage. Iijima (2015) conducted a qualitative study to evaluate the reasons why project managers generally fail to deliver IT projects successfully. According to Iijima (2015), IT projects fail because of the (a) failure of designing the business as a business case, (b) failure to initiate a relevant business case review and approval process, (c) lack of effective cost analysis, (d) failure to develop an effective risk management strategy, and (e) failure to maintain the business case alive throughout project life cycle. IT personnel generally possess the knowledge and technical skills of IT projects but fail to write an IT business case (Iijima, 2015). IT personnel should consider involving other departments of the organization in the writing of the IT project business case. In addition to the failure to design the business case, IT personnel also fail to institute a relevant business case review and approval process (Iijima, 2015). Iijima (2015) noted that ineffective cost analysis constitutes another significant point of IT project failure. In other words, the lack of transparency makes it difficult to ensure that the planning process enables for proper and complete cost estimates.

Moreover, Iijima (2015) shared that risk is a key construct that influences IT project success. The need for the development of an effective risk management strategy is essential to increase the IT projects success rates (Deshaw, 2017; Hartono et al., 2014; Márta et al., 2018; Pimchangthong & Boonjing, 2017). The life cycle of any project includes the (a) initiation, (b) planning, (c) execution, (d) monitoring and control, and (e) closure (PMI, 2017). The IT project manager must not treat the IT project business case as a one-time assignment (Iijima, 2015; PMI, 2017). Therefore, project manages should

consider maintaining the business case throughout the project life cycle to improve IT project success rates (Iijima, 2015).

Aranyossy et al. (2018) conducted a quantitative study to investigate the key factors of project success and failure. Aranyossy et al. (2018) used a survey as an instrument to target a population of 124 Hungarian IT professionals while considering factors such as primary and secondary diversity, and major roles and responsibilities in managing IT projects. Aranyossy et al. (2018) concluded the lack of stakeholder engagement, executive support, and ineffective planning were the major factors of IT project failure.

Stakeholder engagement includes the process of communicating and involving stakeholders throughout the project lifecycle to respond to specific needs and expectations (PMI, 2017). Hopkin (2018) noted an effective management of stakeholder management can help the IT project manager to reduce resistance from stakeholders, and therefore gain their support. Additionally, Aranyossy et al. (2018) noted communication and change management skills are the two primary skills project managers need to improve projects success rates. Because more than 70% of IT projects were unsuccessful because of risks (Deshaw, 2017; Standish Group, 2016), IT project managers should consider developing effective risk management strategies to improve IT projects success rates.

Risk Management Strategies

The widespread occurrence of risk in projects encouraged organizations to take proactive measures to effectively manage risk and its effects (El Yamami, Ahriz,

Mansouri, Qbadou, & Illousamen, 2017; Pimchangthong & Boonjing, 2017; PMI, 2017). As the process of identifying, evaluating, and responding to risk across the project lifecycle to meet project objectives (Pimchangthong & Boonjing, 2017; PMI, 2017), risk management should be a major component of the project management process (Hillson & Simon, 2012). El Yamami et al. (2017) and Júnior and Chaves (2015) noted effective management of risk contributes to improving IT project success. Most researchers and literature identified six risk management processes including (a) risk management planning, (b) risk identification, (c) qualitative risk analysis, (d) quantitative risk analysis, (e) risk response planning, and (f) risk monitoring (Brookfield, Fischbacher-Smith, Mohd-Rahim, & Boussabaine, 2014; El Yamami et al., 2017; PMI, 2017). The IT project manager can develop a project risk management framework by applying the six risk management processes (Marchewka, 2014).

Plan risk management. The development of risk management planning enables the IT project manager to not only formulate the objectives but also identify the ways and means to implement risk tasks (Cagliano, Grimaldi, & Rafele, 2015). As the first step of the risk management processes, risk planning begins with a strong commitment of a risk culture from all the stakeholders involved in the project (El Yamami et al., 2017; Marchewka, 2014; Schwalbe, 2015). According to Marchewka (2014), and Schwalbe (2015), stakeholder engagement ensures the required resources provided will not only help to plan adequately but also deal with the identified IT project risks. Furthermore, stakeholders' involvement in the identification, analysis, and risk response to both

negative and positive risks is essential to develop an effective risk management strategy (Javani & Rwelamila, 2016; PMI, 2017).

Risk identification. Risk identification involves the identification of all project risks and sources of risks, as well as their documentation (El Yamami et al., 2017; Júnior & Chaves, 2015; Marchewka, 2014; PMI, 2017; Schwalbe, 2015). By performing this process, the IT project manager can document existing individual project risks and the sources of overall project risk (Marchewka, 2014; PMI, 2017). Additionally, the risk identification stage provides key data that the project team can utilize to appropriately respond to the identified risks (PMI, 2017).

Júnior and Chaves (2015) conducted a qualitative study to explore the risk management strategies used during the merger period of two telecommunication companies in Brazil. In the process of identifying risks, the project manager can use different techniques or tools including (a) expert judgment, (b) data collection techniques, (c) data analysis tools, (d) interpersonal and team skills, (e) prompt lists, and (f) meetings. Júnior and Chaves (2015) used interviews as a technique to list thirteen exclusive risks identified by the respondents in the merger period between two Brazilian telecommunication companies. Júnior and Chaves (2015) noted the unsafe zone that spread throughout, and the high rate of redundancies was among the most frequently reported risks identified by the respondents.

Risk analysis. After the identification of the risks, the next step for the IT project manager and his or her project team to perform an analysis of the risks. Risk analysis is about appraising identified risk to decide on the probability of happening, influence, and

lapse of time (Brookfield et al., 2014; Javani & Rwelamila, 2016; Júnior & Chaves, 2015; Marchewka, 2014; PMI, 2017; Schwalbe, 2015). Marchewka (2014) noted the project manager should consider prioritizing risks during the risk analysis step before formulating a risk strategy. By prioritizing risks, the project manager can determine which risks require a response (PMI, 2017). To perform the analysis of risks, the project manager can use either the qualitative risk analysis or the quantitative risk analysis (Hopkin, 2018).

The project manager performs the qualitative risk analysis throughout the project by assessing the priority of identified individual IT project risks, and using their probability of happening (Cagliano et al., 2015; PMI, 2017; Schwalbe, 2015). Marchewka (2014) stated that IT project managers and the project team members can use qualitative risk analysis to conduct a subjective analysis of the risk. The IT project manager can use several qualitative tools or techniques for analyzing risks. For example, the IT project manager can use the Delphi Technique to decide how serious risk is by looking at the probability of occurrence of the risk, and the consequences if the risk occurs (Marchewka, 2014; Markmann, Darkow, & von der Gracht, 2013). Moreover, IT project managers can assess the impact of risks regarding time, cost, and quality (PMI, 2017). IT project managers can use a variety of qualitative tools including the probability-impact risk matrix, cause and effect diagram, decision trees, and risk categorization for assessing IT project risks (Holzmann & Spiegler, 2011; Marchewka, 2014; Muriana & Vizzini, 2017). For instance, IT project managers can use a probability-impact risk matrix for defining the rating scales for likelihood and impact of a particular

risk and identify which risks the project team needs to develop a response for (Muriana & Vizzini, 2017). Project managers generally rates the likelihood and impact of project risk on the scale of (a) very low, (b) low, (c) moderate, (d) high, and (e) very high (Hopkin, 2018). Figure 1 depicts an example of the risk impact and probability matrix.

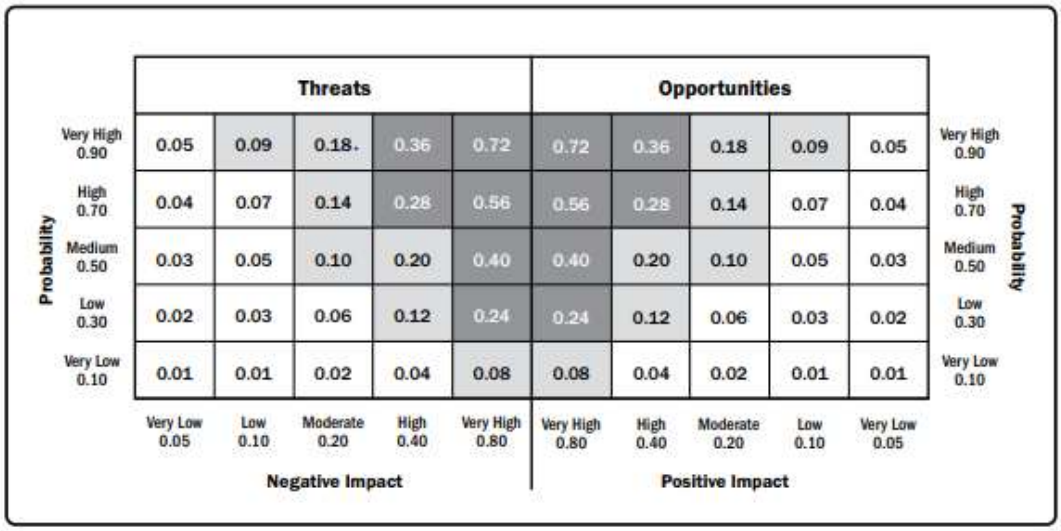


Figure 1: Probability and impact matrix. Project Management Institute. (2017). *A guide to the project management body of knowledge* (6th ed.). Newtown Square, PA: Project Management Institute. Reprinted with permission

IT project managers could use input from the project to assess the likelihood of occurrence for each individual risk identified (Hopkin, 2018; PMI, 2017). The identified risks that are within the red and yellow zones of the matrix will have a risk response strategy that may involve both risk reduction and a contingency plan. Figure 2 illustrates an example of definitions of probability and impacts against three project objectives. IT project managers can use the scales to assess both positive and negative risks by interpreting the impact definitions as threats for negative risks, and opportunities for

positive risks (Hopkinson, 2017). While threats could include project delay, additional cost, and performance shortfall, opportunities would be regarding schedule or cost reduction, and performance improvement (PMI, 2017).

SCALE	PROBABILITY	+/− IMPACT ON PROJECT OBJECTIVES		
		TIME	COST	QUALITY
Very High	>70%	>6 months	>$5M	Very significant impact on overall functionality
High	51-70%	3-6 months	$1M-$5M	Significant impact on overall functionality
Medium	31-50%	1-3 months	$501K-$1M	Some impact in key functional areas
Low	11-30%	1-4 weeks	$100K-$500K	Minor impact on overall functionality
Very Low	1-10%	1 week	<$100K	Minor impact on secondary functions
Nil	<1%	No change	No change	No change in functionality

Figure 2: Example of definition for probability and impact. Project Management Institute. (2017). *A guide to the project management body of knowledge* (6th ed.). Newtown Square, PA: Project Management Institute. Reprinted with permission

Quantitative risk analysis involves a mathematical assessment of individual identified risks and their impacts on the IT project objectives (Javani & Rwelamila, 2016; Kendrick, 2015; PMI, 2017; Schwalbe, 2015). Using the quantitative risk analysis approach, the IT project manager can quantify each of the identified risks, and then develop numerical data that may enhance the risk response strategy (PMI, 2017). During the quantitative risk analysis process, the IT project manager uses the information on individual project risks analyzed in the qualitative risk analysis process as having a sufficiently high impact on the project (Kendrick, 2015; PMI, 2017). Hopkinson (2017)

noted the use of quantitative is more effective for mega or strategically important projects. IT project managers can use the quantitative risk analysis to adequately assess all the project risks by evaluating their aggregated effects on project objectives (Haimes, 2015; Kerzner & Kerzner, 2017; Muriana & Vizzini, 2017; PMI, 2017). Table 1 depicts a comparison between the qualitative and quantitative approach.

Table 1:

Comparison of Qualitative and Quantitative Approaches.

Qualitative Risk Analysis	Quantitative Risk Analysis
Addresses individual risk descriptively; Assesses the discrete probability of occurrence and impact on objectives if it does occurs; Prioritize individual risks for subsequent treatment; Adds to risk register; Leads to quantitative risk analysis	Predicts likely project outcomes based on combined effects of risk; Uses probability distribution to characterize the risk's probability and impact; Uses project models such as schedule or cost estimate; Uses a quantitative method, requires specialized tools; Estimates likelihood of meeting targets and contingency needed to achieve desired level of comfort; Identifies risks with greatest effect on overall project risk

Note: Adapted from Practice Standard for Project Risk Management of the Project Management Institute. Reprinted with permission.

During all the stages of risk management, the IT project manager can use the risk breakdown structure (RBS) to visualize and strategize its approach towards project risks management (Kerzner & Kerzner, 2017; PMI, 2017). IT project managers can use the RBS to group individual project risks. Additionally, the IT project team can use the RBS

to identify the entire sources from which each risk may occur (Hopkinson, 2017; PMI, 2017). The project team can use the RBS to find out the cluster of risks in a certain category and dependencies among risks (Marchewka, 2014; PMI, 2017). The RBS is a powerful tool the IT project manager can use for monitoring and evaluating the risk mitigation process throughout the project (Marchewka, 2014; PMI, 2017). Figure 3 illustrates a hierarchical representation of potential sources of risks.

