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Strategies to Control Internal Factors Affecting Information Systems Projects in Puerto Rico

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Abstract

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by

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MBA, University of Phoenix, 2005

BS, University of Puerto Rico, 2002

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

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Abstract

Many project managers and business leaders lack effective strategies to control internal factors that affect information systems (IS) projects, which may impede leadership's ability to respond to market changes. The purpose of this multiple case study was to explore strategies used by 6 purposefully selected project managers who successfully implemented information system development (ISD) projects by controlling the internal factors that affected different ISD project phases in Puerto Rico's telecommunication service industry. The framework that guided this study was coordination theory. The data collection process included semistructured interviews and project documentation including business requirements, project charters, project plans, and lessons learned which also served as resources for member checking and validation to strengthen the trustworthiness of the study. Analysis of the data occurred following Yin's 5 analytical steps of validating, coding, interpreting, summarizing, and generating themes. The 5 themes that emerged were top management support, clear requirements, communication, project plan, and lessons learned. Each theme corresponded to a phase of the project life cycle. Top management support and clear requirements were the top critical factors (TCF) in the initiating and planning phases. Communication and project plan were the TCF in the executing, monitoring, and controlling phases. Lessons learned were the TCF in the closing phase of the project. Implications for social change include helping IS project managers successfully implement IS projects, providing innovative services to customers, and improving an organization's position so it can provide jobs and economic stability in the region in which it operates.

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Dedication

I dedicate this doctoral study to my family who has been supportive throughout this journey. To Alejandro, Alejandro Gabriel, and Ariana Marie, thank you for all of your understanding and patience and for trusting that all of our sacrifices will lead us to a better quality of life. I also dedicate this to God for all of the angels He sent me throughout this journey. To my loving parents, Mom whom I know is smiling down on me and Dad whom is the person I dream to be, thank you for teaching me that family is all that matters and that hardwork pays off. To the rest of the gang, thank you for motivating me to keep moving forward. To all of you, my love!

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I am grateful for the encouragement and support from my family, peers, mentors, and academic experts during this journey. You made a tremendous impact on my research. Special thanks to Dr. Jaime Klein; you stepped up to become my chair when I needed you most. Thank you for all your wise words and for all the support you gave me. To Dr. Patsy Kasen and Dr. Alexandre Lazo, thank you for all the great advice that kept me pushing towards excellence. This study was possible because of your persistence and mentoring.

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Section 1: Foundation of the Study

Information systems (IS) play an important role in the development and sustainability of any business delivering technical innovations. Within the past 30 years, 50% of the world's top 20 innovations were computer related (Thomas, 2015). This rate indicates that technical innovations are crucial in driving competitive business advantage and sustainability (Poonpool, Limsuwan, & Satchawatee, 2013). Technical innovations apply to telecommunication service companies, which face the challenge to be flexible and financially efficient (Nenickova, 2013). Managers cannot execute their business strategies without information systems (Gold, 2012). Strategies must align with projects to deliver maximum value to gain a competitive advantage (Alsudiri, Al-Karaghouli, & Eldabi, 2013). Managers implement several information systems development (ISD) projects to achieve strategic business goals. With ISD project failure rates ranging from 20% to 28%, managers need to understand strategies to control the internal factors influencing projects (Pee, Kankanhalli, Tan, & Tham, 2014).

Background of the Problem

The rate at which IS projects fail is a concern for project management (PM) practitioners around the world. In 2011, companies spent $3.7 trillion on IS products and services (N. Wang, Laing, Zhong, Xue, & Xiao, 2012). IS project failure rates have decreased from 80% in the late 1970s to 68% in the late 2000s (Cecez-Kecmanovic, Kautz, & Abrahall, 2014; N. F. Doherty, Ashurst, & Peppard, 2012; Ingason & Shepherd, 2014). Nevertheless, high failure rates are detrimental to the execution of strategic business goals (Young, Young, Jordan, & O'Connor, 2012). In the telecommunication

service industry, alignment between strategic goals and company IS capabilities is critical because of the companies' dependence on information technology (Nenickova, 2013).

Several studies addressed the factors that improved IS project success rates (Nwakanma, Asiegbu, Ogbonna, & Njoku, 2013; Ramos & Mota, 2014; Sudhakar, 2013). These studies recommended categorizing projects within the following project types: phases, industries, regions, stakeholders, and organizations (Müller & Jugdev, 2012). Additionally, these studies recommended categorizing internal factors as those under the control of the project team and the organization (Vuori, Mutka, Aaltonen, & Artto, 2013). Some of these internal factors are strategic alignment, coordination, clear goals and requirements, and top management support (Alsudiri et al., 2013; Boonstra, 2013; Ofori, 2013). Project managers must understand the internal factors affecting specific projects to apply strategies that reduce failure (Patanakul & Shenhar, 2012). Segmenting the research by project type and industry allows researchers to obtain specialized results that benefit some, but not all, practitioners. This gap represented an opportunity to explore and examine ISD projects that may contribute to the PM body of knowledge in the telecommunication service industry.

Problem Statement

Despite the large number of IS projects conducted in the last 30 years and increased research regarding IS project success factors and strategies, the failure rates of IS projects that did not deliver the expected benefits remain high (Ingason & Shepherd, 2014). An estimated 68% of IS projects are either a failure or are challenged for different reasons (N. F. Doherty et al., 2012) including internal factors such as coordination,

communication, clear goals and objectives, and clear requirements (Ofori, 2013) as compared to an industry average of 36% (Langley, 2015). The general business problem is that many IS projects fail, resulting in a financial loss for businesses. The specific business problem is that some IS project managers in Puerto Rico's telecommunication service industry lack strategies to control the internal factors and reduce the risk of failure of ISD projects.

Purpose Statement

The purpose of this qualitative multiple case study was to explore the strategies used by IS project managers in Puerto Rico's telecommunication service industry to effectively control internal factors and reduce the failure risk of ISD projects. Identifying the strategies to control internal factors may influence different phases of a project and reduce the risk of ISD project failure (Patanakul & Shenhar, 2012). This study focused on the experiences of project managers who successfully implemented strategies to control internal factors in ISD projects in Puerto Rico's telecommunication service industry.

The participants included six IS project managers who had successfully managed IS projects in Puerto Rico's telecommunication service industry. Understanding the strategies to control internal factors of ISD projects may contribute to increasing successful project outcomes. The successful implementation of IS projects is important for the success of any company (Cârstea, 2014). Successful project outcomes in the telecommunication service industry contribute to positive social change by lowering the costs of telecommunication services and creating efficient economic conditions in the community (Byerly, 2013).

Nature of the Study

I conducted this study using qualitative methodology. Qualitative research addresses the meaning of experience in a study sample through written texts or transcriptions of individual interviews or focus group conversations (Grossoehme, 2014). Qualitative research methods enable researchers to study social and cultural phenomena (Toloie-Eshlaghy, Chitsaz, Karimian, & Charkhchi, 2011). The quantitative or mixed-methods approach involves testing a predetermined hypothesis and assuming that there is an independent reality irrespective of the investigation (Allwood, 2012). A quantitative approach was not appropriate because this study did not involve testing a theory or using numeric data (Hoare & Hoe, 2013). A qualitative approach was appropriate due to the need for understanding the lived experiences of the participants.

I used a case study design for this study because this design allowed me to gain real-world perspectives (Yin, 2014). A case study allows an in-depth investigation of multiple cases that do not have clearly defined boundaries between the phenomenon and its context (Wynn & Williams, 2012). A phenomenological design was not appropriate because it is used to explain the meaning of human experiences, and its purpose is to get to the pure vision of what is an experience (Sanders, 1982). Neither ethnography nor grounded theory was appropriate for this study. Ethnographic research focuses on understanding the behaviors of a culture (Thomas, 2015). Grounded theory research focuses on developing a theory that enables researchers to understand the nature of that experience (Moustakas, 1994; Thornberg, 2012). These designs were not appropriate

because this study did not focus on understanding cultural behavior nor developing a theory.

Research Question

The research question for this study was the following: What are the strategies used by some IS project managers in Puerto Rico's telecommunication service industry to control the internal factors and reduce the failure risk of ISD projects?

Interview Questions

I gathered data using an interview protocol (Appendix A) and documentation analysis. During the interviews, the following questions served to inform the central research question in this study:

1. What is the ISD project you successfully managed?
2. Positioning yourself in that project, what were the internal factors you encountered throughout the project?
3. In which of these project phases (initiating, planning, executing, and closing) did you encounter the aforementioned factors?
4. Which of these factors would you consider the most critical?
5. Which of these factors were present in every phase of the project?
6. Which strategies did you adopt to control these factors successfully?
7. Among these strategies, which is one did you adopt to control the most critical internal factor?
8. How did you coordinate all the activities to complete the project?

Theoretical Framework

Coordination theory provided the framework for this study. Malone and Crowston (1990) presented coordination theory as a body of principles to explain how to coordinate activities and how actors can work harmoniously together. Aagaard, Eskerod, and Madsen (2014) showed that day-to-day coordination is necessary to accomplish a project without delays. Karpowicz (2012) argued coordination theory was especially useful in complex and interconnected networks such as the telecommunication service industry.

According to coordination theory, dependencies are present in different settings with more than one way to manage them (Crowston, 1997). Actors must identify dependencies and coordination problems when considering alternate processes to implement (Crowston, 1997). Coordination theory was relevant to the study of ISD projects because researchers identified ineffective coordination as a central problem (Hsu, Shih, Chiang & Liu, 2012; Parolia, Goodman & Jiang, 2007).

Hsu, Shih, et al. (2012) determined ISD projects have three features that require coordination to provide team members with the ability to solve problems and deliver the final product:

1. ISD projects are large-scale. Therefore, individual or small groups cannot understand the whole project.
2. Increasing uncertainty and rapid change environments require coordination.
3. Interdependence is a characteristic of these projects, which requires coordination.

ISD projects are especially dependent upon coordination because a lack of coordination often results in poor requirements definition, schedule setbacks, and other system-level problems (M. Doherty, 2011). Coordination theory applied to this study by providing a framework to understand strategies to control internal factors in the different phases of an ISD project.

Operational Definitions

The following terms provided the basis and context for this study:

Closing phase: The closing phase consists of accepting the major deliverables through completion of the project (Kloppenborg, Tesch, & Manolis, 2014).

Executing phase: During the executing phase, the team implements the plan to begin development of the project through activities that integrate human and other resources (Windapo, Oyewobi, & Zwane, 2014).

Information system: An information system is the set of interrelated components used to collect, manipulate, store, and disseminate data or information and provide a feedback mechanism to achieve a goal (Vavpotic & Vasilecas, 2012).

Information systems development projects: Information systems development projects are projects designed to develop artifacts that support the business operation. Stakeholders view ISD projects as a process through which developers transform users' requirements into a system design. ISD projects are complex in nature, which presents difficulties in fully capturing user needs, resulting in high failure rates (Hsu, Hung, Chen, & Huang, 2013).

Initiating phase: The initiating phase encompasses start-up, which includes problem identification, possible solutions, objectives, and conceptual aspects (Akbar & Mandurah, 2014).

Internal factors: In organizations, projects compete with other projects or solutions, first for support and later for resources. The internal factors are factors such as coordination, clear goals and requirements that could influence the project and that the project team can control (Vuori et al., 2013).

Monitoring and controlling: Monitoring and controlling are activities involving time, cost, quality risk, change, communication, and coordination management to review the progress and performance of a project (Kocherla, 2012).

Planning phase: The planning phase activities include determination of the relevance of the project; identification of primary risks; and determination of milestones, timeframe, and resources required (Almgren, 2014).

Project life cycle (PLC): The project life cycle is a logical sequence of activities including initiating, planning, executing, monitoring, controlling, and closing out processes to accomplish the project's goals (Ofori, 2013).

Project strategy: The project strategy is the perspective, position, and guidelines on what to do and how to do it to achieve the highest competitive advantage and the best value for the project outcome (Patanakul, Shenhar, & Milosevic, 2012).

Assumptions, Limitations, and Delimitations

This section includes the assumptions, limitations, and delimitations for this study. Assumptions are unverified claims considered to be true (Hamersly, 2015).

Limitations are weaknesses of the study that limit application of findings (Madsen, 2013). Delimitations are the choices that provide the boundaries of the study (Bartoska & Subrt, 2012).

Assumptions

I assumed participants had a successful experience managing ISD projects in the telecommunication service industry. To mitigate this assumption, I provided participants with a background of the study, which included a definition of successfully managed ISD projects. I chose participants who stated they had been successful. I also assumed participants would understand and answer the questions honestly and according to their experiences. To mitigate this assumption, I informed participants that I would use alphanumeric coding to ensure participants' confidentiality.

Limitations

The first limitation included using participants who had been successful managing ISD projects in the telecommunication service industry, which limited the pool of participants available because the telecommunication service industry in Puerto Rico is a small industry. If the pool of participants was too limited, I would expand the selection using different outlets within Puerto Rico's telecommunication service industry, such as professional websites and referrals from peers. The second limitation involved the applicability and generalizability of the findings, because the focus of this study was solely on the telecommunication service industry in Puerto Rico.

Delimitations

The first delimitation of this study was to focus only on the telecommunication service industry in Puerto Rico. I excluded other industries in Puerto Rico. A second delimitation was I focused only on the internal factors that could cause risk throughout the different phases of ISD projects. I excluded external factors affecting an ISD project, in addition to excluding projects outside ISD.

Significance of the Study

Contribution to Business Practice

The potential value to the project management field made this study necessary to expand the research in IS projects, specifically in ISD projects in the telecommunication service industry. I conducted this study to acquire a deeper understanding of the internal factors affecting the different phases of ISD projects. I wanted to understand all the components of the different phases of the project life cycle to promote effective project coordination and increase project success rates (Van den Ende & van Marrewijk, 2014).

I examined the strategies used by project managers to control internal factors. Understanding the internal factors and the strategies used to control these factors could help the project management field by reducing the risk of failures throughout the different phases of ISD projects. Project managers may use these study findings to evaluate the current strategies used to control internal factors within an organization.

Implications for Social Change

Expanding the understanding of critical internal factors and the strategies employed by project management practitioners in ISD projects contributes to positive

social change. Managers who successfully manage ISD projects could promote positive social change by providing innovative services and reducing the cost of telecommunication services for customers. Effective administration of IS projects is important to the success and survival of any company (Cârstea, 2014). Increased success rates may result in organizations being able to implement the necessary changes to meet their strategic business goals, which may enhance the sustainability and competitive advantage of the company within the industry. Improving an organization's position could contribute to positive social change by providing jobs and improving the economic stability of a community.

A Review of the Professional and Academic Literature

This section includes a comprehensive review of the literature regarding strategies to control internal factors in the telecommunication service industry. I initiated the review by conducting a project management based search to gain a deeper understanding of the project management field and its potential gaps and opportunities. I started the literature review from the broader sense of project management and narrowed it to the specifics of this study.

Figure 1 illustrates the topics and subtopics included in this review.

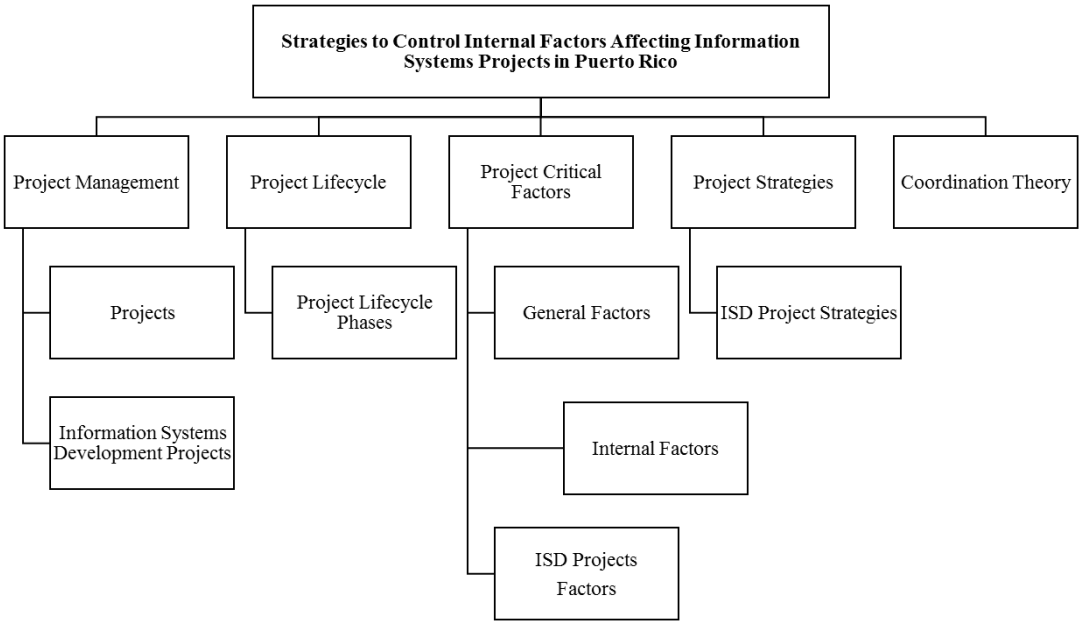

Figure 1. Literature review organization matrix.

I conducted the literature review using peer-reviewed articles, journals, books, dissertations, and websites. The primary search engines included Walden University Library databases and Google Scholar. The literature review includes 94 references: 86 peer-reviewed references, including two dissertations, and eight non-peer-reviewed references, including one website and one book. Eighty-five percent of the articles fall within 5 years of the projected graduation date of December 2016. Table 1 illustrates the total references included in this literature review.

Table 1

Literature Review Sources Fulfillment Table

	Total Sources	Peer-Reviewed Sources	Sources Less Than 5 Years (2012-2016)
Sources Quantity	94	86	80
Percentage	100%	91%	85%

Wysocki (2014) asserted projects arise from the identification of an unmet need to find a solution to a critical business problem, or to take advantage of an opportunity by developing a new product or system. The success of strategic initiatives depends on the firm's ability to manage projects successfully (Chipulu et al., 2014). In industries with constant market changes, such as telecommunication services, organizations draw on project teams to develop IS that produces novel business applications and new problem domains (Khedhaouria & Ribiere, 2013). Information systems are critical to the execution of business strategies because of the constant changes in today's environment (Gold, 2012). The significance of projects in organizations denotes the importance of research in the IS project management field.

This literature review focused on identifying critical factors and the corresponding strategies project managers implemented during the life cycle phases of an ISD project. The specific focus was relevant because IS projects continue to fail at a high rate even though there is a high level of attention to practice and academic research (Nelson & Morris, 2014). Among IS projects, those related to systems development are prone to high levels of failure, and completion times are longer than planned or expected (Armour, 2013; Narayanaswamy, Grover, & Henry, 2013). Several researchers agreed only 32% of

IS projects implemented in United States were successful (Kloppenborg et al., 2014; Nelson & Morris, 2014; Ward & Daniel, 2013). Researchers also agreed that the literature shows no consensus as to what constitutes a universal set of critical factors in IS project management (Basten, Joosten, & Mellis, 2011; Hadaya, Cassivi, & Chalabi, 2012; Lehtinen, Mäntylä, Vanhanen, Itkonen, & Lassenius, 2014).

Lehtinen et al. (2014) identified 130 to 185 failure factors in ISD projects, reaffirming that no definite set of factors applies to every industry (Mishra, Dangayach, & Mittal, 2011). Other researchers combined critical factors into groups or categories. Nwakanma et al. (2013) identified six critical factors that affected IS projects: (a) clear requirements and specifications, (b) clear objectives and goals, (c) realistic schedule, (d) effective PM method/skills, (e) support from top management, and (f) effective user or client involvement. Sudhakar (2012) identified seven critical factors affecting IS projects: (a) communication factors, (b) technical factors, (c) organizational factors, (d) environmental factors, (e) product factors, (f) team factors, and (g) project management factors. The diversity among these studies demonstrated the need to examine projects by industries and regions (Nwakanma et al., 2013).

The diversity of critical factors that emerged from the literature established the need for project managers to develop strategies to control these factors. Strategic project management focuses on the premise that managers initiate projects to achieve business results (Cleland, 2007; Patanakul & Shenhar, 2012). Although strategies differ according to the success factors that project managers want to address, project managers need project strategies to guide an individual project in every phase (Patanakul & Shenhar,

2012). In the literature, several authors proposed strategies to manage IS and ISD projects.

N. F. Doherty et al. (2012) provided six principles to implement ISD projects: (a) project benefits to the organization, (b) emphasis on how to manage the organization changes with the IS, (c) coherent governance structure, (d) active business leadership, (e) stakeholder-enabled benefits realization, and (f) ongoing benefits review. Almgren (2014) suggested the following strategies for the successful implementation of ISD projects: (a) extensive planning and preparation, (b) implementation in phases, (c) regular risk assessment, (d) use of internal and external knowledge, and (e) zero impact on the day-to-day operations. Both studies presented strategies related to stakeholder management and project life cycle. The following sections present a review of literature pertaining to specific areas of this study.

Project Management

Jiang and Klein (2014) suggested that rapid change and demand in the business environment dictated demand for projects. Their study anticipated managing these projects to drive the need for a better understanding of how to conduct these projects. Eighty percent of global executives believed project management (PM) is central to remain competitive in a recession (Nangoli, Ahimbisibwe, & Namagembe, 2013). Although project management has been around for centuries, it became a formal discipline only during the last 60 years as professional organizations contributed to its growth (Hamersly, 2015).

Wysocky (2014) defined project management as an organized set of procedures that requires client involvement to meet the client needs and deliver expected products and solutions to increase business value. The Project Management Institute (PMI) defined PM as conducting project activities using knowledge, skills, tools, and techniques to meet the project requirements (PMI, 2013). Hanisch and Wald (2011) added depth to the description of PM by including the following elements: methodologies, tools, standards, and procedures that apply to projects.

The formalization of PM as a profession recognized that processes, skills, tools, and methodologies have a significant impact on project success (PMI, 2013). Two organizations responsible for the development of the field of PM are the Project Management Institute (PMI) and the International Project Management Association (IPMA). PMI is a nonprofit organization based in the United States while IPMA is a Swiss-registered organization established in 1965 (Remer & Ross, 2014). These organizations offer bodies of knowledge and professional accreditation to help practitioners become subject matter experts to manage projects efficiently.

Traditional PM processes include 10 knowledge areas: (a) integration, (b) scope, (c) time, (d) cost, (e) quality, (f) human resources, (g) communication, (h) risks, (i) procurement, and (j) stakeholders (Carvalho, 2014; PMI, 2013). These knowledge areas connect to one or more of the five processes established by the PMI. These processes include initiating, planning, executing, monitoring, controlling, and closing, which serve as a guide for practitioners to manage projects (Carvalho, 2014; PMI, 2013).

In the last 40 years, the literature reflected increased interest from researchers and practitioners in advancing the PM discipline. This increased interest resulted from the variety of projects and environments that extend beyond the manufacturing industry (Pasian, Sankaran, & Boydell, 2012). One of the research streams was the school of optimization, which focused on work breakdown structures for the division of labor and network planning (Müller & Jugdev, 2012). The second school was the critical success factors (CSF), which addressed factors of project success (Müller & Jugdev, 2012). In 2010, there were nine schools of PM including the CSF school, which focused on the three constraints of cost, time, and scope (Müller & Jugdev, 2012).

Although the amount of research conducted on PM has increased, the knowledge acquired has been fragmented and incomplete (McLeod, Doolin, & MacDonell, 2012). The vast array of literature included valuable information for researchers and practitioners to improve the project management field and demonstrated the ample attention for aspects of PM (Verburg, Bosch-Sijtsema, & Vartiainen, 2013). PM is a vibrant discipline providing different research streams. The focus of this study was IS projects, particularly projects related to systems development.

Projects. Projects have a key role in modern enterprises (Ramazani & Jergeas, 2014). Wysocki (2014) defined a business-focused project as finite, sequencing, and dependent activities that deliver business value. IPMA (as cited in Ramos & Mota, 2014) defined projects as time and cost-constrained operations that produce a deliverable according to the business standards and requirements. PMI (2013) defined projects as temporary endeavors to develop a product, service, or result. The International

Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) (as cited in Savolainen, Ahonen, & Richardson, 2012) defined projects as endeavors with a start and a finish creating a product with specified resources and requirements. Each definition indicated that projects are temporary activities with an objective and a time frame.

Projects require high levels of planning and organization to progress efficiently (Allen, Alleyne, Farmer, McRae, & Turner, 2014). In many industries, projects complemented or replaced traditional structures (Allen et al., 2014). The increased adoption of projects raises management challenges because of the unique characteristics and complexities of each project (Allen et al., 2014). Five main aspects in projects are activity overlaps, roles, skills, knowledge sharing, and time (Akbar & Mandurah, 2014). Knowledge sharing is one of the most valuable aspects because it encourages participants to maintain social capital, sustain high performance, and become more innovative and creative (Park & Lee, 2014).

Projects vary based on the client, organization, and industry. Different project types include engineering and construction, information technology, business and financial services, telecommunication, computer software, and data processing projects (Besner & Hobbs, 2012). All projects create either product, service, improvement, or result (PMI, 2013). Diversity causes a variety of critical success factors (CSF) according to project types, phases, industries, regions, stakeholders, and organizations (Müller & Jugdev, 2012). The literature reviewed provided insight regarding the necessity to

segment the research by project type and industry to obtain results that could benefit the practitioners managing those projects.

Information systems development projects. Technology changes are one of the most critical projects companies undertake (Dawidson, Karlsson, & Trygg, 2004). Information systems provide strategic and operational value to organizations and play a crucial role in the competitiveness of the telecommunication service industry (Mavengere, 2013). Schrien (2013), Nazir and Pinsonneault (2012), and Lu and Ramamurthy (2011) concluded that IS played crucial roles in promoting agility, increasing strategic value in an organization, and making a difference in the competitive environment. IS enables cost efficiency and information acquisition, and supports business leaders in making fast changes (Mavengere, 2013).

IS projects include all of the activities involved in a system implementation (Basten et al., 2011). Cârstea (2014) considered the effective administration of IS projects important to the success and survival of any company. Stakeholders view ISD projects as a process through which developers transform users' requirements into system design, or a process to transform users' needs into a specific information technology artifact (Hsu et al., 2013).

ISD projects involve complex, nonroutine, knowledge-intensive tasks and teams with the diverse knowledge and skills (Hsu, Lin, Cheng, & Linden, 2012; Narayanaswamy et al., 2013). The knowledge-intensive nature of these projects requires developers to understand the users' domains, and the users to understand the developer's domain for the integration of expertise, insights, and skills of many individuals (Hsu, Lin,

et al., 2012; Pee et al., 2014). These characteristics required developers to adapt to the constantly changing environment (Narayanaswamy et al., 2013).

The intangible nature of ISD and ISD project complexities raises difficulties in fully capturing the user needs, resulting in high failure rates (Hsu et al., 2013). Rosenkranz, Charaf, and Holten (2013) stated that problems in ISD projects were sociological more than technological. The major success drivers were: knowledge transfer, communication, and shared understanding among stakeholders (Rosenkranz et al., 2013). These drivers required coordination among stakeholders, as the process of designing a system is a long-term and complex activity that requires financial, human, and time resources (Cârstea, 2014). Coordination in ISD referred to participants agreeing to a common definition of the project objective, sharing information, and the project activities (Hsu, Shih, et al., 2012). The importance of ISD in creating business value indicated that project managers must pay special attention the project life cycle to reduce the risk of failure.

Project Life Cycle

The constant and unpredictable changes in processes during a project's life cycle are a concern for PM research (Van den Ende & van Marrewijk, 2014). Every project passes through different phases throughout its lifetime. The project life cycle is a logical sequence of activities to accomplish the project’s goals (Ofori, 2013). The project phases include initiating phase, planning phase, executing phase, and the closing of the project (Figure 2) (Kloppenborg et al., 2014; Ofori, 2013).

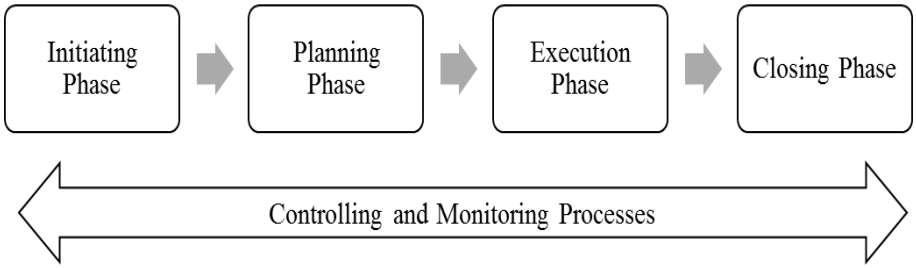

Figure 2. Project management life cycle.

Another popular division of the life cycle referred to the phases as conception, feasibility, implementation, operation, and termination (Van den Ende & van Marrewijk, 2014). Each phase included various sub-projects, phases, or stages in between (Van den Ende & van Marrewijk, 2014). Ofori (2013) found that to ensure success and project quality, project managers must pay attention to details, implement monitoring and controlling processes, ensure participation of key stakeholders, and proper documentation at each phase. The activities, actors, expected deliverables, and control measures differentiate each project phase (Ofori, 2013). In addition, project life cycles differed depending on the characteristics of the organization, the industry, and the technology employed (PMI, 2013).

ISD project life cycles involve translating the business idea into project requirements to create the system specifications (Khedhaouria, & Ribiere, 2013). ISD projects consist of complex processes such as gathering requirements for new IS, analyzing the requirements, designing new IS, and implementing new IS (Vavpotic, & Vasilecas, 2012). The complex process of these projects included processing distinct information cues, coordinating interdependencies among these cues, and coping with changes in these interdependencies over time (Zickert & Beck, 2012). Many researchers

agreed ISD projects have five phases: system planning, analysis, design, implementation, and maintenance (Lai & Tsen, 2013; Vasumathy, & Mohan, 2013). Researchers typically argued over semantics, as Narayanaswamy et al. (2013) stated that ISD project phases should be requirement analysis, design, development, testing, and implementation.

Armour (2013) identified three phases of ISD projects that affected the estimates of completion: preparation, production, and proving. Preparation involved setting up servers and version control systems, acquiring tools, planning and estimating, sourcing staff, and other essential activities that take time but might not contribute to production (Armour, 2013). In production, the maximum work or coding occurs (Armour, 2013). Proving was the final process of completing the exception code, testing, and fixing (Armour, 2013). Other researchers provided different phases and names to the project life cycle, although these phases paralleled the traditional phases of projects (Brown, Hyer, & Ettenson, 2013).

Between 1980 and 1990, researchers examined how the technical aspect of a project related to an organization (Davis, 2014). This period omitted the planning phase of a project (Davis, 2014). The 21st century focuses on stakeholder and project success being dependent on the project life cycle, or short-term focus (Davis, 2014). The importance of the project life cycle provided an opportunity to examine the strategies used to control internal factors present during the different phases of a project while focusing on an industry and project type.

Initiating phase. This phase encompasses start-up, which includes problem identification, possible solutions, objectives, and conceptual aspects (Akbar & Mandurah,

2014). This phase also involves the definition, which includes an appraisal of solutions, definition of the scope of work (SOW), and analysis of risk, finance, and benefits, (Akbar & Mandurah, 2014). Initiating phase requires an alignment of the project with the corporate strategy, as part of the initiating process to create value in the organization (Too & Weaver, 2013).