RBS LEVEL 0	RBS LEVEL 1	RBS LEVEL 2
0. ALL SOURCES OF PROJECT RISK	1. TECHNICAL RISK	1.1 Scope definition
		1.2 Requirements definition
		1.3 Estimates, assumptions, and constraints
		1.4 Technical processes
		1.5 Technology
		1.6 Technical interfaces
		Etc.
	2. MANAGEMENT RISK	2.1 Project management
		2.2 Program/portfolio management
		2.3 Operations management
		2.4 Organization
		2.5 Resourcing
		2.6 Communication
		Etc.
	3. COMMERCIAL RISK	3.1 Contractual terms and conditions
		3.2 Internal procurement
		3.3 Suppliers and vendors
		3.4 Subcontracts
		3.5 Client/customer stability
		3.6 Partnerships and joint ventures
		Etc.
	4. EXTERNAL RISK	4.1 Legislation
		4.2 Exchange rates
		4.3 Site/facilities
		4.4 Environmental/weather
		4.5 Competition
		4.6 Regulatory
		Etc.

Figure 3: Sample risk breakdown structure (RBS). Project Management Institute. (2017). *A guide to the project management body of knowledge* (6th ed.). Newtown Square, PA: Project Management Institute. Reprinted with permission

Risk responses planning. After assessing the risks, the IT project manager should consider developing a risk response planning (Hopkinson, 2017; PMI, 2017). Risk responses planning involves the development of options, selection of effective strategies, and the implementation of action plans for dealing with the overall project risks (Javani & Rwelamila, 2016; Kendrick, 2015; PMI, 2017). Javani and Rwelamila (2016) noted that by developing a risk response planning, IT project managers could develop procedures to reduce the defined risks and oversee such risks, and also identify potential new risks and execute risk response plans. IT project managers can use an effective and appropriate risk response to reduce individual negative risks, increase individual positive risks, and decrease overall project risk exposure (Javani & Rwelamila, 2016; Kendrick, 2015; Muriana & Vizzini, 2017; PMI, 2017).

IT project managers can use five alternative strategies to deal with project risks (Hopkin, 2018; PMI, 2017). These strategies include (a) escalation, (b) avoidance, (c) transfer, (d) mitigation, and (e) acceptance (Cagliano et al., 2015; Marchewka, 2014; PMI, 2017; Talet, Mat-Zin, & Houari, 2014). The escalation strategic approach is suitable when the project team and other major project stakeholders agree they do not have the resources or competencies required to respond to the risk (PMI, 2017). Therefore, even if a risk does not affect project objectives but could still impact another part of the organization, the IT project manager should escalate it to the appropriate owner to ensure its recognition, understanding, and management.

Risk avoidance is appropriate when the IT project team takes actions to remove the negative risk or keep safe the project from its negative influence (Kendrick, 2015; Kerzner & Kerzner, 2017; Marchwicka & Kuchta, 2017; Muriana & Vizzini, 2017; PMI, 2017). The avoidance strategy involves all the actions taken to remove the threat completely (Kendrick, 2015; PMI, 2017; Schwalbe, 2015). In this situation, the IT project manager should make an active approach to prevent the possibility of the threat occurring (Marchewka, 2014). Kerzner and Kerzner (2017) noted project managers can avoid risks by taking actions such as monitoring and evaluation, removing risky activities, reducing system complexity, revising component parts quality requirements, switching to new contractors, and integrating redundancies. However, the IT project manager can or should not avoid all risk. Additionally, communication is critical to risk avoidance (Kerzner & Kerzner, 2017; Marchewka, 2014; PMI, 2017).

One strategy the IT project manager can use is to shift or transfer the liability or consequence of a stated risk to a third party. Risk transference could result in the form of buying insurance against a specific risk or hire out an expert to manage a portion of the project (Marchewka, 2014). Kerzner and Kerzner (2017) and the PMI (2017) noted that transferring risk rarely helps to remove the risk, but creates an agreement for mitigation, acceptance, or avoidance on another party. For instance, the IT project manager can consider using fixed-priced contracts, the IT project manager to transfer the risk to the contractor (Larson, Gray, Danlin, Honig, & Bacarini, 2014; PMI, 2017; Schwalbe, 2015). In this situation, the contractor is aware that his or her company is liable for any risk that occurs (Larson et al., 2014). Before making the decision to transfer the risk, the IT

project manager should determine which party can effectively manage the activities that would generate risks (Larson et al., 2014; PMI, 2017).

The IT project manager can use a mitigation strategy to reduce the probability or the impact of a threat if it does occur (Kerzner & Kerzner, 2017; Larson et al., 2014; Marchewka, 2014; PMI, 2017; Schwalbe, 2015). Larson et al. (2014) noted that a project team in charge of implementing a new system could test the new system on a smaller separate project before implementation. The project team can test a new system to discover several problems, and then propose a solution before implementation (Larson et al., 2014). The IT project manager can use a mitigation strategy to mitigate the probability of the risk occurrence.

IT project managers can use the risk acceptance strategy when acknowledging the existence of a threat, but not taking any proactive action (Marchewka, 2014; PMI, 2017). According to Larson et al. (2014), the project owner is liable for the risk because the probability of occurrence is low. Risk acceptance strategy is useful for low-priority risks, and the project team can also adopt it when the IT project manager has no other way to address the threat (Larson et al., 2014; Marchewka, 2014; PMI, 2017). Risk acceptance strategy can be either active or passive (Hopkin, 2018). An example of active acceptance could be establishing a contingency reserve, including resources such as money, time, or human capital to deal with the threat if it happens (Larson et al., 2014; Marchewka, 2014; PMI, 2017). By adopting a passive acceptance, the project team does not take any active action apart from the recurrent analysis of the risk to ensure that it does change significantly (Larson et al., 2014; Marchewka, 2014).

Risk responses implementation. Implementation risk response involves the overall steps of risk responses implementation (PMI, 2017). In liaison with the risk champion, the project manager appoints the risk owner as the best person to manage an identified risk (Hopkin, 2018; Kerzner & Kerzner, 2017; PMI, 2017). The risk owner is responsible for securing, coordinating and deploying necessary resources to implement planned risk response strategies and bring risks within the defined tolerance thresholds (Kerzner & Kerzner, 2017; Larson et al., 2014). Successful implementation of risks requires strong leadership, effective time management, and the use of tools and techniques such as expert judgments, interpersonal and team management competencies, and project management information system (Kerzner & Kerzner, 2017; PMI, 2017). The risk owner can ensure successful implementation of a risk response strategy by select competent team members, create a positive work environment, establish a high standard of performance, and measure, monitor and report implementation progress (Larson et al., 2014).

Risk monitoring. After identifying, qualifying, assessing, developing, and implementing clear responses, the project team must continuously monitor the various risk triggers to monitor all IT project risks. Risk monitoring is the process of monitoring the identified risks, identifying and evaluating new risks, and assessing how effective the risk process is (Hopkin, 2018; Larson et al., 2014; Marchewka, 2014; PMI, 2017). Larson et al. (2014) and Schwalbe (2015) noted that IT project managers must monitor risks in the same way he or she tracks the project progress. For the risk response control to be effective, the project team should use tools such as data analysis, audits, and meetings

(PMI, 2017). The project team should ensure that risk evaluation and updating is part of every status meeting and progress report system (Larson et al., 2014). The project team must always be on alert to deal with new and unforeseen risks (PMI, 2017).

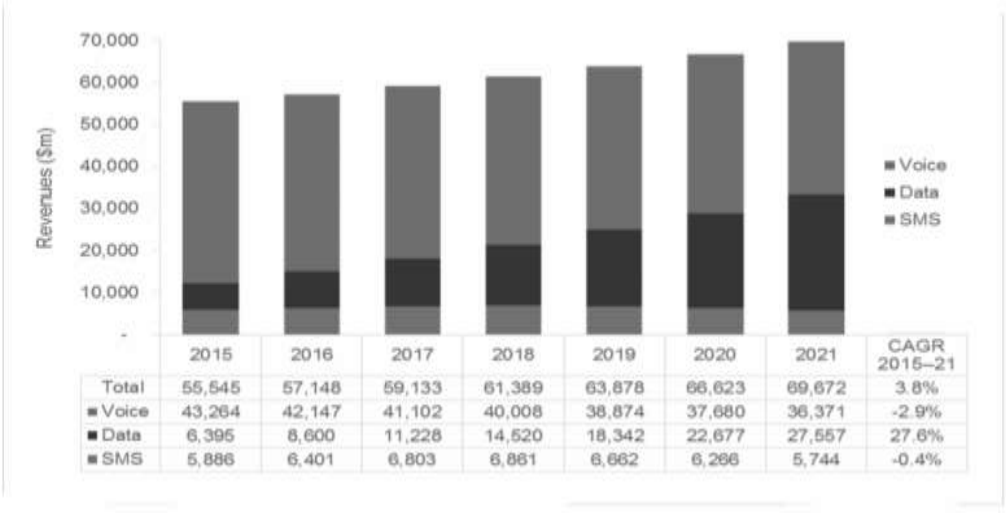
Telecommunication Industry

The telecommunication industry is a driving force of productivity across the economy and societies. In addition to its significant contribution to the economic activities of countries, the telecommunication industry has a positive effect with reference to economic growth, poverty reduction, health education, healthcare delivery, and education and training (Aker & Mbiti, 2010). Katz and Koutroumpis (2014) noted that mobile infrastructures significantly influence the creation of market opportunities and contribute to increasing employment and economic growth. The telecommunication industry has rapidly evolved, and there is a lot to learn from this evolution.

Evolution of the telecommunication industry. Telecommunication networks were primarily government-owned monopolies from their very inception. Stone (2015) and Gómez-Barroso, Feijóo, Quiles-Casas, and Bohlin (2016) noted telecommunication networks were natural monopolies like public utilities, where only one firm had the control of the cable networks and the commutes that routed calls. Therefore, it was no necessary to consider fixing more than one network of cables. Moreover, most West-African countries dealt with telecommunications policy as a national concern managed by a ministry of post and communications (World Bank, 2007).

The impetus for reform of telecommunications arose from the poor performance of domestic incumbent operators, and the need for national economic, social and security

interests (Aker & Mbiti, 2010; Jia, Durrani, & Chen, 2018; Katz & Koutroumpis, 2014; Stone, 2015; World Bank, 2007). In Senegal for example, the member of parliament voted the law that led to the privatization of Sonatel on February 22, 1995, taking away the monopoly right and liberalizing the telecommunication market (Katz & Koutroumpis, 2014). In 2004, Sonatel lost its statutory monopoly, and since then Senegal's telecommunication system has become one of the fastest growing and most competitive in Africa (Katz & Koutroumpis, 2014; World Bank, 2007). Most agencies of regulations in developing countries adopted a competitive strategy to mobile telephony, realizing that the benefits to customers of this approach would be considerable and generate more revenues (Katz & Koutroumpis, 2014; Stone, 2015). Figure 4 illustrates Africa mobile revenue forecast from 2015 to 2021. The graph showed that total mobile revenue for Africa from $55.55 billion in 2015 to $69.67 billion in 2021, capitalizing a compound annual growth rate of 3.8%. Unlikely, the figure also showed that mobile voice revenue in Africa would decline over the forecast period, from $43.2 billion in 2015 to $36.37 billion in 2021. However, mobile data revenue is expected to increase significantly, from $6.40 billion in 2015 to $27.56 billion in 2021, hence a compound annual growth rate of 27.6%.



	2015	2016	2017	2018	2019	2020	2021	CAGR 2015–21
Total	55,545	57,148	59,133	61,389	63,878	66,623	69,672	3.8%
Voice	43,264	42,147	41,102	40,008	38,874	37,680	36,371	-2.9%
Data	6,395	8,600	11,228	14,520	18,342	22,677	27,557	27.6%
SMS	5,886	6,401	6,803	6,861	6,662	6,266	5,744	-0.4%

Figure 4: Africa mobile revenue forecast from 2015 to 2021. Source: Ovum, TMT Intelligence. (2018, November). Africa market outlook: Digital services gather momentum. Retrieved from https://ovum.informa.com. Reprinted with permission

Most governments in developing countries identified a revenue opportunity with the possibility of auctioning to sell successive generations of mobile phone licenses at very high prices (Stone, 2015; World Bank, 2007). In a like manner, the Senegalese Agency for Telecommunication Regulations (ARTP) saw that huge consumer and producer surpluses were appropriate via a license fee. The number of companies involved in the telecommunication market rose sharply (Gómez-Barroso et al., 2016; Stone, 2015). In Senegal, for instance, we assisted in the introduction of Tigo, the second telecom operator in 1999, and then Expresso, the third operator in 2009.

The modern mobile telecommunication industry (MTI). Mobile telecommunication has transformed the way people communicate. While the first generation (1G) of telecommunication realized the essential mobile voice using analog access transmission, the second generation (2G) made known capacity and coverage

(Kumar, Liu, & Sengupta, 2010). The 2G enabled the improvement of the quality of the existing voice services with the introduction of digital multiple access technologies such as code-division multiple access (CDMA) and time division multiple access (TDMA) (Sharma, 2013). Then followed the 3G, which focuses on data higher speeds to open the gates for genuinely mobile broadband, which the 4G fully fulfilled (Kumar et al., 2010; Sharma, 2013). The 4G provides customers with boundless of telecommunication services, including leading mobile services, backed-up by mobile and fixed networks, which are progressively packet-based, along with a support for low to high wireless solutions and limitless data rates, aligned with service demands in multiuser environment (Kumar et al., 2010; Sharma, 2013). According to Sharma (2013), the 5G should be a revolutionary and smart technology that interconnects the globe. The 5G will be the latest iteration of mobile telecommunication engineered to increase the speed and responsiveness of wireless networks significantly. Figure 5 illustrates the evolution wave of mobile telecommunication from 1G to 5G.