The activities or processes related to the initiating phase includes developing a business plan, undertaking a feasibility study, establishing a project charter, appointing a project manager and team, setting up the project office, and performing the phase review (Kocherla, 2012). Vuori et al. (2013) identified the main challenges for a project manager in this phase as securing internal support for a project, convincing key stakeholders to undertake the project, and learning from early experiences. Setting out the scope and specifications of the project at this stage enables securing sponsor support (Ofori, 2013).

In an ISD project, the initiating processes identify the project's beginning (Krajcík, 2013). This phase begins when a business sponsor identifies a need or an opportunity for a system. This phase defines the scope of the information system, and boundaries (Kocherla, 2012). Different activities overlap in the initiating phase to facilitate scheduling and planning (Akbar & Mandurah, 2014). This phase produces scope, boundaries, cost-benefit analysis, risk management, plan, and feasibility documents (Kocherla, 2012). The initiating phase requirements include the active participation of systems analysts, systems owners, and project managers (Kocherla, 2012). Understanding the roles of each participant minimizes ambiguity and confusion

(Akbar & Mandurah, 2014). This phase concludes with an approved project charter (Kloppenborg et al., 2014).

Planning phase. Planning phase activities include determination of the relevance of the project, identification of primary risks, determination of milestones, timeframe and resources require (Almgren, 2014). The planning phase enables the sponsor and manager to be clear on the purpose, outcome, budget, deliverables, and duration of the project (Ofori, 2013). This phase is important because successful projects had quality and early planning as common elements (Cleland, 2007). Cleland (2007) considered project planning an action plan to obtain the best results using the existing resources while dealing with the ever-changing environment of the project and organization.

Verburg et al. (2013) considered planning a core activity of project managers. Planning involves all project stakeholders to ensure agreement on the scope of specifications and support (Ofori, 2013). Cleland (2007) identified several principles in the planning phase: (a) planning was a key responsibility of project managers, (b) project stakeholders were part of the project and recognized that the plan could change, (c) planning was a process that pulls information from the organization and its stakeholders, (d) and project planning quality related to the project success.

In an ISD project, project managers use planning to identify and document how the business will operate with the new system. Kocherla (2012) argued this phase should provide an assessment of the impact this system will have on business processes, employees' activities, and customers. This process begins with a completion of a SOW. The planning phase of an ISD project involves setting goals, defining targets, establishing

schedules, and estimating (Lai & Tsen, 2013). This process includes steps to estimate the size of the software work products, determine the resources needed, develop the schedule, identify and assess risks, and negotiate commitments (Ahamed, 2012).

During the ISD project life cycle, project managers enter the analysis phase after the planning phase. In the generic project life cycle, the analysis is part of the planning process (PMI, 2013). The planning process includes risk and contingency analysis activities (Ahamed, 2012). The objective of this process is to identify all critical areas of risks to develop procedures and contingency plans to minimize these risks. The result of this process is the production of a risk matrix (Ahamed, 2012). This matrix contains the ranking of the risks regarding the impact and the probability of occurrence (Ahamed, 2012).

The next process during the activity-planning phase includes identifying the required activities, assigning roles and responsibilities, estimating activities duration, scheduling the activities, producing accurate costs, and establishing reporting, communication, and acceptance criteria (Ahamed, 2012). To estimate correctly in ISD projects, project managers must reduce incorrect requirements. Rosenkranz et al. (2013) described requirements analysis as an integral activity during the planning phase of an ISD project. Requirements development is a process that gives meaning to customer specifications by consolidating different specifications and multiple requirements (Rosenkranz et al., 2013). The process central roles include communication, negotiation, and determination of requirements (Rosenkranz et al., 2013). Planning is a key phase necessary to mitigate failure risks during the project.

Executing phase. The executing phase involves building deliverables (Kocherla, 2012). In this phase, the activities integrate human and other resources to carry out the project. The project manager coordinates the activities and deliverables of this phase allowing the realization of value for the organization (Eweje, Turner, & Müller, 2012). The executing phase occurs as project managers implement the plan to begin development (Windapo et al., 2014). In this phase, the critical behaviors of the project manager include ensuring quality, communications, and build stakeholder relations (Kloppenborg et al., 2014).

In ISD projects, the executing phase consists of the adequate deployment of resources, design, construction, commissioning, installation, and testing (Windapo et al., 2014). The executing phase is where the project team consumes the majority of the allocated resources. Every project stakeholder involved in the project execution is responsible for business results such as additional profits, growth, and improved market position (Patanakul & Shenhar, 2012). Communication and coordination are integral activities during the executing phase.

In an ISD project, the executing phase is the equivalent of system design and implementation. Lai and Tsen (2013) asserted that system design activities defined the architecture, components, modules, interfaces, and data to satisfy the established system requirements. The design activities require a skilled team with knowledge and specialization, to translate the user requirements into system requirements (Vasumathy & Mohan, 2013). The results of this phase often determine the need for any changes to the original plan. The most common changes include time, budget, or activities (PMI, 2013).

Monitoring and controlling. Project managers conduct monitoring and controlling activities to review the progress and performance throughout the entire project (PMI, 2013). These activities involve time, cost, quality, risk, change, communication, and coordination management (Kocherla, 2012). Project managers establish the performance and reporting systems, monitor project performance, monitor risk, report project status, manage changes in scope, and solve problems (Wysocki, 2014). Appropriate monitoring and controlling systems allow project managers to observe the interdependencies and interactions among individual or multiple projects (Caniëls & Bakens, 2012). Running over budget and scheduling is characteristic of many of the problems found in IS projects.

Project managers implement formal and informal control strategies that contribute to ongoing methods of monitoring (Keil, Rai, & Liu, 2012). Control referred to the rigid practices to monitor progress and quality (Subramanian, Klein, Jiang, & Chan, 2009). Keil et al. (2012) indicated that formal control included standard practices while informal controls focused on the interpersonal dynamics of the team. Although several researchers indicated that monitoring and controlling ensure project success, W. K. Chan and Zailani (2012) found that monitoring does not ensure project success.

Control was thought to be necessary for IS projects but not sufficient to ensure project performance (Keil et al., 2012). Abbasianjahromi, Rajaie, Shakeri, and Chokan (2014) indicated that controlling and monitoring played an important role because many ISD projects have external developers that need constant monitoring. Monitoring external developers is important to review performance and commission (Abbasianjahromi et al.,

2014). The implementation of monitoring and controlling practices throughout the life cycle of a project mitigate risks factors and increase the probabilities of project success.

Closing phase. The closing phase is the completion of the project when the client accepts the major deliverables (Kloppenborg et al., 2014). A significant part of this phase include obtaining formal client acceptance, validating the requirements, receiving final payment, and closing the books (Kloppenborg et al., 2014). Running over schedule is a common problem in IS projects. In the event of schedule delays, the sponsor would have to attend to this situation with urgency to minimize the impact on the organization (Kloppenborg et al., 2014). Unsuccessful closing or project termination negatively affects the firm's future (Kloppenborg et al., 2014). This phase helps project stakeholder's conduct post-project reviews to capture lessons learned during the life cycle (Kocherla, 2012). The lessons learned are valuable to increase understanding and knowledge of future projects in the organization.

Project Critical Factors

Critical factors are the elements that contribute to an expected outcome. W. K. Chan and Zailani (2012) indicated that in projects, critical factors were elements that organizations needed to create an environment that promoted excellence in project management on a consistent basis. Some of the literature focused on internal and external factors affecting project success, but there was limited research defining how to measure success during individual phases of the system development life cycle (Kocherla, 2012).

Determining the factors influencing project success throughout the phases of a project life cycle have a positive influence and increase project success rates (Kocherla,

2012). The complexities and constant changes in the environment complicate the identification of these factors. A gap in the literature seemed apparent, as what constituted a project failure or success related to the perception of the project stakeholders (Lehtinen et al., 2014). This gap reinforced the importance to study critical factors in specific context, considering industry, project type, and life cycle phases.

General projects critical factors. Understanding the critical factors affecting the organization increases the chances of a project succeeding (W. K. Chan & Zailani, 2012). Awareness and understanding result in a systematical assessment, which help managers choose appropriate methods to manage these factors and anticipate possible effects (W. K. Chan & Zailani, 2012). The literature identified these critical factors and examined the factors of project success between 2000 and 2010 (Müller & Jugdev, 2012).

Mishra et al. (2011) presented six categories of success factors, each with one critical factor that has a major impact on that category. The categories identified were factors related to projects, project managers, project team, organization, environment, and tools and techniques. In each category, there was one critical dominant factor. The critical factors identified were clear goals and objectives, leadership communication, clear goal definition, client knowledge and experience, and resource management respectively (Mishra et al., 2011).

Lehtinen et al. (2014) grouped common critical factors into four categories: (a) people, (b) methods, (c) tasks, and (d) the environment. For each category, the authors identified several factors affecting the particular category. The people category included factors such as social interaction, skills, and motivation (Lehtinen et al., 2014). As the

number of people involved in a project increases, the chance of failure increased as a result of stakeholders' conflicts, team spirit, and communication breakdowns (Lehtinen et al., 2014).

Methods included factors such as development work, users, top management, external agents, project team, and cooperation (Lehtinen et al., 2014). Understanding the organization practices and how people work could improve the outcome of the project (Lehtinen et al., 2014). Tasks included sales, customers, requirements, contracting, project management, quality control, development work, and software testing (Lehtinen et al., 2014). Environment referred to the conditions and organizational properties that influenced the project outcome, including factors such as project complexity, available assets, policies, business domain, organizational structures, and technology (Lehtinen et al., 2014). These critical factors were present in various processes including management, sales, requirements, and implementation (Lehtinen et al., 2014). Both researchers included internal and external factors that affected different projects. Within this study, I focused on the internal factors found in the different phases of an ISD project.

Internal factors. Internal factors affect project outcomes. According to Müller & Jugdev (2012) the 10 internal CSF in projects were project mission, top management support, project schedule plan, client consultation, personnel, technology, client acceptance, monitoring and feedback, communication, and troubleshooting. Seven of the ten factors related to every phase of the project life cycle. Vuori et al. (2013) stated that major factors affecting projects in the internal environment were the role of top management, parental support, the organizational culture, organizational structure,

processes, use of rewards, controls and planning, parental strategy profile, timing, and entrepreneurship.

Other researchers focused on knowledge sharing as an internal factor affecting projects. Park and Lee (2014) found that knowledge sharing was one of the most valuable internal activities during a project, as it encourages participants to maintain social capital, sustain high performance, and become more innovative and creative. Effective knowledge sharing improved the relationships between clients and IS developers, and reduced time spent on problem-solving (Park & Lee, 2014).

Knowledge sharing builts trust and dependence among stakeholders, which was fundamental in fostering collaboration and achieving goals. Companies introduced employees to knowledge sharing by incentivizing efforts to share knowledge, sharing opportunities, and the value of the information shared (Y. Wang, Wu, & Yang, 2013). Four factors influenced knowledge sharing related to these conditions; customer orientation, customer perceived benefits, customer socialization, and technological customer capability (Y. Wang et al., 2013). The first two related to motivation, socialization related to opportunity, and technological capability related to ability (Ko et al., 2013).

The alignment of business strategies and projects was another factor believed to increase the success rates of projects. Misalignment caused 30% of all projects to fail (Alsudiri et al., 2013). Business strategies translate into project objectives and the project start-up process through alignment. Alignment between business and information system is the synchronization between the dynamic business objectives and the respective

technological services provided by IT (Ullah, & Lai, 2013). Alignment is difficult when a miscommunication between the business strategy and project managers occurs (Alsudiri et al., 2013). In the telecommunication service industry, internal factors that affected alignment were communication, competence, PM leadership, lack of involvement of the PM in the initial phase of the strategy development, and the executive's commitment (Alsudiri et al., 2013). This overview demonstrated factors affecting projects are as diverse as the projects, industries, and organizations.

ISD projects critical factors. Researchers studying IS projects failed to reach consensus on what constituted a successful project (Basten et al., 2011). The findings revealed a variety of internal and external factors affecting IS projects. In a study conducted by Basten et al. (2011) the researchers indicated adherence to the iron triangle, which consisted of the budget, schedule, and requirements, was not sufficient for IS projects. Focusing only on the iron triangle failed to consider uncertainty in determining the time required, the budget needed, and specifications of a project (Cecez-Kecmanovic et al., 2014).

Nwakanma et al. (2013) identified six critical factors that affected IS projects: (a) clear requirements and specifications, (b) clear objectives and goals, (c) realistic schedule, (d) effective PM method or skills, (e) support from top management, and (f) effective user or client involvement. Sudhakar (2012) identified the following as critical factors affecting IS projects: (a) communication, (b) technical, (c) organizational, (d) environmental, (e) product, (f) team, and (g) project management.

In a study conducted by Vuori et al. (2013) the researchers presented internal factors that influenced a project: top management; organization strategy; organizational culture; resources; on-going projects; and past or future projects. The external factors included customers, competitors, technology, legislation, suppliers, and economic situation (Vuori et al., 2013). Requirements are indicative of specifications that can change during development and after implementation (Cecez-Kecmanovic et al., 2014). Initial requirement specifications produce estimates of effort that in most cases are inaccurate. Additionally, political actions and negotiations affect plans and estimates (Basten et al., 2011). To estimate correctly, researchers recommended reducing incorrect requirements in ISD projects.

The literature commonly identified incorrect requirements as one of the major reasons for project failures. Incorrect client requirements were neither complete, clear, nor adequate (Hsu, Lin, et al., 2012). Common causes of incorrect requirements were attributed to (a) developers elicit the wrong requirements, (b) failure to validate the requirements, (c) environmental changes, and (d) mismanagement of system requirements (Hsu, Lin, et al., 2012). ISD projects are knowledge-intensive and require developers' understanding of the user domains, and users' understanding of the developer's domain.

Alsudiri et al. (2013) found that in many telecommunication service companies, a gap existed between business strategy and the project plan, attributed to miscommunication between leaders and project managers. Internal factors that affected alignment were communication, competence, project manager leadership, project

manager lack of involvement in the initial phase of the strategy development, and executive's commitment (Alsudiri et al., 2013). Many researchers agreed that IS projects must support the organization's strategic goals and agility (Mavengere, 2013; Nenickova, 2013). Within telecommunication service industry, researchers determined the need for a fast and efficient implementation to meet the dynamic market changes and shortened period of strategy validity (Nenickova, 2013).

Stakeholders must align strategic goals with the information system capabilities of the company when designing IS to meet the telecommunication services demand on information technology (Nenickova, 2013). Department support was another internal factor that influenced telecommunication project success (Alsudiri et al., 2013). Nenickova (2013) identified several factors that influenced the flexibility and speed of IS projects: insufficient time or finance resources allocated at the beginning of the ISD project; imprecise definition of the objective of the system; and lack of methodology for business analysis completion. Kosaroglu & Hunt (2009) found the most critical success factors in a telecommunication project was the integration of business processes and technology to deliver a product with no, or minimum, disruption to customers.

Research of coordination in IS projects was diverse, and many researchers concluded that coordination was necessary for IS projects (McChesney & Gallagher, 2004; Strode et al., 2012). Day-to-day coordination is necessary to accomplish a project without delays (Aagaard et al., 2014; Meixell, Nunez, & Talalayevsky, 2006; Ofori, 2013). The complexity and interconnected nature of networks, such as in the

telecommunication service industry, reinforced the importance of coordination (Karpowicz, 2012).