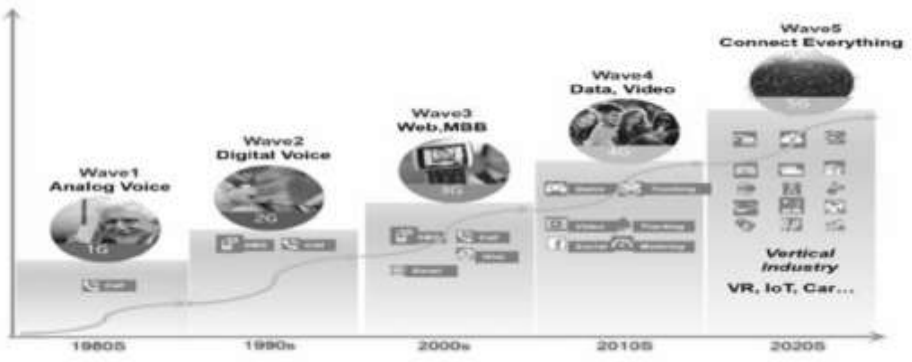


Figure 5: The evolution wave of mobile telecommunication. From "The Innovation Waves in Mobile Telecommunication Industry", by Jia et al. (2018), *IEEE Engineering Management Review*, p. 66. Reprinted with permission.

Jia et al. (2018) used a system thinking approach to investigate the innovation layers propelling the evolution of the telecommunication industry. According to Jia et al. (2018), the telecommunication industry is not only a complex ecosystem but also a highly competitive industry. Bohlin, Gruber, and Koutroumpis (2010) and Jia et al. (2018) agreed that technological innovation is the primary driving force that influenced the transition from a first generation (1G) to a fifth generation (5G) of mobile telecommunication. Jia et al. (2018) explained the development of mobile telecommunication from 1G to 5G with two factors that include the (a) evolution of the network, and the (b) evolution of all the associated ecosystems levels.

Mobile adoption in West-Africa. Mobile adoption has been growing fast in most West-African countries. According to GSMA Intelligence 2018 report, the 15 countries members of the Economic Community of West African States (ECOWAS) registered 176 million subscribers by the end of 2017 (GSMA Intelligence, 2018). Several factors could explain this rapid growth, including the extension of mobile networks to underprivileged communities and the growing accessibility of services and device costs (GSMA Intelligence, 2018; Nwanga, Onwuka, Aibinu, & Ubadike, 2015). According to GSMA Intelligence (2018), between 2010 and 2017, the number of mobile subscribers in the ECOWAS went up by two digits and reflected a compound annual growth rate (CAGR) of just under 10% over that period. However, though annual subscriber growth went

down by single-digit rates, reaching 6% in 2017, the ECOWAS region is still one of the rapidly growing markets in the world, with a forecast CAGR of 4.4% over the period to 2025 (GSMA Intelligence, 2018). Figure 6 illustrates an overview of the African fixed and mobile market from 2013 to 2015.

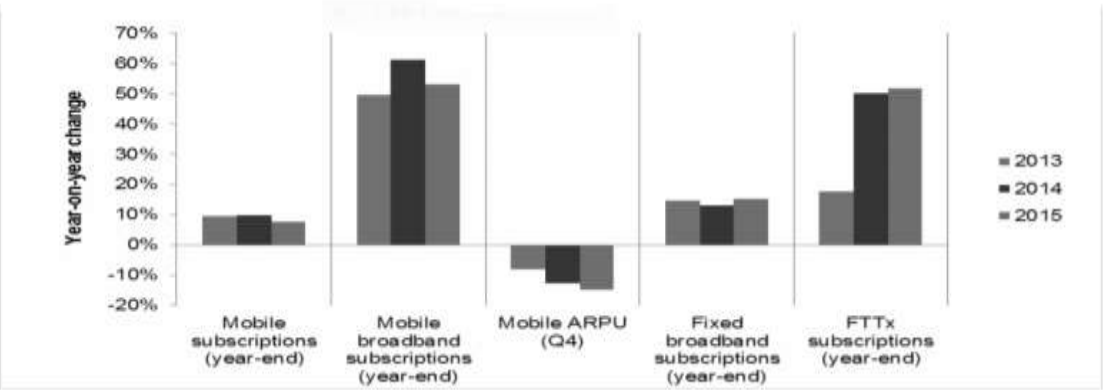


Figure 6: Africa fixed and mobile market overview, 2013 to 2015 (year-on-year % change). Source: Ovum, TMT Intelligence. (2018, November). Africa market outlook: Digital services gather momentum. Retrieved from https://ovum.informa.com. Reprinted with permission

Regarding size and subscribers, one can note the diversity of the mobile market in Africa. While Nigeria dominates the West African market with more than one-half of overall subscribers in 2017, Burkina Faso, Cote-d'Ivoire, Ghana, Mali, and Senegal account for less than a fifth of subscribers (GSMA Intelligence, 2018; World Bank, 2018). With an overall subscriber penetration of 47% in 2017, ECOWAS benefits from the highest penetration rate of all the regional economic communities (RECs) in Sub-Saharan Africa. Then, followed the Southern African Development Community (SADC) with a penetration rate of 44%, the East Africa Community (EAC) with 42%, and finally

the Economic Community of Central African States (ECCAS) with a penetration rate of 40% (GSMA Intelligence, 2018; World Bank, 2018).

Transition to mobile broadband. While some countries including United States of America, South Korea, China, and Japan are putting 5G to work (SDX Central, 2018), the transition to mobile broadband is in progress in West Africa. According to GSMA Intelligence (2018), the extension of 3G and 4G networks, as well as lower data rates and the growing accessibility of smartphones contributed a lot to the shift to mobile broadband in the West Africa region. Though 3G currently remains the dominant mobile broadband technology in West Africa, 4G adoption is significantly growing up because of network expansion and considerable accessibility of 4G devices (GSMA Intelligence, 2018; World Bank, 2018). According to Ovum, TMT Intelligence (2018), Africa had a combined broadband development index (BDI) score of 232 at the end of 2015, with Central and Southern Asia being the only region to evidence a lower score. Figure 8 illustrates the BDI ranking by global sub-region in 2015. With the extension of 3G and 4G networks and accessibility of smartphones, the take-up of mobile broadband grown strongly in Africa. For instance, in the first quarter of 2018, there existed 29 long-term live evolution (LTE) networks in nine countries across West Africa, six of which launched in 2017, including Airtel Nigeria in February 2018, and Africell Gambia and Sierratel Sierra Leone in January 2018 (World Bank, 2018).

Figure 7: Broadband Development Index ranking by global sub region in 2015. Source: Ovum, TMT Intelligence. (2018, November). Africa market outlook: Digital services gather momentum. Retrieved from https://ovum.informa.com. Reprinted with permission Reprinted with permission

The economic and social contribution of the mobile telecommunication industry (MTI). The mobile telecommunication industry has a significant social and economic impact (Broadband Commission, 2016; Jia et al., 2018; Katz & Koutroumpis, 2014; Nwanga et al., 2015). The mobile industry contributed some USD 3.1 trillion to the global gross domestic product (GDP) and some USD 431 billion in public funding and employs 32 million people either directly or indirectly (Broadband Commission, 2016; GSMA Intelligence, 2018). In West Africa as well, the mobile industry has a significant economic and social impact. According to GSMA Intelligence (2018), and the World Bank (2018), the mobile ecosystem generated a total value added of USD 14 billion in West Africa, hence representing 2.5% of the GDP. Concerning public funding, the

mobile ecosystem also made a significant contribution with a tax contribution estimated to USD 4 billion in 2017 (GSMA Intelligence, 2018). Additionally, the mobile industry employed more than 200,000 people in 2017 in West Africa (GSMA Intelligence, 2018; World Bank, 2018). Because more than 70% of IT projects were unsuccessful because of the use of ineffective strategies to manage project risks (Deshaw, 2017), telecommunication companies should consider developing effective risk management strategies to improve project success rates.

Transition

Section 1 of the doctoral study included the background of the problem and an emphasis on risk management strategies for IT project managers. Additionally, I covered components such as the problem statement, purpose statement, and the conceptual framework of the study. I thoroughly discussed information on the assumption, limitations, and delimitations, as well as the significance of the study. In the literature review, I explained how the use of the actor-network theory could enable IT project managers' understanding of risk management strategies, and therefore contribute to effectively improve project performance and quality. I provided detailed information on IT project failure and success, as well as inputs on the risk management processes an IT project manager can follow to manage project risks effectively. Finally, I ended the section 1 with detailed information on the (a) evolution of the telecommunication industry, (b) modern mobile telecommunication industry, (c) mobile adoption, (d) transition to mobile broadband, and the (e) economic and social contribution of the mobile telecommunication industry in West Africa.

In section 2 of this study, I outlined the role of the researcher and described key components including the (a) participants, (b) research methods and design, (c) ethical research, and (d) population and sampling. I also provided information about the choice of the (a) data collection instruments, (b) data collection technique, (c) data organization technique, and (d) data analysis. Finally, I described the methods I utilized for ensuring this study's dependability, credibility, transferability, and confirmability.

Section 2: The Project

Purpose Statement

The purpose of this qualitative multiple case study was to explore the risk management strategies used by IT project managers in the telecommunication industry for improving project success rates. The targeted population was five IT project managers from two telecommunication companies located in Senegal, West-Africa. The targeted population was appropriate for the study because the participants had more than eight years of managing IT projects with a high rate of success. The implications for positive social change from the study's findings included the opportunity to use a modern and innovative telecommunication broadband network to improve the quality of the life of people in the sectors of education, health, and agriculture.

Role of the Researcher

Qualitative methodology is the appropriate method the researcher can use to discover trends in thought and conduct a thorough analysis of the research topic (Yin, 2018). Patton (2015) shared that in qualitative research, the researcher is the data collection instrument. I used interviews to gather data from five IT project managers of two telecommunication companies located in Senegal. Saunders et al. (2015) and Yin (2018) suggested the independent scholar should identify the data analysis process the researcher plans to use for the qualitative analysis. After I collected data from the participants, I used data analysis for interpreting and describing the emergent themes and patterns within the data file. Mostafa and Koroush (2016) suggested the use of thematic analysis for qualitative research. Using thematic analysis in this qualitative research, I

interpreted and concisely described the emergent themes and patterns in my data file. Qualitative researchers can use thematic analysis to organize into a database the data collected, and then divide it into subjects (Saunders et al., 2015).

Researchers should have familiarity with the researched topic (McDermid, Peters, Daly, & Jackson, 2016). As an independent consultant with more than 10 years of experience, I assisted client partners including telecommunication companies in (a) using gap analysis for defining problems, (b) applying tools such as computer simulation or bottleneck analysis for analyzing data and developing solutions, and (c) using project management techniques for implementing strategic solutions. With my experience as an independent consultant to telecommunication companies in West-Africa, I not only developed a professional relationship with internal stakeholders but also deepened my knowledge of various project management topics such as IT project risk management. However, to avoid influencing the results of the research study, I did not involve any participants with whom I had a personal or past professional relationship.

Researchers are responsible for establishing the ethics of the research design (Saunders et al., 2015). To ensure an appropriate collection and analysis of data and comply with the ethical principle, I followed the protocol determined by the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Gabriele (2003) shared that the Belmont Report is essential to human research ethics because it implies respect for the participants of the study, beneficence, and justice. Fisher (2011) shared that researchers can use the Belmont Report to minimize the risk associated to the research, maximize the potential benefits to

research, and achieve a reasonable balance between research risks and potential benefits. I followed the protocols of the Belmont Report, and completed the training organized by the National Commission for the Protection of Human Subjects.

As the research instrument, qualitative researchers should preserve transparency throughout the research (Gabriele, 2003; Saunders et al., 2015). For ensuring the transparency of this research study, I did not involve any participants with whom I had any personal or professional relationships. Yin (2018) also noted that qualitative researchers could improve the study quality by avoiding experimenter bias. Pannucci and Wilkins (2010) and Saunders et al. (2015) indicated the occurrence of bias could be during the planning, as well as the data collection, analysis, and reporting stages. To avoid or minimize bias, I brought back the data to the participants to allow them to comment and correct them for validation (see Appendix D), and also used techniques such as triangulation.

Kvale (1996) noted the qualitative researcher could use different types of questions such as (a) probe questions, and (b) targeted questions. The researcher can use a probe question to employ direct questioning and establish a context for the study (Kvale, 1996; Patton, 2015). The qualitative researcher should use initial probe questions to enhance credibility and build rapport with the participants (Saunders et al., 2015). In addition to initial probe questions, the qualitative researcher can also use targeted questions to build a climate of trust with participants and lead the interview and discussions on the hermeneutic status (Briggs, 1986; Dick, 2006; Hermanowicz, 2002; Kvale, 1996). The use of targeted questions enables the qualitative researcher to have the

participants' responses to the searched topic (Saunders et al., 2015). The researcher can use targeted follow up question to explore the participants' answer to obtain further depth and detail, to ask for clarifying examples, and to explain concepts and theme (Rubin & Rubin, 2005). Yin (2018) noted the researcher could use the interview protocol as a guide during the interview process. I used the interview protocol (see Appendix D) as an instrument to improve the quality of the data collected from the participants.

Participants

Researchers could use the qualitative method to discover trends in thought and opinions and deepen understanding of the problem (Yin, 2018). Sargeant (2012) shared that qualitative research enables the researcher to contribute to the understanding of the problem. The qualitative research approach for the selection of participant differs from that of quantitative research (Sargeant, 2012). Qualitative researchers must select participants who can appropriately respond to the research questions and further improve the comprehension of the problem searched (Sargeant, 2012; Saunders et al., 2015; Yin, 2018). Napier, Keil, and Tan (2009) shared that IT project managers need strong project management skills to improve the project success rates. Therefore, to understand the risk management strategies telecommunication IT project managers use to improve IT project success rate, I set some criteria on the selection of the participants. For instance, I selected IT project managers who had more than eight years of successful experience in managing IT project portfolios within the telecommunication industry. Another primary criterion was that the participants needed to have experience using risk management

strategies to improve IT project performance and quality, and to have contributed to increasing their project success rate.

Hoskins and White (2013) and Saunders et al. (2015) shared that novice researchers may have difficulty establishing rapport with participants unlike them and encounter participants who are resistant to participate in the interview. Buchanan, Boddy, and McCalman (2013) that noted researchers have been most successful where they have a friend, relative, or student working in the organization. Because I am familiar with the targeted organizations to have served as an external consultant, I gave a call to the target companies' executives to collect the e-mail addresses of potential participants. I emailed an invitation letter and the informed consent form to each of the participants to invite them to participate in my research study without involving executives in the recruitment process. My e-mail to the target audience involved (a) the purpose of my research study, (b) a statement concerning confidentiality of the data the participants would provide (c) a statement about the voluntary nature of the study, (d) the type of access required, and (e) my contact information.

The researcher can use a variety of strategies to obtain physical access to appropriate data (Buchanan et al., 2013; Yin, 2018). Saunders et al. (2015) noted one good strategy the qualitative researcher could use is the use of existing contact for developing new ones. Buchanan et al. (2013) also stated having an existing contact, such as a manager constitutes an excellent opportunity to connect with potential participants in the targeted company. I used existing contacts in the two targeted companies to gain access to potential participants. After the participants showed an interest in participating

in my research, I engaged with them via telephone calls to build rapport. During my initial phone call to each of the participants, I shared the purpose of my research study to ensure alignment with my research question. I also gave assurances to the participants concerning confidentiality.

Research Method and Design

Research Method

Researchers can use one of the three types of methods including qualitative, quantitative and mixed methods approaches (Saunders et al., 2015; Yin, 2018). Using one of the research methods, the researcher can collect, analyze, and interpret data (Yin, 2018). However, the researcher should select a research method based on the nature of the research problem, and the researcher's experience (Gratton & Jones, 2009; Saunders et al., 2015). For instance, Patton (2015) advised the use of the qualitative method to analyze organizations to improve effectiveness. Sargeant (2012) explained quantitative research mainly focuses on the impact of a phenomenon, while qualitative research focuses on understanding a problem. The researcher can use a qualitative method to explore and understand the meaning participants confer to a social or human problem (Patton, 2015; Saunders et al., 2015; Yin, 2018). Considering the purpose of my study, as well as my research question, I selected a qualitative method. Using the qualitative approach, I appropriately explored the risk management strategies that telecommunication IT project managers use to improve project performance and quality.

Sargeant (2012) and Yin (2018) noted researchers could use the qualitative method to describe the data and the arising themes, hence facilitating the comprehension

of the phenomenon studied. Saunders et al. (2015) explained the researcher can use the qualitative method to describe in details the feelings, views, and experiences of the participants. Additionally, the qualitative researcher can appropriately provide an interpretation and description of the emergent themes and patterns within his or her data file (Patton, 2015; Sargeant, 2012; Saunders et al., 2015). Moreover, in the qualitative method, the participants provide a thorough understanding of the research problem (Patton, 2015). The qualitative method was the appropriate approach for this study because it enabled me to have an in-depth understanding of the risk management strategies IT project managers use to improve project success rates.

Researchers can use the quantitative method to compute sample size to obtain enough power to ensure the effective attribution of the result of the phenomenon searched (Sargeant, 2012). Saunders et al. (2015) explained quantitative research is the appropriate approach for examining the relationship among variables. The researcher can use a quantitative method to investigate the relationships between variables while primarily aiming at analyzing and representing that relationship statistically through computation analysis (Patton, 2015; Saunders et al., 2015). I did not select the quantitative method because I did not examine the relationship between independent variables and IT project performance.

Saunders et al. (2015) noted mixed method research is a research design with philosophical assumptions as well as methods of inquiry. Stentz et al. (2012) explained researchers could use a mixed method to analyze a phenomenon while combining both quantitative and qualitative data. By combining both qualitative and quantitative research

and data, researchers can deepen their understanding and corroboration, while offsetting the weaknesses inherent in pursuing each approach by itself. I did not choose a mixed method approach because the nature of my study did not require a combination of both qualitative and quantitative data.

Research Design

Saunders et al. (2015) described narrative research, phenomenology, ethnography, and case studies as the types of qualitative research design. Narrative researchers situate individual narrative in participants' experiences, their culture, and historical contexts (Petty, Thomson, & Stew, 2012). The narrative research is appropriate for capturing the detailed life experiences of the lives of a small number of individuals (Petty et al., 2012; Saunders et al., 2015), but not for investigating a real-life phenomenon. Petty et al. (2012) and Yin (2018) noted that a researcher could use a case study design to explore a new phenomenon through detailed contextual analysis. Patton (2015) and Yin (2018) noted researchers could use a case study to have a good understanding of the researched topic. However, since my research study aimed at exploring the risk management strategies used by IT project managers from two telecommunication companies located in Senegal, I selected a multiple case study design.

The primary role of a researcher using a multiple case study design is to reinforce the results by reproducing the patterns and therefore improve the reliability and validity of the research findings (Yin, 2018). Additionally, by allowing replication in the collection of data, a multiple case design can enable researchers to have a better understanding of the problem explored (Anderson, Leahy, & DelValle, Sherman, &

Tansey, 2014; Yin, 2018). Stake (1995) noted that researchers can use a multiple case design to have an in-depth understanding of the problem searched. I used a multiple case study to get a deeper understanding of the researched topic and to explore the participants' experience with the ability to collect and analyze data within the case analysis.

Phenomenological researchers attempt to understand or explain an individual's life experience (Saunders et al., 2015). The researcher can use phenomenological design to avoid prejudices and predetermined assumptions about participants' experiences, feelings, and response to a particular event (Saunders et al., 2015; Stake, 1995; Yin, 2018). Since I was not interested in gathering data on participants' life experiences or understand their perception of the phenomenon, I chose not to select a phenomenological research design.

The researcher can use the ethnographic research design to study large cultural groups of participants interacting over time (Saunders et al., 2015; Yin, 2018). Stake (1995) noted the ethnographic research design is appropriate when the researcher seeks to understand a group's opinion and emotional behavior. Saunders et al. (2015) shared it is appropriate to use the ethnographic research design when the researcher aims at observing and interacting with the target participants in their real-life experience. Yin (2018) suggested the use of the ethnographic design when the researcher seeks to understand the culture of the participant's company. Because the purpose of my research study did not aim at understanding the culture of the targeted telecommunication companies, I chose not to select the ethnographic research design.

The narrative research design is an appropriate method the researcher could use to investigate participants' real-life problems (Patton, 2015; Saunders et al., 2015; Yin, 2018). Using the narrative design, the researcher can focus on the participants' life-stories rather than a theoretical abstraction (Patton, 2015). Because I was not interested in capturing the detailed life experience of the lives of participants, I chose not to select the narrative research design.

The qualitative researcher must reach data saturation to ensure research quality (Bowen, 2008; Kerr, Nixon, & Wild, 2010). O'Reilly and Parker (2012) noted data saturation usually means that the researcher should collect data until there are fewer surprises in the data and no more patterns that emerge from the data. Researchers could use various methods to achieve data saturation (Saunders et al., 2015). Fusch and Ness ((2015) noted interviews are one method researchers could use to reach data saturation when conducting qualitative research. During the study, the novice researcher can research in a manner to reach data saturation (Gibbert & Ruigrok, 2010; Onwuegbuzie, Leech, & Collins, 2010) by collecting rich and thick data (Dibley, 2011). For ensuring data saturation, I collected data from interviews conducted with the participants of the two targeted telecommunication firms.

Population and Sampling

The targeted populations for this research study are five IT project managers from two telecommunication companies located in Senegal, West-Africa. I used purposeful sampling for the selection of the sample population to conduct this study. Qualitative researchers could use in-depth interviews, direct observation, and written documents to

collect and analyze data from participants (Patton, 2015; Saunders et al., 2015; Yin, 2018). Researchers are more successful when they have a friend, parent, or student working in the organization (Buchanan et al., 2013; Saunders et al., 2015). I contacted via e-mail executives from the two targeted companies, shared with them the purpose of this research study, and obtained written permission to initiate contacts with different potential participants. I sent via e-mail an invitation letter and the informed consent form to each of the participants to invite them to participate in my research study without involving executives in the recruitment process (see Appendix D).

Using qualitative research, researchers can target a specific group or type of individual to provide an in-depth understanding of the problem searched (Yin, 2018). To achieve this goal, the qualitative researcher could focus on criterion-based sampling methods such to reach target group (Gentles, Charles, Ploeg, & McKibbon, 2015). I used purposeful sampling to select the sample population of IT project managers. The rationale and strength of purposeful sampling focus on the choice of information-rich cases for in-depth study (Buchanan et al., 2013; Patton, 2015; Saunders et al., 2015). Using purposeful sampling, I selected participants based on pre-selected criteria on this research question. For instance, the participants had more than eight years of successful experience in managing IT projects within the telecommunication industry. Additionally, the participants have used risk management strategies to improve IT project success rates.

The purposeful sampling method is appropriate for identifying and selecting individuals or groups of individuals with exceptional knowledge or experience of a phenomenon of interest (Cresswell & Plano Clark, 2011; Patton, 2015; Saunders et al.,

2015). I selected the participants based on their experiences in successfully implementing IT projects in the telecommunication industry. The participants had more than eight years of IT project management and a success rate of 70%. I considered other criteria such as the participants' ability to delivering the project on schedule and within budget. All the selected participants met the above criteria, and volunteered to contribute to the research study. The qualitative researcher should choose a sample size between 2 to 25 participants (Gentles et al., 2015; Patton, 2015; Saunders et al., 2015; Yin, 2018). For this study, I considered a sample population of five IT project managers from two telecommunication companies located in Senegal.

In a qualitative research study, the sample size is typically small, whereas, in quantitative research, the researcher uses a larger sample (Gentles et al., 2015; Patton, 2015; Saunders et al., 2015). Marshall (1996) noted random sampling is not appropriate for a qualitative study. The study of a random sample can enable researchers to generalize his or her findings to the population, but it is not the most effective technique to develop an understanding of complex issues related to a problem (Marshall, 1996). Therefore, I chose not to apply random sampling to this study.

The purposeful sampling method is appropriate for identifying and selecting individuals or groups of individuals with exceptional knowledge or experience of a phenomenon of interest (Cresswell & Plano Clark, 2011; Yin, 2018). Patton (2015) suggested the use of purposeful sampling to focus on the particular characteristics of a target population. The researchers can use purposeful sampling to appropriately answer the research questions (Marshall, 1996; Patton, 2015; Saunders et al., 2015). Miles and

Huberman (1994) noted qualitative methods focus primarily on saturation. I continued sampling the IT project managers that I considered for this study until there was no new substantive information required even if I reached saturation with the data collected from a specific number of participants. The participants shared their experiences in IT project management, and mainly in the risk management strategies, they used for improving IT project success rates. Researchers should not conduct the interviews in a noisy and uncomfortable setting (Bernard, 1988; Castillo-Montoya, 2016; Saunders et al., 2015; Yin, 2018). To ensure an appropriate record of the data and improve data accuracy and validity, I made sure that the participants were in a quiet place before starting the interviews (see Appendix D).

Ethical Research

Qualitative researchers emphasize their research study on exploring, evaluating, and delineating people and their natural environment (Orb, Eisenhauer, & Wynaden, 2001; Saunders et al., 2015). During the collection and analysis of data, the qualitative researcher has to deal with a variety of issues (Yin, 2018). Ethics appears to be one of the challenges qualitative researchers face (Saunders et al., 2015). Sanjari, Bahramnezhad, Khoshnava, Shoghi, and Cheraghi (2014) noted that ethical issues mostly occur during the interaction between the researcher and the participants. I sent via e-mail an invitation letter and the informed consent form to each of the participants to invite them to participate in my research without involving executive in the recruitment process (see Appendix D). After the participants replied to the e-mail with the words, “I consent”, I started arranging an interview date and time directly with each of the participants.

Researchers should ensure that participants understand that their participation in the study is voluntary, and without any compensation (Orb et al., 2001; Sanjari et al., 2014; Saunders et al., 2015). I informed each of the participants that their contribution in this study was voluntary, and without any incentives. MacNeil and Fernandez (2006) suggested that the researcher should inform the participants of their right to withdraw at any time from the study, and without any penalty. I informed the participants that they had the right to withdraw before, or during the interview without providing any justification via email or phone call.

Researcher should ensure that the ethical protection of the participants is adequate (MacNeil & Fernandez, 2006; Orb et al., 2001). Saunders et al. (2015) recommended the researcher should utilize his or her university's code of ethics to guide the design and conduct his research. For the ethical protection of the participants, the researcher should conduct research in compliance with his or her university IRB and the Belmont Report protocols (Koro-Ljungberg, Gemignani, Brodeur, & Kmiec, 2007). Steele et al. (2016) suggested researchers should get the permission from the participants' organization and approval from the University IRB before collecting data from the participants. I started collecting data from the participants after I obtained Walden University IRB approval and permission from the targeted organizations. The approval number for this study is 09-20-19-0675733 and it expires on September 19, 2020. I complied with the Walden University IRB and the Belmont Report protocols to ensure the ethical protection of all the participants in this study. For example, I did not disclose any information about the participant names and their company in the study. Instead, I used some codes such as

PMS1, PMS2, PMT3, PMT4 and PMT5 to name each participant and targeted companies.