Researchers identified ineffective coordination as a central problem in IS projects (Hsu, Shih, et al., 2012; Parolia et al., 2007; Strode et al., 2012). Mastrogiacomo, Missonier, and Bonazzi (2014) stated that project managers recognized effective coordination as a central issue in IS projects. Effective coordination increased project performance, as failures in information systems projects often resulted from coordination problems (Mastrogiacomo et al., 2014).

The selection of the proper project team members contributes to team composition and coordination. Da Silva et al. (2013) described team composition as a combination of individual team member characteristics and the role these individuals played in the team (da Silva et al., 2013). Creating a productive team requires individuals with the right characteristics. The team criteria that members should have were technical profile, personality, behavior, customer importance, productivity, availability, individual cost, and project importance (da Silva et al., 2013). Communication among project teams promoted learning, innovation, collaboration, and information transfer (Slepian, 2013).

User participation in ISD projects was another critical factor that helped prevent developments that did not meet the user needs. Some researchers found that user participation ensures quality, performance, and reduced uncertainty during the project (Hung, Hsu, Su, Huang, 2014; Nwakanma et al., 2013). Participation improved the quality of the requirements and ensured user compromise and acceptance of the project (Hung et al., 2014). Many users refuse to cooperate with ISD projects, due to resistance

to the new system. Users commit to a project when a strong relationship with the project and the development team exists (Hung et al., 2014).

Nenickova (2013) observed telecommunication service companies faced the challenge of being flexible and financially efficient. Deregulations and greater competition forces the need to develop new products and services in a timely and cost-effective manner (Kosaroglu & Hunt, 2009). Information systems presented strategic and operational value to telecommunication service companies and played a crucial role in competitiveness (Mavengere, 2013).

The literature review regarding IS critical factors demonstrated that there were internal factors such as coordination, communication, project planning, requirements, among others that affected IS project success. Coordination was the internal factor most cited in this literature review. These findings supported the use of coordination theory as the framework for this study. Table 2 shows a summary of the critical internal factors cited in this literature review. Table 2 shows how these factors relate to each of the project life cycle phases. This summary demonstrated the need to understand and implement strategies to manage these factors to increase the probabilities of successful projects.

Table 2

Summary of Critical Factors Mentioned in Literature Review

Factor	Environment	Phase	Authors
Alignment with business strategy	Internal	Initiating, Planning & Executing	Alsudiri, Al-Karaghouli, & Eldabi, (2013); Ofori, (2013); Ullah & Lai, 2013
Clear goals and objectives	Internal	Initiating, Planning & Executing	Mishra et al., (2011); Müller & Jugdev, (2012); Nwakanma et al., (2013); Ofori, (2013)
Clear requirement and specification	Internal	Initiating, Planning & Executing	Hsu, Lin, Cheng, & Linden, (2012); Nwakanma et al., (2013)
Project planning	Internal	Initiating, Planning & Executing	Kocherla, (2012)
Communication	Internal	Planning & Executing	Kocherla, (2012); Mishra et al., (2011); Müller & Jugdev, (2012); Ofori, (2013); Slepian, (2013)
Iron triangle: budget, schedule, and requirements	Internal	Planning & Executing	Basten et al., (2011); Müller & Jugdev, (2012); Nwakanma et al., (2013); Ofori, (2013); Vuori et al., (2013)
Coordination	Internal	All Phases	Aagaard et al., (2014); Hsu, Shih, et al., 2012; Karpowicz, (2012); Mastrogiacomo et al., (2014); McChesney & Gallagher, (2004); Meixell et al., (2006); Ofori, (2013); Parolia et al., (2007); Strode et al., (2012)
Monitoring and controlling	Internal	All Phases	Müller & Jugdev, (2012)
PM leadership and skills	Internal	All Phases	Mishra et al., (2011); Nwakanma et al., (2013)
Project team	Internal	All Phases	da Silva et al., (2013); Lehtinen et al., (2014); Müller & Jugdev, (2012)
Top management support	Internal	All Phases	Müller & Jugdev, (2012); Nwakanma et al., (2013); Ofori, (2013); Vuori et al., (2013)

Project Strategies

Strategic project management focuses on the premise that managers initiate projects to achieve business results (Patanakul & Shenhar, 2012). Companies have used strategy mechanisms to link business strategy and project management (Patanakul & Shenhar, 2012). Patanakul et al. (2012) recognized some practitioners and researchers did not fully understand how to apply project strategy in practice, and determined project managers needed project strategy to guide an individual project in its planning and development phases. Strategy is not the project plan; rather it is a higher level than the plan. Strategy involves the elements that lead to the actual project plan, effectiveness, and efficiency. Patanakul et al. (2012) argued that project strategy should have *perspective* or the general idea; it should have a *position* or what the team wants to achieve and to know when the team achieved it, and a *plan* or guidelines.

Cleland (2007) advocated for project strategy to align with the strategic management of the organization. Strategies differ from the success factors that project managers want to address. Some projects do not reflect the parent company strategies but form its strategy to align with environmental factors (Keil et al., 2012). The project strategy combines management plans with project plans, setting objectives, functional strategies, defining scope, managing resources, process, and context (Keil et al., 2012). In organizations with complex and unpredictable environments, such as telecommunication service companies, it is difficult to maintain a strategy that will flow with the continuous changes in the environment (Vuori et al., 2013).

Projects that do not reflect the organization strategies cause tension among different parties in the organization (Vuori et al., 2013). Projects that move beyond what the organization members hold as knowledge are harder to manage and to accept. In these projects, autonomy increases the chances of being successful (Vuori et al., 2013). Complex and dynamic external markets present opportunities for organizations to allow entrepreneurial and creative projects as a response to the constant market changes (Vuori, et al., 2013).

Technology changes increase dynamism within different industries; this increases the risk for companies and project performance. Selecting the projects that support the business strategy and terminating those that do not, increases project performance (Too & Weaver, 2013). Too and Weaver (2013) found that other strategies that contribute to increased project performance were: (a) project sponsorship between executive and project manager, (b) a project management office (PMO) that provided oversight and continuity to projects, and (c) projects and program support that measured for effective governance system. These strategies assist a company by having a project portfolio that aligns with the business strategy, which resulted in increased project performance. Companies that adopted these strategies to manage IS projects reduced the high failure rates and improved business opportunities (Too & Weaver, 2013).

ISD Project Strategies

The literature presented several strategies to implement IS projects successfully. Systems development risks not managed effectively could result in a loss regarding increased costs, longer completion times, reduced scope and quality, reduced realization

of proposed benefits, or reduced stakeholder satisfaction (Abdul-Rahman, Mohd-Rahim, & Chen, 2012). IS projects require a strategic plan, a technical solution, and a software engineering methodology (McManus, 2014).

N. F. Doherty et al., (2012) provided a set of principles to the successful implementation of ISD projects: (a) focusing on how the business could attain the benefits from the project; (b) placing more importance on how to manage the organization change, business process, and practices to accommodate the new information system; (c) have a coherent governance structure; (d) have active business leadership; (e) stakeholder-enabled benefits realization; and (f) ongoing benefits review. According to Ofori (2013) project teams must pay special attention to the 4Cs to improve project quality: communication, commitment, competency, and coordination.

Project success starts with the project plan to minimize failure risks (Abdul-Rahman et al., 2012). A successful project requires detailed planning, careful monitoring of resources, and comparison of the project status against the plan (Abdul-Rahman et al., 2012). Kocherla (2012) identified a gap in the literature available that focused on the success of a project during the life cycle phases of an ISD project. Key steps to ensure project success were to identify these factors and the project life cycle phase impacted.

The literature review revealed several internal factors that affect ISD projects throughout the different phases. The most cited factors affecting the phases were (a) clear goals and objectives, (b) clear requirements and specifications, (d) communication, and (e) coordination. The next section of the literature review focuses on strategies to manage these internal factors.

Clear goals and objectives. Customer needs or business opportunities are the primary reasons for beginning a project. When IS project teams do not carefully consider the strategy or the project stakeholders, the management of the project consists of budget and schedule (Bloch, Blumberg, & Laartz, 2012). Consideration of the stakeholders is important, as the stakeholders provide the goals and objectives of the project.

In the telecommunication service industry, researchers identified a close relationship between strategic goals and ISD projects (Nenickova, 2013). This relationship exists because the implementation or changes in systems must support the business objectives (Nenickova, 2013). Nenickova (2013) asserted ISD projects in telecommunication service companies should allow fast and efficient implementation because of the dynamic market changes and the short period of strategic validity. This assertion reinforced the importance of establishing clear goals and objectives in ISD projects.

The literature provided strategies to mitigate the risks associated with unclear goals and objectives. Managing project stakeholders is one strategy to minimize unclear goals and objectives (Winch, 2007). Project stakeholder management practices help managers identify who has an interest in the project, analyze stakeholder impact, and establish strategies to engage stakeholders throughout the project (PMI, 2013). The identification of these stakeholders and their interests aim to develop a realistic project mission containing the goals and objectives of the project (Winch, 2007).

The project team develops appropriate management strategies to engage the stakeholders throughout the project (PMI, 2013). In the early phases, the project team and

stakeholders clarify outputs to reduce unclear goals and objectives (Kloppenborg et al., 2014). Project stakeholders must set optimistic and realistic goals and objectives to promote motivation among team members (Olszak & Ziemba, 2012). Stakeholders must understand the business limitations regarding budget and resources to establish achievable goals and objectives.

Another strategy to minimize the risk of unclear goals and objectives was to ensure the participation of a business analyst during the planning phases of the project. The analyst helps the stakeholder to understand the relationship between the goals and the critical factors (Olszak & Ziemba, 2012). Bloch et al. (2012) determined that a robust business case prepared by business analysts helped guide the planning of the project, which could mitigate the risk of unclear goals and objectives. Having clear objectives and goals is the first step in improving success rates in IS projects, and the basis for conducting proper planning of the project.

Clear requirements and specifications. Collecting requirements and specifications is the process of determining and documenting the stakeholders' needs and expectations for the project (PMI, 2013). This process provides the basis for establishing the project scope and is one of the most important processes of the project. Project requirements constantly change by new customer requirements, technology changes, or market changes. PMI (2013) argued user involvement is necessary throughout the discovery and decomposition of the conditions or capabilities the user expected from the project. User involvement in the development process and responsibility assignment for

requirements development is a useful strategy that could reduce requirement changes in the executing phase (Keil et al., 2012).

Abdul-Rahman et al. (2012) found that clear and detailed requirements were one of the top ten most useful strategies to increase project success. Requirement strategies are useful within the telecommunication service industry, where there is a high dependency on technology and engineering (Kosaroglu & Hunt, 2009). The PMBOK presented several techniques to collect requirements, including interviews, focus groups, facilitated workshops, group creativity techniques, group decision-making techniques, questionnaires and surveys, observations, prototypes, benchmarking, context diagrams, and document analysis (PMI, 2013).

Project managers ensure project teams accept the requirements as being realistic and achievable, within the available time, resources, and technology (Abdul-Rahman et al., 2012). One of the benefits of this project strategy implementation is to balance the requirements and the available resources (Vuori et al., 2013). The system development approach enabled the project to evolve with a flexible architecture that allowed changes as new requirements emerged (Vuori et al., 2013). Due to the importance of clear requirements and specification, the project team needs to establish and maintain a good relationship with the users (Abdul-Rahman et al., 2012). Establishing proper channels of communication among the project team and stakeholders become an effective strategy that produces clear requirements and specifications.

Communication. Communication was one of the most cited critical factors in projects. The PMBOK established techniques and processes to improve communication

in projects (Carvalho, 2014). These techniques and processes help project managers ensure timely and appropriate communication with team members and customers. Project communication management ensure the appropriate planning, collection, distribution, control, and monitoring of the project information (PMI, 2013).

The communications management strategy focuses on developing appropriate communication based on stakeholders' needs and requirements (PMI, 2013). This plan documents how the communication flows among project stakeholders (PMI, 2013). Communication methods such as interactive communication, push communication and pull communication facilitate the information flow among stakeholders (PMI, 2013). These methods apply to every project and help minimize information breakdown between the project team and stakeholders.

The literature revealed evidence of communication breakdown in IS projects. The Communication Integrated Framework (CIF) is a framework that considered the individual and the organizational perspectives in IS projects (Carvalho, 2014). This framework considered barriers to communication between the IT department and the business. These barriers include trust, priorities, semantics, and environment (Carvalho, 2014). CIF integrates the project management strategies for project communication. Stakeholders and project team members share information using different methods including meetings, emails, data storage, and reporting (Carvalho 2014; PMI, 2013). Project managers implemented CIF to gain an understanding of the different perspectives in projects and improve communication among different stakeholders (Carvalho, 2014).

This framework contributed to IS projects by considering the existing barriers that affect communication between the IT department and the business.

Coordination. Coordination was arguably the most cited critical factor in projects. Coordination is the sharing and use of information about the project activities within an organization. Coordination strategies provide a group of mechanisms to manage different dependencies in a project (Strode et al., 2012). Strode et al. (2012) determined coordination strategy had three components including synchronization, structure, and boundary spanning. Each component facilitated the coordination among project team members and stakeholders.

Synchronization referred to activities where all team members are simultaneously together, e.g. project meetings (Strode et al., 2012). Structure in coordination strategy included the availability of team members and their substitutability with another team member (Strode et al., 2012). The last component, boundary spanning, referred to activities to elicit assistance or information outside the project team (Strode et al., 2012). Coordination strategy helps project managers mitigate the risk of coordination problems during IS projects, by establishing coordination mechanisms that increase team availability.

Coordination Theory

Thomas W. Malone and Kevin Crowston developed coordination theory as the body of principles to coordinate activities and define how actors can work harmoniously together (Crowston, 1997; Malone & Crowston, 1990). Coordination theory was the framework to inform this study. Coordination in organizations refers to the integration of

different units to complete the tasks assigned (Hsu, Shih, et al., 2012). Business endeavors require coordination among human, and tangible and intangible resources. Malone and Crowston (1994) considered good coordination nearly invisible, and humans mostly notice the lack thereof.

Coordination theory applies to different disciplines, including computer science, organization theory, management science, economics, linguistics, and psychology (Malone & Crowston, 1994). The versatile nature of coordination theory demonstrated its applicability to this study promoting understanding of the procedures to advance coordination among activities and actors. Malone and Crowston (1994) identified several coordination processes: (a) managing shared resources and task assignments, (b) managing producer–consumer relationships, (c) managing simultaneity constraints, and (d) managing task and subtasks relationships.

Resource allocation processes help manage interdependencies between activities. This process includes task assignment or the amount of time a person will spend on any given task (Malone & Crowston, 1994). Gold (2012) considered this activity important in ISD projects because most organizations have limited resources, which causes project managers to compete for the available resources. The second process was a notification process in the relationship between consumer and producer, where one activity produced what members will use in other activity (Malone & Crowston, 1994). Considering that ISD projects have linked activities, coordination is central to avoiding changes within the project schedule. In every phase of the project, group decision-making and

communication were important factors when implementing coordination process (Lehtinen et al., 2014; Malone & Crowston, 1994).

Crowston (1997) tested coordination theory during a software change process for a computer manufacturing company. The purpose involved analyzing task assignment, resource sharing, and dependencies management. Crowston (1997) found coordination problems arose when dependencies constrained conducting a task. From this finding, Crowston (1997) explained several claims of coordination theory. The first claim determined that actors find the dependencies and the mechanisms to manage them in different settings (Crowston, 1997). The second claim identified there is more than one mechanism to manage dependencies (Crowston, 1997). The third claim summarized coordination theory by stating that actors identify the dependencies and the coordination problems, and then consider which alternate process to implement (Crowston, 1997). This theory suggested separating activities is necessary to complete the tasks and manage dependencies.