The ethical issues of confidentiality and anonymity also come to the fore during the analysis and reporting of data (Orb et al., 2001; Saunders et al., 2015; Stake, 1995). I committed to comply with Walden University IRB regulations by keeping for 5 years in an encrypted external driver and keep the encrypted external driver in my safe-deposit box. Upon request from the IRB faculty, I will share all the data about the research study. I will delete all the data collected after a timeframe of 5 years.

Data Collection Instruments

Qualitative researchers could use methods such as individual interviews, focus groups, observations, and actions research for gathering data (Bernard, 1988; Saunders et al., 2015; Yin, 2018). As the primary data collection instrument, I used a semi structured interview to collect data from the targeted participants (see Appendix E). The semistructured interview is appropriate when the researcher will only have one opportunity to interview a participant and when he or she will be forwarding several interviews out into the field for collecting data (Given, 2008; Patton, 2015; Saunders et al., 2015).

The qualitative researcher should utilize an interview framework protocol to (a) verify alignment on the research question, (b) build a survey-based conversation, (c) receive feedback on interview protocol, and (d) pilot the interview protocol (Castillo-Montoya, 2016). Patton (2015) and Rubin and Rubin (2005) stated that researchers can use the interview protocol to understand participants' experiences, describe those

experiences and their meaning. I utilized the interview protocol before, during, and after the data collection process to increase the quality of the data obtained from the participants (see Appendix D).

Researchers could use some techniques such as member checking, and triangulation to ensure the quality of data collected from participants (Birt, Scott, Cavers, Campbell, & Walter, 2016; Saunders et al., 2015; Treharne & Riggs, 2014; Yin, 2018). Birt et al. (2016) and Patton (2015) noted that member checking is a useful technique the researcher could use to improve the accuracy of the data. Saunders et al. (2015) indicated member checking is a good technique the researcher could use to enhance the accuracy, credibility, validity, and transferability of the research study. I used member checking to allow the participants to comment and correct the transcribed interview for validation (see Appendix D).

Data Collection Technique

The qualitative researcher can use a variety of data collection techniques that include (a) using several sources of evidence, (b) generating a case study database, (c) keeping a source of evidence, and (d) being cautious when using data from electronic sources (Saunders et al., 2015; Yin, 2018). The primary data collection technique I applied for this qualitative research study was the semi structured interview (see Appendix E). Semistructured interviews are in-depth interviews in which participants must answer predefined open-ended questions (Jamshed, 2014). Given (2008) and Yin (2018) noted the semistructured interview guide provides a clear set of instructions to the researcher and reliable and comparable qualitative data. Doody and Noonan (2013)

believed that using semistructured interviews; researchers can effectively address the research question during the interview, and thereby collect data.

Researchers could use the semistructured interview to allow the participants to express their opinions in their terms (Jamshed, 2014; Kvale, 1996; Saunders et al., 2015; Yin, 2018). For this study, I used semistructured interviews to ask different types of questions to the participants while building rapport (see Appendix E). Kvale (1996) noted researchers could use a probe question to employ direct questioning and establish a context for the study. Saunders et al. (2015) also shared the qualitative researcher can use initial probe questions to enhance his or her credibility and build rapport with the participants. In addition to using probe questions, the researcher should use targeted questions to have the participants' responses on the searched topic (Given, 2008; Kvale, 1996). Rubin and Rubin (2005) noted through semistructured interviews, the researcher could formulate targeted follow-up questions to explore the respondent's response to (a) obtaining more details and information (b) ask for elucidating examples, and (c) clarify concepts and themes. I used semistructured interviews to improve the reliability and validity of the data I collected from the participants through both taking notes and audio recording.

Researchers can use semistructured interviews to gather high-quality data from the participants (Gravlee, Maxwell, Jacobsohn, & Bernard, 2018; Saunders et al., 2015). Duncan and Fiske (2015) and Yin (2018) stated researchers could use semistructured interviews to build a good relationship with the participants and gain a more in-depth insight into specific answers. Gibbs (2018) suggested researchers should use

semistructured interviews to improve the quality of the validity of participants' response. I used semistructured interview to engage with the participants (see Appendix E) and collect reliable and comparable data.

Qualitative researchers could use semistructured interviews to deal with scheduling and costs constraints (Saunders et al., 2015; Yin, 2018). Kvale (1996) and Oltmann (2016) believed the geographical distribution of participants is a significant aspect of the interview context. In a semistructured interview, anonymity is not possible, as the researcher identifies the participants (Kvale, 1996; Oltmann, 2016; Stake, 1995; Yin, 2018). To protect the anonymity and confidentiality of the participants in this study, I did not disclose any information about the participant names and their company. Instead, I used some codes such as PMS1, PMS2, PMT3, PMT4 and PMT5 to name each of the participants and their firm's name.

Researchers should ensure the accuracy of the data collected from participants (Saunders et al., 2015; Yin, 2018). Birt et al. (2016) and Treharne and Riggs (2014) suggested the use of member checking for exploring the credibility of the results. Patton (2015) and Yin (2018) also indicated that the researcher should return the data to participants to check for accuracy and resonance with their experience. I used member checking to allow the participants to comment and correct the transcribed interview for validation (see Appendix D).

Data Organization Technique

The qualitative researcher can use different techniques to organize the data collected from the participants (Saunders et al., 2015). Gibbs (2018) and Yin (2018)

shared some data organization techniques include using written notes, audio recording, and participant coding. Researchers can use of audio recording to keep accurate records of interviews (Al-Yateem, 2012; Denzin, 2017; Krippendorff, 2018). Saunders et al. (2015) indicated the researcher can use written notes to preserve data gathered during interviews. I used written notes, audio recording, and participant coding for organizing the data collected from the participants. I also asked for the participants' approval to record the interview with an audio recording device (see Appendix D). I securely stored the recorded data in an encrypted external driver and ensured that it is kept in my safe-deposit box for 5 years.

Researchers should organize data collected from participants by constructing a database (Saunders et al., 2015; Yin, 2018). The organization of data enables the researcher to improve the research quality (Gibbs, 2018). Saldaña (2015) and Gibbs (2018) indicated researchers could use coding for organizing, examining, and analyzing data in a structured way. After I collected the data from the participants, I reviewed the whole data set and identified emerged themes. I listed the emerged themes and assigned them numbers to entitle categories. Additionally, I created a coding table and classify the data into themes.

Data Analysis

Qualitative researchers can use different data analysis process to apply to the research study (Saunders et al., 2015). However, it is essential for the researcher to identify the adequate data analysis technique (Saunders et al., 2015; Yin, 2018) and effectively apply it to the analysis of the data collected. For instance, researchers could

use multiple data sources to develop a thorough understanding of the research study (Patton, 2015; Yin, 2018). Denzin (2017) and Patton (2015) identified four types of triangulation, including (a) method triangulation, (b) investigator triangulation, (c) theory triangulation, and (d) data source triangulation. The researcher can use methodological triangulation to collect more comprehensive data, improve validity, and enhance understanding of the research problem (Denzin, 2017; Oliver-Hoyo, & Allen, 2006; Yin, 2018). I used semistructured interview and peer-reviewed articles as method triangulation to collect data from IT project managers (see Appendix E).

The qualitative researcher can conduct data analysis through four steps, including (a) data transcription, (b) data organization, (c) data coding, and (d) data validation (Denzin, 2017; Marshall & Rossman, 2016; Saunders et al., 2015). Patton (2015) and Yin (2018) noted researchers should transcribe interviews to determine the accuracy of the data to analyze. Saunders et al. (2015) also indicated researchers should transcribe the interview for organizing the data and archiving them for later use. After I collected the data through audio recording and written notes (see Appendix D), I used NVivo to transcribe the data.

Researchers can use different types of techniques to organize data (Patton, 2015). Marshall and Rossman (2016) and Saunders et al. (2015) indicated the researcher should use thematic analysis for organizing data. Using thematic, the researcher can organize data into a database and divide them into themes (Mostafa & Koroush, 2016). Maguire and Delahunt (2017) shared researchers could use thematic analysis to identify essential patterns or themes within the qualitative data, and use these themes to address the

research problem and interview questions. I used thematic analysis to identify, interpret, and appropriately describe the emergent themes within the transcribed data.

Researchers could use coding to organize, examine, and analyze data in a structured way (Saldaña, 2015). Gibbs (2018) shared coding is an appropriate technique the researcher could use to compress data into themes for a thorough data analysis process. Saunders et al. (2015) indicated codes mostly stem from the data collected, theories, interview questions, or the central research question. I reviewed the central research question, interview questions, and the actor-network theory associated with this research. Saldaña (2015) and Saunders et al. (2015) suggested the use of computer software to analyze qualitative data. Zamawe (2015) noted qualitative researchers could use NVivo to enhance the accuracy of data. I used NVivo for coding, mapping, and finding out key themes or patterns in the data.

Reliability and Validity

Reliability and validity are essential to assess the quality of research (Abowitz & Toole, 2010; Heale & Twycross, 2015; Morse, Barrett, Mayan, Olson, & Spiers, 2002). Heale and Twycross (2015) and Saunders et al. (2015) shared reliability refers to the replication and consistency of a measure. Miller (2008) described reliability as the dependability, consistency, and repeatability of the project's data collection, interpretation, and analysis. Davies and Dodd (2002) noted the validity of a qualitative research study concerns the rigor and trustworthiness of the researcher in ensuring research quality. Morse et al. (2002) noted that qualitative researchers could effectively establish rigor through research credibility, dependability, conformability, and

transferability. Morse (2015) stated that dependability related to reliability, while validity focuses on key constructs such as credibility, conformability, and transferability. In this qualitative research study, I focused on the above four significant constructs for ensuring research reliability and validity.

Reliability

Qualitative researchers should assess the reliability of the study findings by evaluating the solvency of the research while considering the application and usefulness of the methods and approaches used and the integrity of the conclusions (Noble & Smith, 2015). Saunders et al. (2015) and Noble and Smith (2015) noted qualitative researchers should express rigor when conducting research. To establish the dependability of the research study, researchers should address the dependability of the study (Anney, 2014; Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). Nowell, Norris, White, and Moules (2017) noted that researchers should ensure the research process is logical, traceable, and well documented. Researchers should offer the readers the flexibility to examine the research process to appropriately judge the dependability of research (Amankwaa, 2016; Connelly, 2016). Reliability requires researchers to be consistent throughout the research study (Korstjens & Moser, 2018). To ensure the dependability of this research, I described the research steps followed from the beginning of the research project to the development and reporting of the results (see Appendix D). Yin (2018) and Patton (2015) suggested the use of member checking to enhance the accuracy of the data. Korstjens and Moser (2018) and Saunders et al. (2015) also noted member checking enables the improvement of data accuracy, mainly because the

researcher and the participants look at the data with different perspectives. I used member checking to allow the participants to comment and correct the transcribed interview for validation (see Appendix D).

Validity

Qualitative researchers should ensure the rigor and trustworthiness of the study to achieve research quality (Amankwaa, 2016; Connelly, 2016; Davies & Dodd, 2002). Korstjens and Moser (2018) and Saunders et al. (2015) indicated researchers should establish the validity of the research study by addressing the credibility, transferability, and confirmability of the study. Guba and Lincoln (1994) noted credibility addresses the fit between participants' views and the researcher's representation of them. Credibility refers to confidence in the truth of the research results (Guba & Lincoln, 1994; Nowell et al., 2017).

Researchers can use a variety of techniques to ensure the credibility of the research (Leung, 2015; Saunders et al., 2015). Yin (2018) suggested the collection of data from multiple sources for enhancing the quality of research. Guba and Lincoln (1994) and Moon et al. (2016) also noted researchers could use techniques such as data and method triangulation to address credibility. I used semistructured interview and peer-reviewed articles as method triangulation to address credibility (see Appendix E), and ensure the validity of this study. Additionally, researchers can use member checking to address the credibility of the research (Amankwaa, 2016; Saunders et al., 2015; Yin, 2018). I used member checking by returning the findings to the participants to find out if the research findings reflected their experiences (see Appendix D).

Researchers should ensure that the research results are transferable to other studies (Amankwaa, 2016; Guba & Lincoln, 1994; Nowell et al., 2017). Colorafi and Evans (2016) and Tobin and Begley (2004) defined transferability as the generalizability of the inquiry. Researchers should provide adequate detailed data that the readers can analyze and apply the data to other situations (Guba & Lincoln, 1994). Anney (2014) and Guba and Lincoln (1994) noted researchers should address the transferability of the research study to gather thick detailed data that will facilitate the applicability of the research findings to other possible contexts. Patton (2015) and Yin (2018) suggested the use of semistructured interviews to collect information-rich cases for in-depth study. Saunders et al. (2015) also noted researchers should use semistructured interviews to provide a robust description of the participants' experiences, context, actions, and their environment. I used semistructured interviews (see Appendix E) to collect rich data from IT project managers who had more than eight years of managing IT projects, and clarified all the research processes, from data collection to the production of the research findings.

Researchers should address confirmability by demonstrating that the interpretations and results originate from the data (Amankwaa, 2016; Guba & Lincoln, 1994; Tobin & Begley, 2004). Guba and Lincoln (1994) noted researchers should only establish confirmability after achieving credibility, transferability, and dependability. Researchers can establish confirmability using techniques such as audit trial, reflexive journal and triangulation (Amankwaa, 2016; Guba & Lincoln, 1994; Nowell et al., 2017). Gentles et al. (2015) and Saunders et al. (2015) indicated the researcher should confirm

the validity of the transcribed interview to establish confirmability. I used member checking by returning the findings to the participants to find out if the research findings reflect their experiences (see Appendix D).

Data saturation is a major construct to evidence the trustworthiness of qualitative research (Morse, 2015; Saunders et al., 2015; Stake, 1995). Morse (2015) noted data saturation influences the credibility of the researcher's study. Miles and Huberman (1994) suggested the use of purposeful sampling to achieve data saturation. The researcher can use purposeful sampling to identify and select participants with exceptional knowledge or experience of a phenomenon of interest (Cresswell & Plano Clark, 2011; Yin, 2018). The use of purposeful sample enables researchers to answer the research questions appropriately, and improve the credibility of the study (Marshall, 1996; Patton, 2015; Saunders et al., 2015). Though I reached data saturation with the coded interviews data collected from the five participants I considered for this study, I continued to collect more data until saturation was achieved.

Transition and Summary

The purpose of this qualitative multiple case study was to explore risk management strategies used by IT project managers in the telecommunication industry for improving project success rates. The topic is a significant business problem as more than 70% of IT projects were unsuccessful because of the use of inappropriate strategies to manage projects risks (Deshaw, 2017). The focus of this research study was to contribute to improving IT project performance and success.

In section two, I provided an overview of the role of the researcher, participants that I interviewed for my research, as well as the research method and design that I selected for my study. Additionally, I provided detailed information about the population and sampling approach, importance of ethical research, data collection instruments I used in this research, as well as the data collection technique and data organization technique. Moreover, I discussed data analysis and reliability, and validity. In section 3, I made a presentation of my study's findings, discussed its application to professional practice, and implication for social change. I also made recommendations for further studies and shared my personal experience within the doctoral study process.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative multiple case study was to explore the risk management strategies used by IT project managers in the telecommunication industry for improving project success rates. Standish Group (2016) noted in 2015, that while 29% of IT projects were successful, 52% were challenged, and 19% failed. In other words, 70% of IT projects in 2015 failed or were challenged (Standish Group, 2016). Stoica and Brouse (2013) and Iijima (2015) also stated the failure rate for IT project management has been high since its inception. IT project managers from the telecommunication field could use the findings of this research to reduce IT project failure rate.

The actor-network theory was the groundwork of the conceptual framework. I conducted semistructured interviews with five IT project managers of two telecommunication companies located in Senegal for an effective understanding of the topic. The participants answered 9 open-ended interview questions (see Appendix D). The participants' responses to the interview questions enabled me to respond to the main research question:

RQ: What risk management strategies do telecommunication IT project managers use to improve project success rates?

The use of qualitative software NVivo contributed to improving the accuracy of qualitative studies (Zamawe, 2015). After the review and transcription of the data collected from the participants, I used NVivo 12 Plus for Windows to find out key emerged themes in data. I identified four emerged themes representing the strategies IT

project managers in the telecommunication industry used to improve project success rate: (a) project risk management culture, (b) project risk management framework, (c) project risk communication and (d) project risk lessons learned.

Presentation of the Findings

The central research question for this multiple case study was as follows:

RQ: What risk management strategies do telecommunication IT project managers use to improve project success rates?

I conducted semistructured interviews to collect data from five IT project managers from two telecommunication companies located in Senegal. The analysis of the data enabled me to identify four key themes that included (a) risk management culture, (b) risk management framework, (c) risk communication, and (d) risk lessons learned.

The four emerged themes from the data analysis aligned with the risk management strategies the participants used to improve IT project success rates. The use of the actor-network theory enabled me to analyze the social aspects of project management while focusing on risk management tools and techniques (see Pollack et al., 2013). I used the actor-network theory as the conceptual framework to understand the context of the research and the research question. Additionally, I used the actor-network theory as the conceptual framework to identify the tools and techniques IT project managers use to manage risks. Moreover, the four emerged themes aligned with the literature on IT project risk management.

The risk management culture framework represents the importance of establishing a risk culture that could drive the effective management of IT project risks. Without a

strong risk culture, risk management strategies cannot be effective. The second theme represents the importance of using effective tools and techniques for (a) identifying risks, (b) assessing risk impacts, and (c) defining adequate responses to risks. The third theme constitutes the essential role of risk communication in the risk management process. The fourth theme represents the importance of risk lessons learned from risk situations in IT projects. All five participants offered the four major themes representing effective IT project risk management strategies.

Theme 1: Risk Management Culture

I used of NViVo 12 Plus to identify, analyze and interpret key themes in the data collected from the participants. The first theme that emerged from the data analysis was risk management culture. Barkley (2004) and Hopkinson (2017) noted that to effectively manage project risks, the organization should build a culture that supports the management of project risks. The project manager should create a culture of risk to increase project success (Hopkinson, 2017). Barkley (2004) stated the project manager and project team members can develop an effective risk planning, identification, assessment, and risk response strategy with a strong risk management culture.

In this study, I used codes such as PMS1, PMS2, PMT3, PMT4, and PMT5 to name the participants and their companies. All five participants shared the essential role of risk management culture in the successful management of IT project risks. For instance, PMS1 stated the following:

> Without a risk management culture, the risk management strategies cannot be effective. Our organization's risk management culture supports the project team

> to effectively address the key to implementing effective IT project risk management strategies. Additionally, there is an alignment between the organization's risk culture and risk management strategies, which facilitates the involvement of all stakeholders where appropriate.

An effective risk management strategy is mostly the result of a successful risk management culture (Barkley, 2004). Hopkinson (2017) and Barkley (2004) stated an organization with a strong risk management culture has procedures in place that require the project manager to and other project stakeholders to go through disciplined (a) risk planning, (b) risk identification, (c) risk analysis, (d) risk responses planning, (e) risk responses implementation and (f) risk monitoring. For instance, PMS2 stated the following:

> The development of a strong risk management culture can have positive impacts on project risk management effectiveness. The management in our organization continuously invests in a culture of risk management competencies including (a) training in risk planning, (b) strong alignment between corporate planning and risk management planning and (c) effective communication between stakeholders.

Risk culture is essential in the sense that it a critical impact on the effectiveness of risk management (Hillson & Murray-Webster, 2017). Hopkinson (2017) noted numerous benefits for the project manager to permanently consult with stakeholders when dealing with risk management. PMT3 indicated:

> The risk culture of our organization has influenced the effectiveness of risk management policies, and helped project team to plan and implement risk

> responses more appropriately. Additionally, our company's risk culture contributed to create alignment between project team members and key stakeholders, which influenced effective risk monitoring and control of former projects.

Risk culture is essential throughout the project risk management cycle (Barkley, 2004). Hillson and Murray-Webster (2017) and Hopkinson (2017) pointed out that the effective management of risks requires a strong organization's risk culture. PMT4 explained the following:

> An alignment between our organization's culture and the risk management strategies contributed to improving former projects' success. Our organization's risk culture influences attitudes towards risk, hence shaping the way stakeholders and project team collaborate in (a) risk management planning, (b) risk identification, (c) risk assessment, (d) risk response planning and (e) risk monitoring and control.

PMT5 also indicated, "The effective risk management strategies are the result of a long-term investment to build a strong risk culture. Our organization's risk culture influenced the strategies adopted to manage IT project risks."

The project manager should consider two important levels of risk management including implicit risk management, and explicit risk management (Hillson, 2014). Hillson and Murray-Webster (2017) and Hopkinson (2017) noted the implicit risk management emphasizes on overall project risks through decisions made about the structure, scope, and content. The explicit risk management is about the risk management

process to identify, assess, respond to, and control risks during the project lifecycle (Hillson, 2014; Hillson & Murray-Webster, 2017; Hopkinson, 2017). PMT5 indicated:

> The project team effectively managed former projects' implicit and explicit risks because of strong risk culture. Building a strong risk culture enabled our organization to improve the success rate of former projects we implemented.

Risk management culture was one of the emerged themes regarding the strategies IT project managers in the telecommunication industry used to improve project success rates. Hillson and Murray-Webster (2017) and Hopkinson (2017) noted that a strong risk culture defines a successful risk management strategy. The topic of risk management culture was a critical part of the discussion on effective risk management strategies for IT project managers. The actor-network theory, which was the conceptual framework used for this study focused on risk culture as an essential aspect of risk management strategies. Organizations should consider developing a strong risk culture for IT project managers to manage project risk effectively. An organization with a weak risk culture has a lower chance of implementing its risk management strategy successfully, and therefore, a low probability to improve project success rates.

Theme 2: Risk Management Framework

Of the four emerged themes, the risk management framework was the second theme that I identified from the data analysis. All participants pointed out the risk management framework as the overall approach the IT project manager and project team members should use to manage project risks effectively. The five participants shared that their organization's risk management framework provided them tools and techniques for

(a) identifying potential project risks, (b) defining risk response strategy to minimize the impact of identified risks, and (c) monitoring and controlling those risks. Alhawari, Karadsheh, Talet, and Mansour (2012) and Marchewka (2014) noted a risk management framework provides useful tools that project stakeholders can use to better identify and understand the number of risks that can influence an IT project. The PMI (2017) defined the risk management process in six processes including (a) risk management plan, (b) risk identification, (c) qualitative risk analysis (d) quantitative risk analysis, (e) risk response planning and (f) risk monitoring and control. PMS1 and PMS2 referred to the Project Management Body of Knowledge process as a risk management framework; however, PMT3, PMT4 and PMT5 shared an in-house risk management framework that aligned with the Project Management Body Knowledge.

PMT3, PMT4, and PMT5 shared that their organization used a risk management framework that comprised (a) risk initiation, (b) risk identification, (c) risk prioritization, (d) risk response planning, and (e) risk monitoring and control. PMT3 noted that at the risk initiation stage, the project team meets with key stakeholders to discuss the project objective and how the existing risk management framework will be used for managing the project. PMS1 and PMS2 stated that their organization uses a risk management plan that describes the approach to how risks will be used in the project. All participants indicated they used tools and techniques such as (a) documentation reviews, (b) brainstorming, (c) Delphi technique, (d) interviewing, (e) checklists and (f) diagramming techniques for risk identification.

Once the risks are identified, the project team should analyze the risks to determine their qualitative and quantitative impact on the project (Hopkin, 2018; Marchewka, 2014; PMI, 2017). All participants indicated using qualitative and quantitative tools and techniques to analyze identified risks. For instance, PMT3 noted:

> The qualitative and quantitative risk analysis is an important stage in the risk management strategy. We use qualitative tools such as risk probability and impacts, and quantitative tools including interviewing and decision tree analysis to analyze project risk. The use of the probability and impact tool helps us to assess the probability of each risk occurring and assign a score.

PMT4 also shared the following:

> During the project risk analysis stage, we use generally tools such as project assumptions testing, and decision tree analysis. The project assumption testing enabled the project team to evaluate all major assumptions on former projects, and to establish that the assumption is accurate and that the probability assigned is in the right estimation.

PMT5 indicated, “To analyze project risks, we use tools including project assumption testing, and risk probability and impacts. Using the risk and impact risk, project team working on former projects rated potential risks based on their probability and impact.” PMS1 shared:

> For the analysis of project risks, our project team uses tools that include risk probability and impact, and decision tree analysis. For example, using the probability and impact on former projects, we identified the risks with (a) low

> impact –low probability, (b) low impact-high probability, (c) high impact-low probability, and (d) high impact-high probability. Then, we focused our attention on medium and high-priority risks.

PMS2 noted, "During the analysis of risks, we use a combination of tools that include risk probability and impact, data precision ranking, and sensitivity analysis and interviewing." Additionally, all five participants shared that for each risk, they worked with stakeholders to develop a risk response documented in the risk register. To monitor and control risks, PMS1 noted that the use of a project risk audit to determine how effectively project risks are monitored and eliminated. PMS2 also shared the use of project risk audits during the risk monitoring and controlling stage. For PMT3, the use of periodic review helps the project team to monitor and control project risks more effectively. PMT4 indicated using earned value analysis while PMT5 noted using project risk response audit for monitoring and controlling risks. Moreover, all five participants shared that they not only use the risk register as a key input to develop correct risk response plans but also to control and monitor positive and negative risks.

Of the four themes that emerged from the data analysis, the risk management framework represented one of the strategies IT project manager in the telecommunication industry used to improve project success rates. Successful risk management strategies largely depend on the risk management framework IT project managers use to identify and understand potential risks to project success (PMI, 2017). The use of a risk management framework showed that all the participants followed a process that

integrated five steps within their risk management strategies. Table 2 illustrates the risk management process followed by all the five participants and their related frequency.

Table 2: *Subthemes Representing Participants' Risk Management Process With Related Frequency*

	Number of participants that shared this perspective	Percentage of participants that shared this perspective
Risk initiation/Risk management plan	5	100%
Risk identification	5	100%
Risk analysis/Risk prioritization	5	100%
Risk response planning	5	100%
Risk monitoring and control	5	100%

The risk management framework aligns with some steps of the actor network including problematization, and interessement. Callon (1986) noted problematization as the first step of the actor-network process that attempts to identify the problem. During risk identification, the project manager meets with key stakeholders to identify the risks inherent to the project (Hopkin, 2018; PMI, 2017). Interessement is the second step of the actor-network process involving negotiations between actors regarding the roles they may play within the network. The project managers engages with the project team members to appoint them at different roles including risk champion, risk owner, and action owner (Hillson, 2014). The risk management framework aligns with the problematization and interessement components of the actor-network theory.