Jiang & Klein (2014) agreed with the claims of coordination theory; business leaders who establish effective coordination processes can manage project activities and avoid unpleasant surprises at all stakeholder levels and across functional boundaries within an organization. For example, on the Hoover Dam project, one of the factors that contributed to the success of the project was close coordination between the owner and project team (Kwak, Walewski, Sleeper, & Sadatsafavi, 2014). Several researchers concluded that day-to-day coordination was necessary to accomplish a project without delays, especially in complex and interconnected networks such as in the

telecommunication service industry (Aagaard et al., 2014; Karpowicz, 2012; Meixell et al., 2006; Ofori, 2013). Other researchers concluded that ineffective coordination was a central problem in IS projects. Several researchers studied the role of coordination in IS projects through the lens of coordination theory, which demonstrated the applicability of this theory in today IS research (Hsu, Shih, et al., 2012; Parolia et al., 2007; Strode et al., 2012).

Research regarding coordination of IS projects was diverse, and many of these researchers concluded that coordination was necessary for IS projects (McChesney & Gallagher, 2004; Strode et al., 2012). Mastrogiacomo et al. (2014) stated that several of the existing IS research based on coordination theory. Coordination theory was not used to predict but was a valuable tool for gaining a better understanding of how particular activities support coordination in businesses (Strode et al., 2012). In a study conducted by Mastrogiacomo et al., (2014) the authors stated that project managers recognized effective coordination as a central issue in IS projects. Effective coordination increased project performance because failure in IS projects results from coordination problems (Mastrogiacomo et al., 2014).

Coordination is a key activity in ISD projects, with interdependence as the driving force. Coordination theory stated task uncertainty and interdependence determined the use of the different modes of coordination (Hsu, Shih, et al., 2012). ISD projects have three features that require coordination to provide team members with the ability to solve problems and deliver the final product (Hsu, Shih et al., 2012). The first one identified ISD projects as large-scale (Hsu, Shih, et al., 2012). The second feature determined that

increasing uncertainty and the rapid change environment requires coordination (Hsu, Shih, et al., 2012). The third feature stated the need for interdependence arose from these projects, which required coordination (Hsu, Shih et al., 2012).

M. Doherty (2011) suggested ISD projects were especially dependent upon coordination, as poor coordination resulted in poor requirements definition, schedule setbacks, and other system-level problems. Several internal factors that influence a project relates to coordination. Mastrogiacomo et al. (2014) stated that coordination theory did not consider the cognitive aspects of situations and suggested the theory of joint activity for IS project management research. Bangerter and Clark's (2003) approach specified the cognitive conditions necessary for effective coordination and the linguistic acts to accomplish coordination.

Bangerter and Clark's methods described how people used language to coordinate activities using Clark's common ground theory as a base (Mastrogiacomo et al., 2014). The purpose was to improve real-time team coordination and facilitate detection and repair of coordination problems (Bangerter & Clark, 2003). Although researchers can apply their methods to conduct research regarding IS projects, I chose Crowston and Malone's (1994) coordination theory because it encompassed every aspect, while Bangerter and Clark focused on the communication among project actors.

Understanding the role coordination plays in projects help offset the costs associated when lack of coordination occur in a project. Coordination costs were higher when project activities were smaller, as there is more information exchange between actors (Meixell et al., 2006). In ISD projects, coordination costs were higher due to the

amount of interaction between developers, client, and users, when developing a system to satisfy all of the actor's needs. Coordination was a central problem in ISD projects when the information exchange among actors is insufficient (Parolia et al., 2007). Coordination was a concern when determining the number of resources and tasks needed in IS activities (Meixell et al., 2006).

Transition

In section 1, I set the foundation for this study, which established the background, business problem, research question, and theoretical framework. In addition, I presented a brief introduction of the research method, interview questions, and the significance of the study to affect positive change in business practices and the greater society. The literature review explored the existing body of literature on this research topic. This review provided detailed information about the topic and its relevance to today's practice. Having a clear focus on the study and a deeper understanding of the topic helped explore and examine the development of the research.

Section 2 expands on the methodology and design of the study, introduced in Section 1. Section 2 focuses on the proposed qualitative research study regarding the strategies used by project managers to control internal factors throughout the phases of an ISD project in the telecommunication service industry. This section will provide a deeper understanding of the role of the researcher, the study participants, and the methodology. Section 3 will present the findings of the study. In this section, I include the presentation of findings, applications to professional practice, implications for social change,

recommendations for action, and future study. Finally, I end Section 3 with a summary and conclusions.

Section 2: The Project

The information presented in Section 1 supported the research problem. Section 2 presents the development of the study focusing on the role of the researcher, research participants, research method and design, population and sampling, ethical practices, data collection instruments, data collection techniques, data organization techniques, and reliability and validity of the study.

Purpose Statement

The purpose of this qualitative multiple case study was to explore strategies IS project managers use to control internal factors in the telecommunication service industry in Puerto Rico. I aimed to identify strategies used to control internal factors in the different phases of a project (Patanakul & Shenhar, 2012). In this study, I focused on the experiences of project managers who successfully implemented strategies to control internal factors in ISD projects in the telecommunication service industry. The participants included six IS project managers who had successfully managed IS projects in Puerto Rico's telecommunication service industry. Understanding the strategies to control internal factors of ISD projects may contribute to increasing successful project outcomes. The successful implementation of IS projects is important for the success of any company and can have a positive social impact by providing society with goods and services that create a higher standard of economic living in the community (Byerly, 2013; Cârstea, 2014).

Role of the Researcher

In qualitative research, the researcher plays a key role in conducting the study. The role of the researcher includes designing the study and obtaining the required approval from the institutional review board (IRB) before the data collection process (Hamersly, 2015). The researcher must play an active role in the collection, organization, and descriptive analysis of the data collected (Hooper, 2013). In case study research, data collection often involves individual interviews, observation, and document analysis (Houghton, Casey, Shaw, & Murphy, 2013; Yin 2014). To conduct interviews, researchers must establish a trustworthy relationship with the participants to capture their experiences and knowledge about the topic (Sanabria, 2014). During the interview phase of the study, I followed an appropriate interview protocol to enhance each interview session and ensure consistency in the interview process.

The semistructured interview protocol I employed consisted of standardized open-ended questions and the use of a script at the beginning and end of each interview (Jacob & Furgerson, 2012). Following an interview protocol, researchers ask the same open-ended questions to each participant (Turner, 2010). The levels of questions went from the general description of the case to the specifics to build confidence and trust with the interviewee (Jacob & Furgerson, 2012). Researchers must bracket their experiences and listen to the experiences of the participant to understand how the participant feels about the phenomenon (Jacob & Furgerson, 2012; Tomkins & Eatough, 2013). To ensure a correct interpretation of the participant's answers, I asked participants to review the transcript of the answers provided (Harper & Cole, 2012).

My role was to identify strategies that emerged from the participants' experiences according to interview data and documentation analysis. In qualitative case study research, the researcher must be familiar with the topic of study (Anosike, Ehrich, & Ahmed, 2012; Yin, 2014). I am a process and project manager in a telecommunication service industry with experience in ISD projects. I conducted the study with participants from my place of employment, as well as with members of the PMI chapter in Puerto Rico.

Having a professional relationship with participants is acceptable when the research pertains to the researcher's profession (Swar, Moon, Oh, & Rhee, 2012). To ensure the integrity of the study, I did not consider employees under my direct supervision. Part of a researcher's role is to be the instrument to gather and interpret data (Khan, 2014a). In this process, the researcher must be neutral to avoid bias in the interpretation of the results (Khan, 2014a). Epoche, or bracketing, is a process researchers follow to avoid bias. Bracketing means leaving out of consideration all existing personal beliefs, preconceptions, or assumptions to get straight to the participants' experiences (Moustakas, 1994; Sanders, 1982). To avoid bias, I identified the bias and engaged in bracketing to avoid influencing the participants' description of the experience (Dowling & Cooney, 2012).

The *Belmont Report* presented three basic ethical principles that researchers must follow when conducting research involving humans (National Commission for the Protection of Human Subjects in Biomedical and Behavioral Research, 1979). These three principles included respect for persons, beneficence, and justice. Respect for

persons dictates that a researcher must provide participants relevant information that allows them to participate voluntarily, and to respect their opinions in the study. Beneficence dictates that researchers have an obligation to treat individuals in an ethical manner by respecting their decisions and protecting them. Justice dictates the protection of some classes during the selection process of participants.

To comply with these ethical principles, I provided each participant with an informed consent form to ensure each participant understood the purpose of the study and their voluntary participation. The nature of this study did not require physical contact between the participants and myself. I followed the interview protocol to promote an atmosphere of respect and honesty. The interview consisted of general, broad, open-ended questions to allow the participants opportunities to describe their experiences (Bevan, 2014). Considering the participants' voluntary participation, I conducted the interviews during a time that suited their availability. To maintain the integrity of the participants' responses, during the interviews, I requested additional clarifications and provided the participants a summary of their responses to determine accuracy (Sousa, 2014). In addition, I conducted transcript review and follow-up interviews to clarify any questions I had. Harper and Cole (2012) supported these validations as part of member checking strategy (Harper & Cole, 2012).

Participants

Purposeful and snowballing sampling are used to select participants with knowledge on the topic of the study, which could promote engagement of participants (Robinson, 2013; Thomas, 2015). I used purposeful and snowballing sampling to select

participants for this study. Purposeful sampling is a qualitative strategy that helps achieve representation of relevant perspectives about the topic of inquiry (Ware et al., 2012). Snowball sampling is a strategy used by researchers to have participants refer candidates who meet the study criteria (Trotter, 2012).

To gather the necessary information, I selected participants who had knowledge gained from their experience on the topic (Van Der Velden & Emam, 2012). The selection criteria included participants who resided and practiced project management in Puerto Rico, who had successfully implemented ISD projects in the telecommunication service industry, and who had a minimum of 2 years of experience working in IS projects in the telecommunication service industry. In qualitative research, the primary question when selecting the participants is, do you have the experience that I am looking for? (Englander, 2012). These three criteria helped inform the study and were important to establish alignment with the research question.

Sample sizes for qualitative studies range from five to 50, which is a smaller sample size than the sample required for a quantitative study (Dworkin, 2012). In case studies, the sample size depends on the uniqueness of the research topic (Marshall, Cardon, Poddar, & Fontenot, 2013). Reaching saturation is the general rule for determining the sample size (Dworkin, 2012). The concept of saturation means that findings become repetitive, and the researcher will not gain any new insight (Lohle & Terrell, 2014). In case studies, $N = 1$ is an adequate sample size (Robinson, 2013; Thomas, 2015). To conduct this study, I selected two companies from the

telecommunication service industry and interviewed six participants who had successfully managed an ISD project within each company.

The nature of the case study makes it harder to classify the adequate sample size (Marshall et al., 2013). My sample size followed Yin's (2013) recommendation of at least six sources of evidence. To gain access to these participants, I used several strategies including starting with a group of my professional peers and including managers referred by peers and acquaintances who had experience related to this study. I established communication with participants in person, by email, or by phone to communicate the purpose of the study and determine their willingness to participate.

To select the sample, I focused on participants who had successfully implemented an ISD project within the telecommunication service industry. Once I identified the participants, I established a collaborative relationship with them. Building a successful working relationship with participants is essential in qualitative research (Thomas, 2015). To establish this relationship, I was clear about the purpose of the study and my intentions. I established open communication channels with the participants by answering all of their questions.

An important factor of research is maintaining the confidentiality of and information contributed by research participants (Palys & Lowman, 2012). To ensure confidentiality, I assigned codes to each case and alphanumeric codes to conceal participants' identities (Thomas, 2015). I respected the participants' personal and professional needs and conducted the interviews during a time that was convenient for them.

Research Method and Design

Method and design are important aspects of research. Methodology refers to the strategy that guides the study, which consists of theoretical, political, and philosophical assumptions and their implications in research practice (Wahyuni, 2012). Method refers to the technique used to acquire and analyze the data (Petty, Thomson, & Stew, 2012; Wahyuni, 2012). To select an appropriate research method, the researcher must state the research question of the study. Having a clear and defined research question will help the researcher identify the method that helps answer the established research question (Wahyuni, 2012; Yin, 2014). In this study, I explored the strategies implemented by project managers to control internal factors in ISD projects in the telecommunication service industry. This section presents the research method and design for this study.

Research Method

Research methodology refers to the process or strategy used by a researcher to acquire knowledge about a topic (Khan, 2014a; Petty et al., 2012). I chose qualitative methodology to conduct this study. In a qualitative study, researchers seek to understand the meaning of experience in a study sample, through written texts or transcriptions of individual interviews or focus group conversations (Grossoehme, 2014). Qualitative research aligned with the focus of this study because it allowed participants to communicate their perceptions according to their experiences (Khan, 2014a). Qualitative methodology provided a better fit for studying IS due to the difficulties in reducing the complex social and technical phenomena in the IS field into quantitative data (Goldkuhl, 2012).

Researchers can perform qualitative IS research using an interpretivism paradigm (Goldkuhl, 2012). Research paradigms are assumptions about the perception of the world, which guides the behavior of a researcher (Wahyuni, 2012). Interpretivism is an established paradigm in IS qualitative research (Goldkuhl, 2012). The interpretivism paradigm allows the researcher to understand how members of a social group provide meaning to their realities and how these meanings constitute their actions (Goldkuhl, 2012). I chose an interpretivism paradigm to promote listening to participant experiences about the strategies used to control internal factors in ISD projects (Khan, 2014a). Interpretivism is a branch of ontology (Goldkuhl, 2012; Khan, 2014a), which focuses on how participants and researchers perceive reality (Khan, 2014a). To understand the participants' perceptions, I conducted in-depth semistructured interviews.

I chose qualitative methodology over quantitative or mixed methods because a qualitative approach allows researchers to gain a deeper understanding of a phenomenon (Toloie-Eshlaghy et al., 2011). Quantitative and mixed-methods research contains the element of testing a predetermined hypothesis and assumes that there is an independent reality irrespective of the investigation (Allwood, 2012). Qualitative research allowed me to explore the lived experiences of the participants and gain a deeper understanding of the PM practices in the IS field (Goldkuhl, 2012). Conducting in-depth qualitative research enabled me to gain a deeper understanding of IS project success criteria (McLeod et al., 2012).

Researchers conduct quantitative research to explain phenomena according to numerical data that researchers analyze using mathematical methods including statistics

(Yilmaz, 2013). Quantitative research is conducted to test theories with statistical tests (Hoare & Hoe, 2013; Yilmaz, 2013). A quantitative method was not appropriate because the purpose of this study did was not to test a theory or use numerical data (Hoare & Hoe, 2013). Quantitative research assumes that social phenomena have an objective reality independent of the actors (Yilmaz, 2013). This assertation contradicts the purpose of my study, which was to gain a deeper understanding of the strategies used by project managers to control internal factors that affect ISD projects in the telecommunication service industry. The in-depth exploratory nature of this study did not allow the use of quantitative methods (Lund, 2012).

A mixed-methods approach blends qualitative and quantitative methods (Lund, 2012; Venkatesh, Brown, & Bala, 2013). This method is appropriate when neither qualitative nor quantitative research alone is enough to understand the phenomenon (Venkatesh et al., 2013). Neither a quantitative nor a mixed-methods approach was appropriate for this study. The qualitative method provided the in-depth understanding required in this study.

Research Design

I chose a multiple case study research design to conduct this study. A multiple case study is appropriate to obtain a holistic and real-world perspective of the phenomenon (Yin, 2014). A case study is a qualitative design that allows an in-depth investigation of a contemporary phenomenon that does not have clear defined boundaries between the phenomenon and its context (Wynn & Williams, 2012; Yin 2014). A case study addresses research questions that require an in-depth understanding of a social or

organizational process (Moll, 2012). A multiple case study allows the researcher to make comparisons in diverse settings (Houghton et al., 2013). Using a multiple case study with different data sources provides robust and accurate answers to the research questions (Houghton et al., 2013).