Theme 3: Risk Communication

Risk communication emerged as the third theme identified from the data analysis. Kliem and Ludin (2019) and the PMI (2009) stated that project success depends largely on communication throughout the risk management process. All participants indicated they communicated risks before, during, and after a project to ensure that they met stakeholders' needs and expectations. Using an effective risk communication plan, the project manager can appropriately address the stakeholders' expectations on the project risks, and also inform them on what risk information they will receive, when and how they will receive it (Hillson & Murray-Webster, 2017; Hopkin, 2018; PMI, 2017).

Though all the participants indicated that they communicate risks to the stakeholders during the four major phases of the risk management process that include (a) risk identification, (b) risk analysis, (c) risk response planning, and (d) risk monitoring and control, it is to note that they used different communication methods. For example, PMS1 noted:

> At the early stage of the risk management process, I conduct a risk workshop for risk identification purposes. The workshop is generally restricted to key stakeholders such as the project sponsor, customer and some members of the upper management. During the workshop, I use a variety of techniques that include interpersonal and team skills, brainstorming, and interviews to identify risks. We record all the identified risks in the risk register which we share with all key stakeholders.

PMS2 indicated:

> The project stakeholders and I organize a risk identification workshop during which we brainstorm to identify potential project risks. We also use other tools such as the company's checklist. Once we identify the risks, they are captured in the risk register. The risk register is shared with all key project stakeholders via the company's cloud-based instant messaging platform.

PMT3, PMT4, and PMT5 also noted they used communication methods that include weekly meetings, presentations, and emails to communicate risks to stakeholders. For instance, PMT5 noted:

> The project team has a plan to communicate risk to key stakeholders from the risk identification to the risk monitoring and evaluation. During a kickoff meeting, the project team conducts brainstorming sessions with key project stakeholders to discuss the project objectives and the most significant risks related to the project. Also, to capture the most significant risks, the project team uses the company's checklists. Once risks are identified and recorded in the risk register, we use our electronic data interchange system for stakeholders to access it.

PMT3 indicated:

> During risk identification and assessment, I facilitate risk workshops and risk reviews, at which project team members and key stakeholders actively participate. Once the risks are identified and assessed, we document them in the risk register and share it with project team members and key stakeholders. At regularly project team meetings, scheduled progress reports and stakeholder reviews, I discuss all

> the information about the project risks with project team members and key stakeholders. Also, during the risk response planning phase, I conduct reviews with upper-management, risk champion, and other key stakeholders involved in the risk management process. Each appointed risk owner regularly reports progress on responses to the risk champion via the risk register. The project team updates the risk register with new information that we generate after each phase. Then, a risk report is emailed to all key stakeholders.

PMT4 shared:

> During the risk identification stage, I hold project team risk meetings with key project stakeholders including project sponsor, risk champion and executive management. I facilitate the risk meeting at which the risks are identified and registered in a risk register.

PMT3, PMT4, and PMT5 also indicated the importance of using the risk register to communicate the status of risks to project stakeholders. For example, PMT3 noted:

> To provide a concise presentation to key stakeholders on the status of project risk, I use a risk register with a dashboard. The use of the risk register with a dashboard is effective to interact with all key project stakeholders regardless of their location, and also to communicate them the risk status and progress.

PMT4 shared:

> At the early stage of the project, I create a risk log also known as a risk register. We use the risk log as an internal communication tool to provide stakeholders

> with information about each risk and their nature, reference, and owner, as well as mitigation measures.

PMT5 indicated, “The risk register of the company’s electronic data interchange system makes it easy for the project stakeholders to access information about the risk status at any point in time.”

The project manager should develop an effective communication plan to involve all stakeholders in the risk management process where appropriate (Hillson & Simon, 2012). All participants indicated that they involved and engaged key stakeholders in all the phases of the risk management process using communication tools such as meetings, interactive online platforms, team briefing, emailing, risk reports, presentations and interviews. Moreover, the participants indicated that the use of the risk register throughout the risk management process enabled alignment with key stakeholders.

The project manager needs to use appropriate tools and techniques to communicate project risks to stakeholders (Hillson & Murray-Webster, 2017; PMI, 2017). All participants indicated that one of their major roles as project managers consisted of regularly reporting risk status to key stakeholders such as the project sponsor and steering committee. The participants stated that their risk response strategies were successful because of their alignment with the stakeholders’ needs and expectations. For example, PMT3 highlighted that:

> As the project manager, I am accountable for the project and for delivering the project’s expected outcome. To ensure effective management of the project risk

> strategies, I use the risk register to monitor and evaluate the efficiency and effectiveness of the risk response strategy.

PMT5 also highlighted:

> I appoint a risk champion whose one role is to analyze risk data and produce risk reports. I also use the risk register to access the progress on risk report reported to the risk champion by the risk owner. I addition, I use the risk register to evaluate the effectiveness of the actions implemented by the risk action owner.

PMS1 indicated the importance of using the risk triggers for measuring the effectiveness of the risk management strategy:

> I use risk triggers and trigger dates in conjunction with the probability and impact measurement (PIM) score. In case a risk elevates to a PIM score, the risk triggers will show the impacted area and the trigger date will indicate when the risk action owner has to start the planned risk response. Using the risk triggers that the risk champion and I define in the risk response plan, we use risk metrics to determine whether or not the risk response strategies are effective.

PMS2 highlighted:

> I regularly use the risk register to review and update the status for each risk to ensure risks are under control. The risk owner I appoint will close the risk with a lesson learned if it is no longer considered a threat. Besides, I revise the mitigation action or get approval from the committee review board to proceed with the associated contingency plan, update and publish the current top risk list, and prepare a risk status report for use in project reviews.

All participants indicated that by participating in risk workshops and review meetings, the stakeholders were engaged and supportive of the risk management strategy for the project.

The risk communication aligns with the concepts of enrolment and mobilization of the actor-network step processes. Enrolment involves negotiations between actors accepting the roles they were given and enroll in the network (Callon, 1986). During negotiations, the project assigns different roles including risk champion, risk owner, and action owner (Hillson, 2014). For instance, the action owner executes agreed actions to support risk response strategies, and report progress on actions to the risk owner (Hillson & Simon, 2012). Callon (1986) indicated mobilization happens as external to the network move to support it. To gain the support of key stakeholders, the project manager uses tools including the risk register to communicate project risk to stakeholders.

Theme 4: Risk Lessons Learned

Lessons learned are learning the project team and stakeholders gain from the process of performing the project (Hopkin, 2018; PMI, 2017). Kwak and Stoddard (2004) shared the use of lessons learned contributes to effective risk management. All the participants indicated using lessons learned throughout all the processes of risk management. PMT5 highlighted that the lesson learned constitutes a day-to-day process in each risk management stage. PMT4 also indicated the importance of using lessons learned throughout the risk management process. PMS1 noted that they documented lessons learned in each risk management stage so that the project team and key stakeholders can gain knowledge of what went wrong and what went right. PMS2 shared

that the use of lessons learned during each stage of the risk management process contributes to effectively implement the risk response strategy. For example, PMS2 indicated, “I bring the project team and key stakeholders together to discuss what went wrong and what went right and what the impacts on the project were.” PMS1 highlighted:

> For each step of the risk management strategies that the project team and I perform, we invest time and energy to gain learning. After each risk management process, I facilitate risk lessons learned sessions during which I identify comments and suggestions from project team members and key stakeholders, then document them. Besides, I also use risk lessons learned documents of similar projects performed by the organization

All the participants indicated that they also used documented risk lessons learned on former projects to learn from past mistakes. For instance, PMT3 noted that, “Using lessons learned from previous projects, the project team and key stakeholders identified that their organization had to deal with excessive expenses of risk management resources because of the use of subjective qualitative measures to rank risks.” PMT4 also noted:

> Documented risk lessons learned of former projects indicated that effective stakeholder engagement and management contributed to the successful implementation of risk management strategy. Therefore, at the end of each risk management process, I conduct a risk lesson learned session. Before each session, the participants complete a survey, which helps them to better interact and share inputs during the risk lessons learned session.

PMT5 indicated using the risk lessons learned as follow:

> After each risk management process, I facilitate risk lessons learned workshops to identify lessons learned. During the workshop, I ask the participants to share what went right, what went wrong, and what we need to improve. After capturing the participants' inputs and recommendations, I share the findings with key project stakeholders.

PMS2 shared, "The use of documented lessons learned from former projects indicated that a documented risk management process does not mean that the process will be followed by the project team."

The project team should conduct lessons learned project review just after project closure and involve all the project team members and key stakeholders (Barkley, 2004). All participants mentioned the importance of developing risk lessons learned report after project closure. Kerzner and Kerzner (2017) noted project managers should document lessons learned so that future project managers can learn from what went right and what went wrong. All participants shared some good practices that they would expect to reproduce for future projects. For example, PMS2 indicated the following good practice they would like to reproduce:

> We set up a focused risk management team with defined roles and responsibilities. The risk management team's responsiveness to each other was effective. Also, the communication within project team members and with stakeholders was effective. We organized risk workshops and reviews, during which project team members and key stakeholders worked together to identify

> and assess risks. We had adequate resources available to appropriately respond to each identified risk.

PMS1 also highlighted the following as good practices they would like to reproduce for future projects:

> The project team had both technical and soft skills to assume roles and responsibilities. The project team had an effective plan to engage with key stakeholders during each risk management phase. The project manager regularly reviewed the progress of risk response and their related actions with risk owners. The project team regularly reported risk status to key project stakeholders with recommendations.

PMT3 indicated the following good practices they would like to use as a benchmark for future projects:

> The project team enforced the strong participation of key stakeholders in the risk management process. During the past projects we managed, there was effective communication between project team members to deal with risks; also, the project team members appropriately communicated risks to key stakeholders.

PMT4 highlighted:

> We had contingency plans in place to mitigate risks that occurred. The project team regularly communicated the risk status to key project stakeholders and senior management. The project team used the risk register to report progress on a risk response strategy.

PMT5 indicated, “The project team effectively communicated with key stakeholders. Also, the risk champion ensured not only the quality of risk data but also effectively analyzed data and produced risk reports.”

In addressing lessons learned reports, the project manager should also focus on things that they should improve for future projects (Kerzner & Kerzner, 2017; PMI, 2017). All participants indicated things that went wrong during the risk management process. For example, PMT3 shared:

> The stakeholders did not receive proper training on how to use the new risk register with a dashboard. This situation made it difficult to effectively communicate the risk status and progress to the stakeholders. Therefore, we had to use alternative strategies such as emailing and reports.

PMT4 noted, “The project team was ineffective in the document numbering system, which created conflicts with some key stakeholders.” PMS1 noted, “The project team did not effectively manage time during meetings with key stakeholders; therefore, they had to spend more time than scheduled working on risk identification and assessment.” PMS2 indicated:

> Some project team members including risk owners did not receive effective coaching and mentoring on aspects of risk management such as the development of risk responses in the form of risk actions, and the monitoring of progress on risk responses.

All participants shared they used documented lessons learned from former projects, and documented lessons learned report after closing projects.

Risk lessons learned focus on how the project team manages each stage of the risk management process (Kerzner & Kerzner, 2017). The project manager could use documented lessons learned to increase the effectiveness of the risk management strategy (Kwak & Stoddard, 2004). All participants indicated the importance of using documented lessons learned from former projects to avoid reproducing the same mistakes. Additionally, the participants shared the importance of documenting lessons learned report after project closure to allow future project managers to gain knowledge from what went right and what went wrong. The actor-network theory, which was the conceptual framework used for this study highlighted risk lessons learned as a critical driver of risk management strategies. The project manager should document risk lessons learned throughout the risk management process to manage project risk effectively. Additionally, the project manager should document a risk lessons learned report at the closing phase of the project so that future project managers can learn from went wrong and what went right.

Applications to Professional Practice

The purpose of this qualitative multiple case study was to explore risk management strategies used by IT project managers in the telecommunication industry for improving project success rates. The findings and recommendations from this research study may contribute to business practices and therefore help IT project managers manage project risks more effectively. Effective risk management contributes to improving IT project performance and success (Didagra, 2013; Hamza et al., 2012). Deshaw (2017) shared in 2017, that more than 70% of IT projects were unsuccessful

because of ineffective risk management strategies. Therefore, if IT project managers use effective risk management strategies, it may contribute to improving project success rates.

The population consisted of five IT project managers from two telecommunication companies located in Senegal, West-Africa. The population had more than eight years of managing IT projects with a high rate of success. All five participants in the study shared their experience in managing IT project risks successfully in the telecommunication industry. Four main themes that included (a) risk management culture, (b) risk management framework, (c) risk communication, and (d) risk lessons learned constituted the effective strategies IT project managers should use to improve project success rates.

The four themes that emerged from this study contributed to professional practice in many ways. For instance, the findings showed that strong risk culture is indispensable for the effective management of IT project risks. The second theme, risk management framework addressed the importance of using appropriate tools and techniques for (a) identifying risks, (b) assessing risk impacts and (c) defining adequate risk responses. The third theme, risk communication addressed the importance of developing and implementing a communication plan that involves all the project stakeholders in the risk management process where appropriate. The final theme, risk lessons learned focused not only on the importance of documenting risk lessons learned throughout the risk management process but also on the necessity of documenting lessons learned report after project closure. Using the above findings as a benchmark, IT project managers can

develop effective risk management strategies, and therefore improve the success rate of future projects. Using the findings from this study, IT project managers could successfully develop a 5G broadband network, which will allow their organizations to compete more effectively, and sustain growth.

Implications for Social Change

The implications for positive social change from this study's findings may include the opportunity to use modern and innovative telecommunication broadband network to enhance the quality of the life of the populations in the sectors of education, health, and agriculture. By applying the findings and recommendations of this study, IT project managers may (a) build risk management into their organization's culture, (b) develop and implement an effective risk management framework, (c) communicate risk more effectively and (d) integrate risk management lessons learned appropriately throughout the risk management processes and after project closing phase.

Researchers should act as change agents by promoting positive social change (Wittmayer & Schapke, 2014). By applying the findings and recommendations of this study, IT project managers within the telecommunication industry may improve projects' success rates, which could, in turn, enable economic growth with a direct impact on poverty. Additionally, the improvement of IT project success rates in the telecommunication industry could enable strengthening employee information exchange in West-Africa, increase the conduct of job interviews remotely and make eLearning programs available for all.

The improvement of IT project success rates in the telecommunication industry can help create a connection between rural healthcare providers and their patients to services in remote areas through the use of telehealth. Therefore, patients in rural areas could receive care remotely and avoid long travel times. The improvement of IT project success rates in the telecommunication industry could enhance the quality of the life of the populations in the sector of agriculture. Moreover, IT project managers could consider using the findings from this study to successfully implement projects, which could, in turn, enable the e-Transformation of the economy by opening up opportunities in energy and water supply management, transportation, financial services, and telemedicine. Vishakha and Vandana (2019) noted the effective use of information communication and technologies could not only improve the performance of farmers at work but also help them perform work more effectively in a shorter time. IT project managers within the telecommunication industry should consider using the findings and recommendations from this study to apply effective risk management strategies for improving project success rates, which in turn could potentially impact the lives of populations.

Recommendations for Action

The findings from this study include risk management strategies IT project managers from the telecommunication industry use to improve project success rates. The four themes that emerged from the data analysis included (a) risk management culture, (b) risk management framework, (c) risk communication, and (d) risk lessons learned. According to the Standish Group (2016), in 2015, 70% of IT projects failed or were

challenged. Due to the low success rate of IT projects, the use of the four themes resulting from this study may benefit IT project managers.

The first recommendation I formulate is for executives from organizations to consider building and sustaining a risk management culture. Barkley (2004) shared organizations can build a risk management culture by (a) establishing a vision of risk-based decisions, (b) integrating risk in strategic planning, and (c) training employees to see risk. Therefore, I recommend that executive management consider integrating the risk vision into the corporate strategy. Moreover, executive management should use their leadership to further risk management, and provide training programs for (a) risk identification, (b) risk assessment and (c) risk planning. The second recommendation is for the IT project manager to use and implement a risk management framework that relates to how the risk management activities are structured and performed. I recommend that IT project managers consider using a risk management framework that includes the (a) strategic planning to manage project risks, (b) tools and techniques to perform each risk process, (c) roles and responsibilities of project team members at each stage of the risk process, and (d) funds needed to perform each risk activity, as well as their timing.

A third recommendation is for IT project managers to consider using appropriate tools and techniques to involve their team members, and regularly communicate project risks to key stakeholders. The project managers should share accurate project risk data at the right time with key stakeholders (Hopkin, 2018). The PMI (2017) suggested the use of the risk register at each phase of the risk management process to communicate on the risk status and progress. To effectively communicate risks, I recommend the use of

reporting tools such a risk register with a dashboard. A fourth recommendation is for IT project managers to document risk lessons learned during each phase of the risk management process, and risk lessons learned reports after the closing stage of the project. Kerzner and Kerzner (2017) and the PMI (2017) noted the project team should use risk lessons learned during each phase of the risk management process. Kwak and Stoddard (2004) also shared project managers can use documented risk lessons learned from past projects to increase the effectiveness of the risk management strategy. Project managers should consider using lessons learned from previous projects to avoid reproducing similar mistakes. Additionally, I recommend to IT project managers to document risk lessons learned after each phase of the risk management process to allow future IT project managers to gain knowledge of what went right and what went wrong.

I plan to share the findings of this study with the participants and their organizations. Because Walden University will publish my study in the ProQuest database, other scholars interested in researching topics in risk management strategies might benefit from my findings. As an adjunct instructor and member of the PMI, I plan on sharing my study's findings during conferences that I will participate in, or training in the field of risk management that I will conduct.

Recommendations for Further Research

I formulated several recommendations for further research. The recommendations would consider some components of research that include the (a) methodology, (b) industry, (c) geographical location, and (d) conceptual framework. Future researchers may consider other methods such as the quantitative or mixed-method to examine the risk

management strategies IT project managers use to improve project success rates. For instance, future researchers could conduct a quantitative study to examine the impact of risk on project performance or success rates. Future researchers should consider the transferability of the findings from this study to other industries such as banking, health, and education, and expand the study to different geographic locations. Additionally, I recommend future researchers to apply other theories than the conceptual framework used for this study.

The fact that I considered five IT project managers for this study, and restricted the research to two telecommunication companies located in Dakar, Senegal, constituted some limitations for this study. To avoid raising issues on the generalization of the findings, future researchers should focus on a larger sample and not restrict the study to one location. Moreover, I recommend future researchers to consider using other theories including the stakeholder theory or a mix of the actor-network theory and stakeholder theory to appropriately explain and understand the risk management strategies used by IT project managers.

Reflections

I would like to share several reflections on my experience within the DBA Doctoral Study process. Pursuing a doctorate in business administration enabled me to acquire new competencies in the field of project, program and portfolio management, and particularly in research methodology. The feedback I received from instructors was very helpful in the sense that it helped me to identify my weaknesses in writing academic documents and find a path for improvements. For example, using the feedback from the

URR's proposal evaluation, I improved my work and obtained approval. The feedback from my doctoral chair and committee member was very constructive and helpful. Interacting with other students on the discussion thread was a good experience as it enabled me to learn from other students' research topics, and therefore gain new knowledge. Additionally, the interaction with other students in the discussion thread enabled me to improve my ability to express ideas with clarity and to network with peers from other cultures, countries or even continents.

The use of the literature review was helpful and instructive as it enabled me to gain knowledge in IT project risk management strategies and project success. The doctoral journey was very rich and it contributed to improving my research skills and ability. Before starting with Section 2 of this doctoral study, I was wondering on how to avoid participants' bias during data collection. The different conversations I had with my chair, as well as the literature review on qualitative research, provided me tools on how to avoid participants' bias during data collection. Pannucci and Wilkins (2010) noted that bias can occur at any phase of the research, including data collection and data analysis. To avoid participants' bias, I used opened ending questions, which allowed me to better access the participants' true experience on the topic. Patton (2015) suggested the use of member checking to improve the accuracy of the data collected from participants. I also used member checking to allow the participants to comment and correct the transcribed interview for validation. I used the doctoral journey to improve my skill in research, and to gain exceptional competencies in project management.

Conclusion

The purpose of this qualitative multiple case study was to explore risk management strategies used by IT project managers in the telecommunication industry for improving project success rates. The research method used to collect data from the five participants was a semistructured interview. The participants were located in Dakar, Senegal, and they had more than 8 years of IT project management with a risk management success rate of 70%.

Member checking is a good technique the qualitative researcher could use to enhance the quality of the data collected (Saunders et al., 2015; Yin, 2018). Therefore, I used member checking for ensuring both data validity and saturation. The four emerged themes from the data analysis aligned with the risk management strategies described in the literature. I used the actor-network theory as the conceptual framework to understand well the context of the research, as well as the research question.

The strategies IT project managers within the telecommunication industry use to use improve project success rate included (a) risk management culture, (b) risk management framework, (c) risk communication and (d) risk lessons learned. Organizations should consider investing in building a risk management culture by integrating the risk vision into their corporate strategy. Additionally, to sustain the risk management culture, executive management should use leadership to further risk management, and provide training programs in each aspect of the risk management process. The risk management framework is crucial for the effective management of project risks. IT project managers should consider developing and implementing a risk

management framework that includes a (a) strategic plan to manage risk, (b) tools and techniques for managing each risk process, the (c) roles and responsibilities of project team members at each phase of the risk management process, and the (d) required funds and timeframe for managing each risk activity.

Project managers should utilize the appropriate tools and techniques to communicate project risks to key stakeholders. To increase the effectiveness of risk management strategies, IT project managers should consider using documented risk lessons learned from past projects. Additionally, IT project managers should consider documenting risk lessons learned after closing each phase of the risk management process so that future project managers could gain more knowledge on what was successful or not. The findings of this study could potentially contribute to business practice and in some ways to positively influence social change.

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Appendix A: PMI Permission Notice

From: Permissions@pmi.org [mailto:Permissions@pmi.org]
Sent: Friday, November 16, 2018 7:08 PM
To: Catherine Viega <Catherine.Viega@pmi.org>
Subject: Permission

Name: Amath SARR

Organization Name:Walden University
Organization Type: Academic
Title: Doctoral Student
amath.sarr@waldenu.edu

Member Number: 4914878
R.E.P. Number: N/A

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Name of PMI Publication: Project Management Body of Knowledge / Practice Standard for Project Risk Management
Name of Author/Editor: Amath SARR
Edition or periodical volume/issue/date: Sixth Edition / Edition 2009
Name of the article: N/A
PMBOK: Pages 311, 406, and 407; Practice Standard for Project Risk Management: P 38
Graphics to be reproduced: PMBOK: figure 11-1 (Project Risk Management Overview), figure 11-4 (Risk Breakdown Structure), and table 11-1 (definitions for probability and impacts)
Practice Standard for Project Risk Management: Figure 7-1
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Appendix B: Ovum Permission Notice

Bunting, Gemma <Gemma.Bunting@ovum.com>

Thu 11/22/2018 3:10 AM

Dear Amath,

Thanks for your enquiry. As the document you are referring to is already in the public domain, we have no issue with you sourcing the below mentioned charts, as long as you accurately reference Ovum as the source.

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From: Amath Sarr <amath.sarr@waldenu.edu>

Sent: 22 November 2018 02:12

To: clientservices@ovum.com

Cc: UK Ovum - Marketing Enquiries <enquiries@ovum.com>

Subject: Request for Permission to Reprint Figure 2 and 3 of Africa Market Outlook Digital services gather momentum

Dear Sirs,

I am a doctoral student at Walden University, and I am currently conducting a doctoral research study on “Effective Risk Management Strategies for Information Technology Project Managers”. The industry I have targeted for my research is the telecommunication and the target population is comprised of IT project managers within telecom companies in Senegal, West Africa. I would like your permission to reprint the following figures from "Africa Market Outlook Digital services gather momentum":

Figure 2: Africa mobile revenue forecast, 2015–21 (page 6)

Figure 3: Africa fixed and mobile market overview, 2013–15 (year-on-year % change)

If permission granted, the figures will only be used for academic purposes and not commercial.

I look forward to hearing from you.

Best regards,

Amath SARR

Doctoral Student

Walden University

Appendix C: Jia et al. (2018) Permission Notice

Jianguo Jia <jiajianguo@yahoo.com>
Fri 11/9/2018 8:52 PM
Hi Tariq
I am fine. thanks for your information.
Amath,

That is ok to use the figure 5
Thanks for your information.
All you best regards

jianguo

Hello JianGuo

Hope all is well.

Please see the request given below.

Would you agree to the request. If so, please reply directly

All best wishes
Tariq

From: Amath Sarr <amath.sarr@waldenu.edu>
Date: 09/11/2018 03:47 (GMT+04:00)
To: Tariq Durrani <t.durrani@strath.ac.uk>
Subject: Request for Permission to Reprint Figure on the Evolution Wave of Mobile Telecommunication

Dear Professor Durrani,
I wish my email finds you well, and your loved ones as well. My name is Amath SARR, and I am an independent scholar at Walden University. I am currently conducting a doctoral research study on risk management strategies for information technology project managers. The industry I have targeted for my research is the telecommunication and the target population is comprised of IT project managers within telecom companies in Senegal, West Africa. I read your articles the “Innovation Waves in Mobile Telecommunication”, and I would like to have your permission to reprint the figure 5 on the “evolution wave of mobile telecommunication”.
I look forward to hearing from you.
Best regards,
Amath SARR

Appendix D: Interview Protocol

1. Contact executives from the targeted companies to obtain a list of potential participants;
2. Email an invitation letter and the informed consent form to each of the participants to invite them to participate in my research study without involving executives in the recruitment process;
3. After the participants reply to the email with the words, “I consent”, I will arrange interview time directly with each of the participants;
4. Create a dossier for each of the participants before the interview;
5. Conduct semistructured interview via Skype/GoToMeeting or phone interview
6. Share with each participant the purpose of the research study and have participants’ approval for recording the interview;
7. Provide assurance to participants about confidentiality;
8. Share interview questions with participants, and ensure that the interview place is quiet and comfortable before starting the interview;
9. Warmly thank participants for taking the time to contribute to your research study;
10. Inform participants that transcribed data will be shared to check accuracy and validate

Appendix E: Semistructured Interview Questions

1. What strategies does your organization employ to conduct risk management activities for an IT project?
2. As an IT project manager, what is your role in managing IT project risk in your organization?
3. What strategies has your organization used to manage IT projects' risks?
4. How has your organization addressed the key barriers to implementing effective IT project risk management strategies?
5. Who are the main stakeholders you involve in your risk management plan?
6. How do you communicate with stakeholders during the risk management process?
7. What strategies do you use to manage negative risks as well as enhancing the opportunities?
8. As an IT project manager, how do you evaluate the effectiveness and success of risk responses strategy?
9. What else can you share with me about your organization's successful IT risk management strategies?