A multiple case study research is appropriate to study the phenomenon within the context of work, allowing the researcher to get close to the individuals and day-to-day operations (Moll, 2012). Case studies are a common research design in business research (Thomas, 2015; Yin, 2014). Several researchers conducted project management and IS research using case study design. For example, Thomas (2015) conducted a case study research regarding IS retention strategies. Aagaard et al. (2014) investigated coordination in projects using a case study. Carvalho (2014) investigated IS project management using a case study.

The diversity of business research using case study demonstrated the viability of this design regarding IS project management research. The focus of this research was to understand how project managers control internal factors in ISD projects. A multiple case study design was appropriate to examine the strategies used by project managers to control internal factors in ISD projects, through semistructured interviews and document analysis.

In qualitative studies, researchers can select a phenomenology design, ethnographic design, or grounded theory design. A phenomenological research allows an in-depth exploration of a process from the perspective of one or more individuals (Finlay, 2013). Herein, data emerges from the experiences of participants (Lohle & Terrell, 2014;

Moustakas, 1994). Phenomenology research begins by examining the individual phenomena, followed by an analysis of how the meanings developed and ends with the individual experience review (Sanders, 1982). This research focuses on studying a unique phenomenon, but this research seeks to understand the strategies used by project managers to control internal factors in projects. A phenomenology design was not appropriate because there are diverse studies regarding the factors affecting IS projects.

Ethnography involves extensive fieldwork (Moustakas, 1994) and focuses on the study of cultural groups in their natural settings (Grossoehme, 2014; Hallett & Barber, 2014). The focus of ethnographic research is to understand the behaviors of a culture and not to understand a phenomenon through the participants' perceptions (Thomas, 2015). Ethnography was not the appropriate research design for this study.

Grounded theory research focuses on unraveling the elements of experience to develop a theory that enables researchers to understand the nature of that experience (Moustakas, 1994; Thornberg, 2012). The purpose of a grounded theory research is to develop a theory from the data collected and analyzed in the field (Grossoehme, 2014; Khan, 2014b). A grounded theory design was not appropriate since the aim of this study was to gain a deeper understanding of strategies used by project managers to control internal factors in ISD projects, not to develop a theory.

In qualitative studies, obtaining an adequate sample is fundamental when performing credible research (Marshall et al., 2013). Sample sizes for qualitative studies range from five to 50, which is a smaller sample size than the sample required for a quantitative study (Dworkin, 2012). In case studies, the sample size fluctuates depending

on the uniqueness of the research topic (Marshall et al., 2013). Reaching saturation is the general rule for determining the sample size in a qualitative study (Dworkin, 2012). Data saturation occurs when findings become repetitive, and the researcher will not gain any new insight from additional data (Khan, 2014a; Lohle & Terrell, 2014).

I interviewed three participants from each case until I reached data saturation. Previous multiple case studies conducted in PM had different sample sizes. In a study conducted by N. F. Doherty et al. (2012) the authors conducted research using three cases with 10 participants from each case. In another study conducted by Boonstra (2013) the author used five cases with three to five participants from each case. Bigliardi, Dormio, and Galati (2012) conducted PM research in the telecommunication industry in Italy, using three cases with three participants from each case. The diversity of cases and participants demonstrated that the sample size depended on the availability of cases and participants who had experience in the topic.

Population and Sampling

In IS research, a variation of sample size was present in all research designs (Marshall et al., 2013). Sampling is a central process in qualitative research to define the population from which the researcher will obtain the sample (Robinson, 2013). The total sum of individuals comprises the population from which researchers can obtain the sample (Robinson, 2013). Obtaining an adequate sample is fundamental to credible analysis and reporting (Marshall et al., 2013). Researchers must use inclusive or exclusive criteria to delineate the population (Robinson, 2013). For this study, I determined the population based on inclusive criteria. The criteria for the population

included participants who resided in Puerto Rico and participants who had successful experience managing projects in the telecommunication service industry.

Once the researcher identifies the population, the researcher must determine the sample size (Robinson, 2013). To determine the sample from the population, I included additional criteria directly related to the research question. The selection criteria for the participants of this study included participants who have successfully managed an ISD project in the telecommunication service industry and participants who had minimum 2 years of experience working in IS projects in the telecommunication service industry.

Based on these criteria, I applied purposeful sampling and snowballing techniques to select the participants of the study. Purposeful sampling is a qualitative strategy to achieve representation of relevant perspectives about the topic of inquiry (Ware et al., 2012). Snowball sampling starts with an individual, which meets the criteria for the study, and the researcher asks that individual to nominate other candidates with the required criteria for the study (Trotter, 2012). Both techniques help select participants with knowledge of the topic, which could promote engagement of participants in a study (Robinson, 2013; Thomas, 2015).

To evaluate if the individuals of the population have the criteria necessary for this study, I only selected participants who had experience successfully managing an ISD project in the telecommunication service industry. Having a pool of practitioners in the study provided a detailed understanding of constraints and ambiguities of the practice (Taylor, Artman, & Woelfer, 2012). Adequate estimation of sample size relates to the concept of data saturation (Marshall et al., 2013). Qualitative study sample sizes range

from five to 50 (Dworkin, 2012). In case studies, the number of participants could be as small as one case (Robinson, 2013). The number of cases and participants depends on the nature of the study (Marshall et al., 2013). In qualitative research, reaching saturation is the general rule for determining the sample size (Dworkin, 2012).

Ethical Research

Qualitative research allows researchers to gain an understanding of a person's experience, but can result in ethical challenges for participants and researchers (Aluwihare-Samaranayake, 2012). Ethical principles guide qualitative research involving human participants (Moustakas, 1994). For this study, I followed the ethical parameters established by Walden University's Institutional Review Board (IRB). The IRB is the regulatory committee responsible for approving research and overseeing ethical standards in human subject research (Blackwood et al., 2015). Before gathering data, I submitted the consent form and IRB application to seek official IRB approval. The informed consent form provides information regarding the purpose and duration of the study, nature of involvement, how the researcher will ensure participant confidentiality, possible risks for participants, and incentives if any (Aluwihare-Samaranayake, 2012). The informed consent for this study complied with Walden University's IRB requirements.

I provided this consent form to each participant before commencing the study, and I discussed all the elements included in the consent form with the participants. Providing the consent form before commencing the study gave the participant an opportunity to understand their role and the commitment requirement for the study

(Aluwihare-Samaranayake, 2012). Once I discussed the consent form with the participant, I gathered their signature.

Although the participant signs the consent form, the individual may withdraw from the study at any time (Mandava et al., 2012). Participants selected for the study had many responsibilities; if a participant wished to withdraw from the study, he or she could do so at any time by sending an email. If a participant wanted to remove their participation from the study, I would send a return acknowledgment email to complete the withdrawal process (Hamersly, 2015). I informed the participants that there was no payment for participating in this study. I offered a summary of the study's findings to each participant (Pee et al., 2014).

I took all necessary steps to ensure the ethical protection of participants. Any information provided by the participant was confidential, and I only used it for the purpose of this study. To ensure confidentiality, I assigned the participants an alphanumeric code to conceal participant identities (Thomas, 2015). In addition, I used code names to protect the company where the participant works. I respected the participants' personal and professional needs and conducted the interviews at a time that was convenient for the participants. I stored the research data files, containing the signed informed consent forms, interview recordings, and transcriptions in a secure encrypted file on an external hard disk drive for a five-year period (Hamersly, 2015; Lohle & Terrell, 2014; Thomas, 2015).

Data Collection Instruments

Once I obtained IRB approval to conduct the study, I began the data collection process. In qualitative research, the researcher is the primary data collection instrument and is an active respondent in the data collection process (Pezalla, Pettigrew, & Miller-Day, 2012; Xu & Storr, 2012). Interviewing is the dominant method of data collection in qualitative research (Bevan, 2014; Englander, 2012). A researcher must understand qualitative interviewing is a social interaction (Pezalla et al., 2012). I conducted semistructured interviews to collect data for this study. In case studies, researchers gather data using semistructured interviews, observation, and document analysis (Houghton et al., 2013). To conduct this study, I gathered information using semistructured interviews and document analysis.

To initiate contact with the participants, I used several strategies, including in-person, email, or phone contact with a group of my professional peers. I contacted project managers referred by acquaintances. Once I contacted the participants, I scheduled a time to conduct in-person interviews. During the interview process, I established communication with each participant to clarify any questions the participants may had regarding the process, confirmed availability, scheduled the interview, and presented the consent form to the participants. I conducted the interview in a setting convenient to the participant. This location should be outside the place of employment, to promote interaction and reduce interruptions (Doody & Noonan, 2013).

I employed an in-person semistructured interview protocol (see Appendix A) consisting of standardized open-ended questions. I used a script at the beginning and end

of each interview to maintain consistency (Jacob & Furgerson, 2012). In this interview protocol, researchers ask the same open-ended questions to each participant (Turner, 2010). The levels of questions go from basic to the most complex to build confidence and trust with the interviewee (Doody & Noonan, 2013; Jacob & Furgerson, 2012).

I recorded and transcribed each interview. In cases where participants would not agree to a recorded interview, I would use detailed notes of the participants' responses (N. F. Doherty et al., 2012). To validate a correct interpretation of the participants' answers, I engaged in member checking practice. Member checking practice serves as a means of quality control by allowing participants validate the accuracy of the summaries reflecting their views and by reviewing the transcript of the answers provided (Harper & Cole, 2012).

Data Collection Technique

In qualitative studies, there are several techniques to collect data. Techniques are the method researchers use to gather and analyze data to produce knowledge about the specific topic (Petty et al., 2012). The techniques used in qualitative research are individual interviews, focus groups, observation, and documentary analysis (Petty et al., 2012). I used individual semistructured interviews and documentation analysis as the method to acquire data. Consistency in data collection is important to ensure the credibility of research results (White, Oelke, & Friesen, 2012). To ensure consistency, I employed the interview protocol and used the same method for every participant.

The semistructured interviews consisted of eight questions designed to inform this study and answer the research question: What strategies do some IS project managers in

the telecommunication service industry use to control internal factors to reduce the risk of failure of ISD projects? The questions developed from the description of the experience to specific questions about that experience:

1. Which ISD project you successfully managed?
2. Positioning yourself in that project, which were the internal factors you encountered throughout the project?
3. In which of these project phases; initiating, planning, executing and closing did you encounter the mentioned factors?
4. Which of these factors would you consider as the most critical?
5. Which of these factors were present in every phase of the project?
6. Which strategies did you adopt to control these factors successfully?
7. Among these strategies, which is the one that you adopt to control the most critical internal factor?
8. How did you coordinate all the activities to complete the project?

The first question sought to engage the participant in sharing a successful experience managing an ISD project. The following two questions sought to learn from the participants' experience. The fourth and fifth questions sought to understand what was the top critical factor for the participant and if any of the factors were present in every phase of the project. The sixth and seventh question sought to gather knowledge about the strategies used by the participant throughout the project. The last question of the interview directly related to coordination theory.

The length of the interviews depends on the research question and the research strategy (Rowley, 2012). I asked the participants to allocate 1 hour to 1½ hours to conduct the interviews, which concurred with the length of the interviews in a PM study conducted by Heising (2012). During each interview, I recorded and wrote notes of the answers provided by the participant (N. F. Doherty et al., 2012; Doody & Noonan, 2013).

I incorporated three levels of notes to help in the coding process and initial data analysis (N. F. Doherty et al., 2012). These levels consist of notes taken at the time of the interview, notes as soon as possible after the interview, a fieldwork journal to record the research process, problems or ideas (N. F. Doherty et al., 2012; Grossoehme, 2014). The notes taken at the time of the interview included keywords or phrases that enabled reflection of the discussion and elaboration of ideas (Doody & Noonan, 2013).

The advantages of using semistructured interviews as the data collection technique outweigh the disadvantages this method presents. Semistructured interviews allow the researcher to obtain rich and thick descriptions of the participants' experiences (Yilmaz, 2013). These descriptions are essential to gain a clear understanding of the strategies used by practitioners in ISD projects. This technique allows the researcher to posit follow-up questions, according to the responses given by the participant.

The major hurdle of this method is taking notes during the interview. The researcher must maintain a balance between taking notes and maintaining eye contact with the participant (Jacob & Furgerson, 2012). Eye contact, showing empathy, carefully listening, and maintaining a neutral demeanor are essential in building trust in a relationship with the participants (Doody & Noonan, 2013).

I requested permission to collect case documents to complement the semistructured interviews. In case studies, the most important use of documents is to validate and corroborate evidence from other sources (Yin, 2014). To obtain access to documentation, the participants provided several documents for the specific projects under study (Yin, 2014).

The data must include a clear description of participants, activities, interaction, and settings to ensure credibility and trustworthiness in a study (Yilmaz, 2013). In addition to a thick description, a second important element in conducting a credible and trustworthy study is to implement member checking as part of the data collection process (Yilmaz, 2013). Member checking provided an opportunity for the participants to validate the accuracy of the summaries reflecting their views, and to correct any inaccuracies in the transcripts (Harper & Cole, 2012). I sent each participant the transcript via email and provided five days for review and comments. Once I received the participant comments, I analyzed the comments. In cases were necessary, I scheduled a follow-up interview to clarify any questions and ensure validity (W. T. Wang, & Ko, 2012).

Data Organization Technique

Organization of the data is essential to conduct in-depth analysis and obtain accurate research results to ensure the success of qualitative research (White et al., 2012). Data organization begins with the transcription of the interviews. To organize the data, I transcribed each interview using Dragon 13. I saved each transcription in a digital folder. To ensure the confidentiality of each participant, I saved each record according to the

pre-assigned participant alphanumerical number. I maintained a fieldwork journal to record the research process, ideas, or problems that arose during the data collection phase (N. F. Doherty et al., 2012; Grossoehme, 2014).

I used NVivo 10 software to code and store data preserving participants' confidentiality. The use of NVivo 10 facilitated the identification of patterns of emerging themes from all the data. I stored the research data files containing the signed informed consent forms, interview recordings, transcriptions, and company documentation in a secure encrypted file on an external hard disk drive for a five-year period (Hamersly, 2015; Lohle & Terrell, 2014; Thomas, 2015). After the five-year period, I will destroy all documentation and erase the external hard disk drive.

Data Analysis

Anosike et al. (2012) urged researchers to consider case study analysis to provide a better understanding of managerial processes. As per the interview protocol, I asked each participant the eight questions listed in Appendix B. In addition to data collected through these interviews, I applied data triangulation of company documents to enhance the validity of the findings (Houghton et al., 2013). Data analysis is a critical step in qualitative research, where the researcher is the primary instrument (Z. C. Y. Chan, Fung, & Chien, 2013).

The purpose of data analysis is to uncover themes to answer the central research question. Yin (2014) presented four triangulations that apply to case studies: data triangulation, investigator triangulation, theory triangulation, and methodological triangulation. For the purpose of this study, I employed data triangulation to obtain

accurate results. Data triangulation allows the researcher to confirm the data obtained from the semistructured interviews with company documentation (Yin, 2014).

Data analysis involves working with the data to discover meaningful themes, patterns, and descriptions to answer the research question of the study (Thomas, 2015; Yin 2014). I followed Yin's (2011) five analytic phases composed of compiling, disassembling, reassembling, interpreting, and concluding. The analytical process followed the process used by Thomas (2015) in a study to analyze retention among IT professionals. I began this process by recording all interviews in audio format and then transcribed each interview (Sanabria, 2014).

I used Dragon 13 software to transcribe each interview (Hamersly, 2015). I sent each transcription to each participant for validity before commencing the analysis of the data (Jacob & Furgerson, 2012; Sousa, 2014). To maintain the integrity of the participants' description, the researcher may request clarification about the descriptions or additional details of certain aspects, before analysis of the data (Sousa, 2014). During the interviews, I requested additional clarifications and provided the participants a summary of their responses to determine accuracy. In addition, I conducted follow-up interviews to clarify any questions I may had.

Once the participants validated the transcriptions, I transferred the validated files into NVivo 10 software to classify, code, sort, and analyze the data. Qualitative software facilitates data management and analysis promoting a manageable and rigorous process (Ishak & Bakar, 2012). Using NVivo 10, I began Yin's (2011) process of compiling the data, which was the process of organizing the data. The second step was to disassembling

or coding of the data. Coding is the process of tagging segmented data with category names or descriptive words and then grouping the data (Thomas, 2015).

Researchers conduct coding of data when identifying patterns and themes during the reassembling process, which is the third step (Gill 2014; Ishak & Bakar, 2012). To complete this step, I used the auto-coding feature in the NVivo 10 software to identify emerging themes, which increased the rigor of the study (Hilal & Alabri, 2013). NVivo 10 provides the researcher an opportunity to discover tendencies and themes to derive a conclusion (Hilal & Alabri, 2013). I used the nodes function to assign a node to each one of the interview questions (Sotiriadou, Brouwers, & Le, 2014). I labeled each interview question using project management (PM) and the number of the question, PM1 to PM8 (Sotiriadou et al., 2014). The emergence of themes was the key indicator of successful reassembling of the data (Yin, 2011).

The fourth step was to interpret the meaning of the data to make sense of the findings (Yin, 2011). During this step, the researcher provides meaning to the data, which is necessary to understand and describe the data (Thomas, 2015). To achieve this understanding, I read and reread each interview transcription to get a sense of the whole description provided by the participant. I used bracketing to avoid having any preconceived ideas (Flood, 2010; Gill, 2014). I correlated key themes that emerged from the analysis with the literature review, to identify if the theme previously emerged in other studies. The last step in the analysis was to arrive at conclusions. Concluding is the development of statements that raises the findings of a study to a higher conceptual level (Yin, 2011). The result of this analysis sought a comprehensive understanding of the

strategies used by project managers to control the internal factors that influence ISD projects in the telecommunication service industry.

Reliability and Validity

Reliability

Quality is a key aspect of qualitative research. Quality must be present in every step of the research (Ali & Yusof, 2011). Researchers must pay careful attention to reliability and validity (Morse, Barrett, Mayan, Olson, & Spiers, 2002). Reliability refers to the consistency of findings, which occurs when the researchers reached saturation or no new information emerges from the data collection process (Trotter, 2012; Wahyuni, 2012). In qualitative research, reliability and validity parallel the concept of trustworthiness. Trust encompasses dependability, credibility, transferability, and confirmability (Golafshani, 2003; Morse et al., 2002; Wahyuni, 2012).

To ensure reliability in qualitative research, researchers must examine the study's trustworthiness through dependability. Dependability parallels reliability in qualitative studies. Dependability refers to repeatability and replicability of the study (Wahyuni, 2012; Yilmaz, 2013). Researchers must apply strategies such as systematic data collection procedures, multiple data sources, triangulation, thick and rich description, and audit trails to establish the trustworthiness of the study (Yilmaz, 2013). I applied systematic data collection and audit trail strategies to established dependability in the study.

I ensured dependability by conducting the interviews using an interview protocol (Appendix A). The semistructured interview protocol consisted of standardized open-

ended questions with a script at the beginning and end of each interview (Jacob & Furgerson, 2012). The use of this protocol allowed me to maintain consistency, by asking the same open-ended questions to each participant (Turner, 2010).

I maintained a fieldwork journal to record the research process (Grossoehme, 2014). I recorded ideas or problems that arose during the data collection phase in the journal (N. F. Doherty et al., 2012). This journal serves as an audit trail that enables the examination of the research process and output (Wahyuni, 2012). These strategies ensured reliability in the study by promoting consistency and systematic descriptions of the research process.

Validity

Validity refers to how well the results of the study reflect the phenomena observed by the researcher (Grossoehme 2014; Wahyuni, 2012). In qualitative studies, credibility, transferability, and confirmability are the equivalent of internal and external validity in quantitative studies (Wahyuni, 2012).

Credibility. Credibility refers to the extent researchers considered results to be believable from the participants' perspective (Venkatesh et al., 2013; Wahyuni, 2012). I applied interview transcript review, and a validation of the interview findings as part of member checking strategy, and triangulation to ensure the credibility of the findings. During the interviews, I requested additional clarifications and provided the participants a summary of their responses to determine accuracy. I sent each participant the interview transcript via email and provided five days for review and comments. When I received the participants' comments, I analyzed them. In cases where necessary, I scheduled a

follow-up interview to clarify any questions and ensure validity (W. T. Wang & Ko, 2012). Member checking provided the opportunity to validate the accuracy of the interview statements, and to correct any inaccuracies in the transcripts and interpretation of the findings of the study (Harper & Cole, 2012).

The last strategy I applied was triangulation. Triangulation improves case study validity (Yin, 2014). Triangulation refers to crosscheck data collected from different sources for consistency (Wahyuni, 2012). I crosschecked the findings of the interviews against the documents provided by the participants. These three strategies ensured the credibility of the study.

Transferability. Transferability of findings is important to establish the validity of a study. Transferability refers to the extent researchers can use the findings in another similar context (Moon et al., 2013). To ensure transferability of the study findings, I provided rich and thick descriptions of the data collection and analysis process, which is consistent with IS research (Venkatesh et al., 2013). In addition, I provided rich descriptions of the participants of the study, which included project managers with at least 2 years of experience in ISD projects.

Confirmability. The last component of validity is confirmability. Confirmability refers to the degree to which others can corroborate the findings to ensure the results reflect the experiences of the participants (Venkatesh et al., 2013; Wahyuni, 2012; Yilmaz, 2013). I used audit trail, triangulation, and peer debriefing to ensure confirmability of the study. Peer debriefing ensures an honest analysis of the study by involving other researchers to review the findings, to determine how well these findings

resonate with participants and audience experiences (Yilmaz, 2013). I submitted the proposed study for review to a doctoral committee, including a professional methodologist to ensure proper evaluation and debriefing (Thomas, 2015). The use of the different strategies ensured that this study has reliability and validity. In addition to reliability and validity, data saturation is a crucial factor in qualitative studies, since obtaining an adequate sample is fundamental when creating credible research (Marshall et al., 2013). To ensure data saturation, I interviewed three participants from each company.

Transition and Summary

The focus of this study was to understand the strategies used by project managers to control the internal factors that influence ISD projects in the telecommunication service industry of Puerto Rico. I chose to conduct a qualitative study because this methodology provided the processes and strategies needed to gain the understanding I was seeking. Section 2 presented a detailed explanation of my role as the researcher, and a rich description of the participants and the sample size. The interview protocol consisted of semistructured interviews with eight questions. The use of this protocol allowed maintaining consistency throughout the research, asking the same open-ended questions to each participant (Turner, 2010). I conducted this study upholding the utmost ethical standards and I employed different strategies to ensure reliability and validity.

Within Section 2, I revealed the research methodology, purpose statement, role of the researcher, participants and sample size, research method and design, data collection and analysis, and the reliability and validity of the data collected. In Section 3, I include

the presentation of findings, applications to professional practice, implications for social change, recommendations for action, and future study. Finally, I end Section 3 with a reflection and conclusions.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative multiple case study was to explore strategies IS project managers used to control internal factors in ISD projects in the telecommunication service industry in Puerto Rico. In this study, I aimed to identify strategies used to control the internal factors throughout the different phases of a project. Once I obtained IRB approval to conduct this study (IRB Approval #05-11-16-0474244), I began the data collection process. The data collection process involved semistructured face-to-face interviews with six participants who had more than 5 years of IS project management experience within two important telecommunication service companies in Puerto Rico.

As established in my interview protocol, I recorded, translated (where applicable), and transcribed the interviews, which provided an opportunity to be thoroughly familiar with the data collected from each participant. Also, I triangulated the findings with project documentation that each participant provided. I used NVivo 10 software to code and analyze data and identify themes. Five themes emerged from the data analysis: (a) top management support as the top critical factors (TCF) in the initiating phase, (b) clear requirements as the TCF in the planning phase, (c) communication as the TCF in the executing phase, (d) lessons learned as the TCF in the closing phase, and (e) project plan as the TCF in the monitoring and controlling phase. These themes provided insight regarding the most critical internal factors in each phase and the corresponding strategies

project managers used to control these factors in ISD projects in the telecommunication service industry in Puerto Rico.

Presentation of the Findings

The overarching research question of this study was as follows: What were the strategies used by some IS project managers in Puerto Rico's telecommunication service industry to control the internal factors and reduce the failure risk of ISD projects? To answer this research question, I conducted semistructured interviews and reviewed and analyzed supporting project documentation provided by each participant to triangulate the participants' responses. I conducted the interviews in a place selected by the participant. To ensure confidentiality of the participants and the organizations, I coded each company and participant as presented in Table 3.

Table 3

Participants and Organization Codes

Company A	Company B
Participant CA-P1	Participant CB-P4
Participant CA-P2	Participant CB-P5
Participant CA-P3	Participant CB-P6

The focus of this study was ISD projects designed to develop artifacts that support the business operation (Hsu et al., 2013). The selected projects included systems to manage customer information, systems to integrate different platforms, and systems to manage value-added services. Table 4 shows the description of the projects discussed in the interviews.

Table 4

Project Descriptions

Project Descriptions	Participant
System implementation that allowed added function and the ability to manage customer's wireless subscriptions.	CA-P1
A new ordering system for the corporate sales and customer service department.	CA-P2
An address validation front end included in the sales ordering system.	CA-P3
A regulatory system to validate participants' enrollment in the federal subsidy program.	CB-P4
An integrated system that customer service personnel could access to conduct commercial efforts.	CB-P5
A system to monitor customers' roaming usage.	CB-P6

Five themes emerged from the data analysis: (a) top management support as the TCF in the initiating phase, (b) clear requirements as the TCF in the planning phase, (c) communication as the TCF in the executing phase, (d) lessons learned as the TCF in the closing phase, and (e) project plan as the TCF in the monitoring and controlling phase. The generated themes provided a broad and clear understanding of the frequent internal critical factors that IS project managers encountered in the different phases of ISD projects in the telecommunication service industry in Puerto Rico. In addition, the themes provided insight into the strategies the project manager implemented to control the factors, as well as how the project managers coordinated ISD projects.

First Theme: Top Management Support as the TCF in the Initiating Phase

In the initiating phase, the most frequent internal factor was top management support, which was an important determinant of IS project success. Top management

support is a set of desirable attitudes and behaviors that promotes IS project success (Boonstra, 2012). Participants CA-P1, CA-P2, CB-P4, and CB-P6 stated that ensuring top management support in this phase was a critical factor to reduce the risk of failure. Participants CB-P4, CB-P5, and CB-P6 stated that before beginning the project they made sure that each project had top management support. Participant CA-P1 indicated that top management support was a key factor in the development of the system. Participant CB-P4 indicated that the first step in conducting an ISD project was to validate that the project had top management support in the organization. Participant CB-P6 indicated that if the project did not have top management support, there would be a high probability that the organization would kill the project.

Several studies indicated that top management support was a critical factor in IS projects, which validated the findings that top management support is a critical factor in the initiating phase of ISD projects. Boonstra (2012) explained how critical top management support is in IS projects. Similarly, Liu, Wang, and Chua (2015) stated that one critical factor in IS project success is top management support. Liu et al. (2015) also noted that this support must include resources, participation, and involvement. Vuori et al. (2013) stated that top management support was a critical factor in IS project success. Also, Müller and Jugdev (2012), Nwakanma et al. (2013), and Ofori (2013) concluded that top management support was essential for the success of IS projects.

Project managers considered top management support as a critical factor in IS projects because it helps enhance the users' understanding and commitment to the project (Boonstra, 2013). Liu et al. (2015) stated that top management support might be the most

critical success factor in IS projects, which aligns with my participants' perception of this factor being the most critical in the initial phase of the project.

Top management support comprises resource provision, participation, and involvement (Liu et al., 2015). My study participants ensured top management support by implementing several strategies. In Company A, Participants CA-P1 and CA-P2 indicated that to ensure top management support, they conducted a kickoff meeting in which the participants explained the importance of the project and the benefits to the company. In this meeting, the participants gave managers the opportunity to express the perceived risks and present further suggestions to develop a system that met the stakeholders' requirements. Then, the participants created a project charter and had all top management involved signed this document. PMI (2013) and Abdul-Rahman et al. (2012) stated that preparing a project charter is a direct way in which top management formally accept and commit to the project. To ensure the top management remained engaged in the project, the participants conducted weekly status meetings, which helped keep the project on track and allowed participants to address any issue that could affect the project.

In Company B, the participants indicated that the first step was to validate that the project had top management support. To do so, participants conducted an initial meeting. Once they validated this support, the participants ensured continuity and active participation by providing weekly project progress reports to the CIO. Furthermore, Participant CB-P4 indicated that building a trusting relationship was essential to ensure top management support in the project. Rose and Schlichter (2013) asserted that trust is a key factor in ensuring top management support in ISD projects. Participant CB-P4

indicated that setting clear expectations about the capabilities of the IT department was key in building a trusting relationship with the top management.

The participants from both companies ensured top management support by conducting initial meetings and providing weekly status reports. An initial meeting with top management ensures that the project has the support needed and serves as a starting point for the project (Liu et al., 2015). Windapo et al. (2014) stated the importance of conducting status meetings. Furthermore, Boonstra (2013) stated that weekly meetings with top management demonstrated to the project stakeholders the top management's commitment.

Second Theme: Clear Requirements as the TCF in the Planning Phase

In the planning phase, clear requirements were the most frequent internal factor. Requirements are a condition or a specification that a system must possess to satisfy the stakeholder's interests (PMI, 2013). Requirements specifications have a pivotal role in ISD projects because clear requirements drive the communication between stakeholders and the project team, have a key role in the design and testing phases, and serve as a reference for project managers (Bjarnason, Unterkalmsteiner, Engström, & Borg, 2015). In IS project management literature, there is a plethora of research indicating the importance of clear requirements in IS projects. Hsu, Lin et al. (2012), Nwakanma et al. (2013), and Ahamed (2012) argued that requirements changes during ISD projects were one of the reasons ISD projects failed.

In this study, all six participants stated that requirements were a critical factor encountered in their projects. In Company A, Participant CA-P1 stated that requirements

documentation was the most critical task in the project and described requirements as the project umbrella. Specifically, Participant CA-P1 mentioned that a major challenge in the project was to document all requirements because the developer was a contracted company and it was important to ensure that stakeholders documented everything to avoid future development issues. Furthermore, Participant CA-P1 stated that additional challenges included translating these business requirements into technical requirements, and ensuring that the developing team did not lose any requirements in this translation.

Participant CA-P2 stated that requirement was a critical factor because this was a large project that impacted several systems, which complicated achieving consensus and approval of the system requirements. Participant CA-P3 indicated that requirements development was a critical factor because this project affected several departments such as collections, sales, and customer service, and each department had specific requirements for a universal system. Also, Participant CA-P3 identified needed to determine whether the departments had the technology needed to implement this system.

In Company B, Participant CB-P4 indicated that requirement documentation was a critical factor in the project because the team needed to define the front end and the interfaces with the federal agency to comply with the agency rules. Furthermore, Participant CB-P4 stated that the most important aspect was to identify what they were going to do, who was going to do it, and how they were going to do it. The identification of these aspects was the foundation of having strong and clear requirements in this project.

Participant CB-P5 mentioned that there was not a clear identification of all the requirements, which caused the implementation of change control. The complexity of this project required hiring external developers whom helped in the correct requirements definition. Participant CB-P6 stated that the requirements documentation was a critical factor because the business managers did not have a PM culture, which hindered the proper documentation of the requirements. Participant CB-P6 indicated that the commercial manager sent a requirements email containing only seven points. Also, the commercial stakeholders did not want to participate in the requirement development phase. In addition, in this project the finance director needed to ensure that these requirements did not have any negative impact on the business.

The participants stated that this critical factor emerged in the planning phase of the project. During the planning phase, the project stakeholders develop the different requirements for the system (McManus, 2014; Menéndez & da Silva, 2016; PMI, 2013). Though this critical factor emerged in the planning phase, the participants indicated that project managers must monitor and control this factor throughout the phases of the project. Bjarnason et al. (2015) and Becker et al. (2016) confirmed the statements of the participants.

Developing clear requirements in ISD projects is a complex task that require that project managers adopt different strategies to elicit those requirements successfully from the project stakeholders. The PM literature has a plethora of research regarding how to properly elicit and document requirements in IS projects (Bjarnason et al., 2015). The PMI (2013) presented several techniques to collect requirements, which included:

interviews, focus groups, facilitated workshops, group creativity techniques, group decision-making techniques, questionnaires and surveys, observations, prototypes, benchmarking, context diagrams, and document analysis. Furthermore, Bjarnason et al. (2015) expanded these techniques to include formal requirements specifications, requirements models, templates, user stories, and requirements expressed using natural language.

Both case study companies have a PM methodology project managers follow to obtain clear requirements for any IS project. Following the established methodology, both companies have a formal requirements document and stakeholders work sessions as the strategies used to elicit and gather clear requirements. These strategies concurred with the strategies presented by PMI (2013) and Bjarnason et al. (2015).

Formal requirements document. Both companies have a formal requirements document to gather all the requirements for every ISD project. In company A, this document is a business requirement document (BRD). A BRD is a template in which the stakeholders documented every requirement for the new system. As verified with the project documentation provided by the three participants this document contained the following sections:

1. Version control, which recorded every change realized in the document.
2. The introduction of the project containing the purpose, the actual business situation, the project scope, the general requirement of the system, stakeholders, definitions, and any supplemental graphics or flowcharts.
3. Functional business requirements.

4. Nonfunctional business requirements.
5. Approvals sheet, which contained the signatures of the different managers and their respective director.

Participant CA-P1 stated that the BRD allowed for proper documentation of the requirements. This document incorporated the criteria the business unit established for the system, including the different interfaces and processes the new system required. All three participants incorporated a business analyst (BA) to document the project requirements. The BA is a subject matter expert in requirements documentation. Participant CA-P1 indicated that the BA was a key player to obtained complete and clear requirements because this person had a greater understanding of the different systems. Participant CA-P2 indicated that the BA was a key factor because the analyst developed the requirements according to the specifications of the business stakeholders. Several studies supported the inclusion of a BA in IS projects. Nenickova (2013) studied the importance of BA in IS projects in the telecommunication industry. Additionally, Pee at al. (2012) indicated that BA has the responsibility of ensuring a clear understanding of the requirements and the system design.

In company B, the formal document is a Process Document (PD), which is similar as the BRD used in company A. As verified in the project documentation provided by the participants the PD contained the following sections:

1. Document elaboration, which stated the person that redacted the document.
2. Document revisions, which recorded every change realized in the document.

3. Approvals sheet, which contained the signatures of the different managers and their respective director.
4. Objective, which stated the objective of the document.
5. Scope, which included the scope of the document.
6. Glossary of terms.
7. As Is process, which was a description of the actual process the new system impacted.
8. Proposal description, which included a description of how the new system should operate.
9. To Be process, which was a description of how the new system would modify the existing process.
10. Addendums, which contained additional graphics, tables, or diagrams.

Although company B did not have a BA, the participants indicated that when eliciting and gathering the requirements personnel from the IT department participated, which enhanced the understanding to develop the system. All three participants stated that this active involvement of IT personnel was an advantage when filling out the systems requirements specification (SRS) document. This document translated the business requirements into the technical requirements used to develop the system. In addition, Participant CB-P4 added that timely involvement of IT personnel in the requirements process facilitated the presentation and approval of the proposed solution to the stakeholders.

Stakeholders work sessions. Both companies conducted stakeholders work sessions to elicit and document the business requirements for their respective systems. In company A, the meetings included every stakeholder and the assigned BA; while in company B, the meetings included every stakeholder and key IT personnel. Participant CA-P1 stated that in the work sessions the stakeholders established the business rules or the desired functions of the new system. In this sessions, the participant included the impacted operational areas, the assigned BA, and the contracted company, which allowed for a thorough documentation of the requirements. Additionally, during the work sessions Participant CA-P1 emphasized the importance of proper requirements documentation about the testing phase. Furthermore, Participant CA-P1 indicated that a key factor was the alignment between the project manager and BA because this alignment allowed for a prompt completion of the requirements documentation.

Participant CB-P6 indicated that having face-to-face meetings with all the stakeholders was critical because this was the first project that followed a proper PM methodology and stakeholders were apprehensive of the process. The meetings allowed for the stakeholders to understand and gain trust in the process. In both companies, the strategies used to elicit and document clear requirements involved a formal document and work sessions with key IT personnel with knowledge regarding the organization's systems.

As stated by the six participants proper requirements documentation was critical to every project. In ISD projects, clear requirements are a key leverage point for those project managers that want to develop an information system (Becker et al., 2016).

Requirements elicitation need stakeholder input to identify what the stakeholders want to obtain from the new system (Becker et al., 2016), which is essential to develop a system that meets the customer needs (Menéndez & da Silva, 2016). The PMI (2013) established formal requirement documentation and meetings as strategies used to elicit and document requirements. The plethora of research regarding the importance of proper requirements elicitation strategies in ISD projects, confirmed the strategies implemented by the participants.

Third Theme: Communication as the TCF in the Executing Phase

In the executing phase, the most frequent internal factor was communication. Communication is one of the most cited factors in the project management literature review (Kocherla, 2012; Mishra et al., 2011; Müller & Jugdev, 2012; Ofori, 2013; Slepian, 2013). Five of the six participants mentioned that communication was a critical factor in their projects. Participant CA-P1, mentioned that communication was critical in the executing phase because it allowed for stakeholders engagement and proper execution of the project. Participant CA-P2, indicated that communication was a serious risk, especially in the implementation of the project. Participant CA-P3, indicated that although communication was a factor present throughout the project, in the executing phase became critical to eliminate user resistance, train all the personnel, have all the technical requirements in place, and receive the necessary feedback for the application enhancement.

In company B, Participant CB-P4 stated that communication was a critical factor in the executing phase because they needed to develop a system that met the

specifications of the commercial area. Participant CB-P6 stated that communication with the different impacted areas was critical during the executing phase to coordinate all the activities. The importance placed by five of the six participants regarding communication confirmed findings of other researchers that communication is a critical factor in ISD projects (Jan, Dad, Amin, Hameed, & Shah, 2016).

Communication strategies that provide timely management of communication through proper channels are critical for effective project management (Zuofa & Ochieng, 2014). In company A, the participants followed the established methodology to coordinate communication among every project stakeholder, as evidenced by the project documentation provided by the participants. Participants CA-P1 and CA-P2 indicated that to prepare the communication plan each gathered all the communication requirements from the different stakeholders. For example, some stakeholders wanted only written communication, others wanted face-to-face communication, and others only wanted communication through text messages.

Participant CA-P1 indicated that the communication plan also included the time zone they were going to use to have the communication with the outside team that was working on the project. The participant established in the communication plan, one-hour weekly status meetings and how they would document these meetings. Furthermore, Participant CA-P1 indicated that he had casual communications with the stakeholders to create a bond, while Participant CA-P2 established an open-door policy.

Participant CA-P3 indicated that the communication plan included implementation releases, notifications, training manuals, and flash cards with the system

benefits. These inclusions were appropriate to eliminate the user resistance to the project. Also, Participant CA-P3 incorporated suggestions cards where the users gave additional suggestions to enhance the system in future phases.

In company B, participants mainly used emails and face-to-face meetings to coordinate the executing activities. Participant CB-P6 indicated that communication was a key factor to ensure the project team conducted the assigned tasks. Participants CB-P6 documented every agreement reached in the meetings and substituted the word ‘tasks” with “commitments” to engage the responsible for completing the assigned tasks. In addition, participants in Company B implemented a war room with a call center from which the project team could handle all the situations presented by the different users.

The project management literature, have a plethora of research regarding the strategies implemented by both companies. The PMI (2013) devoted a complete chapter into the project plan communication. This chapter includes communication plan and meetings as part of the communication strategies, as implemented by both companies. Additionally, several studies documented the importance of adequate communication management in IS projects, which reaffirmed the findings of this study (Deshpande, Beecham, & Richardson, 2013; Kuehn, 2016).

Fourth Theme: Project Plan as the TCF in the Monitoring and Controlling Phase

As part of monitoring and controlling processes, all six participants indicated that the project plan was the critical factor that provided the tool to monitor effectively and control the project. Project managers conduct monitoring and controlling activities to review the progress and performance throughout the entire project (PMI, 2013).

Appropriate monitoring and controlling systems allowed project managers to observe the interdependencies and interactions among individual or multiple projects (Caniëls & Bakens, 2012).

In company A, the three participants used Primavera as the primary tool to monitor and control the project. Participant CA-P1 indicated that he implemented daily tracking of the project as part of the monitoring and controlling process. This daily tracking helped the participant identify any deviation, which facilitated the correction of any situation promptly. In addition to the project plan, Participants CA-P1 and CA-P3 implemented a work issue log in which the participant recorded the history of every agreement and every issue that arose during the project. Additionally, Participant CA-P1 presented to the project sponsor a one sheet including the accomplishments of the week, what was in process, what were the next steps, what were the issues encountered, and how the team was going to handle those issues.

In company B, the three participants used Microsoft Office Project as the primary tool to monitor and control the project. The three participants indicated that they implemented a "4-UP" or a dashboard with the milestone or activities. As evidenced by the project documentation provided by the participants, this "4-UP" included a Gantt Chart, the accomplishments of the week, the risks or issues that they encountered, and which were the next steps.

Successful project completion requires careful and frequent monitoring of the project tasks against the plan (Abdul-Rahman et al., 2012; Allen et al., 2014). The PMI (2013) established that project managers should conduct frequent monitor and control

processes in compliance with the established project management plan. Additionally, in studies conducted by W. T. Wang & Ko (2012), Ofori (2013), and Carvalho (2014) the researchers reaffirmed the use of the tools implemented by both companies to monitor and control IS projects.

Fifth Theme: Lessons Learned as the TCF in the Closing Phase

In the closing phase, all six participants stated that the critical factor was to capture the lessons learned from the project. The lessons learned are valuable to increase understanding and knowledge of future projects in the organization (Langley, 2015). As evidenced by the projects' documentation, every participant documented the lessons learned and conducted post-review meetings to discuss the lessons with the project team.

Both companies have a formal document in which the project manager documented what were the project successes, what they could do better, and future recommendations. The participants presented this document in a team meeting where everyone discussed the findings of the project. In company A, the project manager, the CIO, and the IT Sub-Director signed this document.

Capturing lessons learned in the closing phase of the project is a common strategy in IS projects. Windapo et al. (2014) indicated that post-project review or lessons learned are the final part of the closing phase, which identifies what went wrong and what was done well to avoid committing the same mistakes in future projects. Several researchers reaffirmed the importance of capturing and discussing lessons learned in ISD projects to avoid the same mistakes in future projects, which confirmed the findings of this study (Abdul-Raham et al., 2012; Allen et al., 2014; Brown et al., 2013).

Theoretical Framework Findings

Coordination Theory by Malone and Crowston (1990) was the framework for this study. The findings of this study supported the application of coordination theory in IS project management research. All six participants indicated that careful coordination of resources, systems, and groups was a key factor throughout the different phases of the project. Participant CA-P3 indicated that coordination began in the planning phase of the project and continued through all phases. Participant CB-P6 indicated that a lack of coordination among the different groups could jeopardize the project.

Coordination theory is a body of principles explaining how to coordinate activities and how actors can work harmoniously together (Malone & Crowston, 1990). Research showed that day-to-day coordination was necessary to accomplish a project without delays (Aagaard, Eskerod, & Madsen, 2014). Karpowicz (2012) argued coordination theory was especially useful in complex and interconnected networks, such as in the telecommunication service industry. Coordination theory was relevant to the study of ISD projects since different researchers identified ineffective coordination as a central problem (Hsu, Shih, et al., 2012; Parolia et al., 2007). The findings of this study support the applicability of coordination theory. The participants of this study stated the importance of coordination throughout the different phases of the project, and the negative impact lack of coordination have over ISD projects.

Applications to Professional Practice

The findings of this study could have a positive impact on the project management field. In this study, I examined the strategies used by project managers to

control internal factors during the different phases of an ISD project. Understanding the internal factors and the strategies used to control these factors, could help the project management field by reducing the risk of failures throughout the different phases of ISD projects.

Project managers may use these study findings to evaluate the current strategies used to control internal factors in ISD projects. The findings of this study provided two major contributions to the project management field. The first contribution is that I identified the top critical factor in each phase of the project life cycle. It is crucial to understand all the components of the different phases of the project life cycle to have effective project coordination (van den Ende, & van Marrewijk, 2014).

The identification of the TCF by phase could benefit IS project managers by providing a guide of the factors that will most likely come up in in the different phases of the project. The participants of this study identified top management support, clear requirements, communication, project plan, lessons learned, and coordination as the top critical factors in ISD projects. Table 5 presents these factors and their corresponding phase.

Table 5

Top Critical Factor by Project Life Cycle

Top Critical Factor	Project Phase
Top management support	Initiating Phase
Clear requirements	Planning Phase
Communication	Executing Phase
Project plan	Monitoring and Controlling
Lessons learned	Closing Phase
Coordination	All Phases

The second contribution to the project management practice is the strategies IS project managers could apply to control the aforementioned factors. The participants of this study identified several strategies presented in Table 6, to control the TCF in each phase of the project life cycle. The strategies presented by the participants could benefit project managers by providing additional tools IS project managers could implement to manage ISD projects. Patanakul et al. (2012) recognized some practitioners and researchers did not fully understand how to apply project strategy in practice, and determined project managers needed project strategy to guide an individual project in its planning and development phases.

Table 6

Strategies to Control the Top Critical Factor by Project Life Cycle

Top Critical Factor	Project Phase	Strategy
Top management support	Initiating Phase	Initial meeting (project charter), weekly status meetings, and build a trusting relationship.
Clear requirements	Planning Phase	A formal requirements document and stakeholders work sessions.
Communication	Executing Phase	Communication plan and face-to-face meetings.
Project plan	Monitoring and Controlling	Use of a PM software, weekly status meetings, work issue log or 4-UP.
Lessons learned	Closing Phase	A formal document to capture lessons learned and a closeout meeting to discuss the lessons learned.
Coordination	All Phases	Project plan and communication plan.

Implications for Social Change

The findings of this study provided insight into how project managers could implement different strategies to control frequent internal factors, which could improve business practices and the organizational competitive advantage. Systems development risks not managed effectively, could result in losses regarding increased costs, longer completion times, reduced scope and quality, reduced realization of proposed benefits, or reduced stakeholder satisfaction (Abdul-Rahman et al., 2012). Applying project strategies could benefit organizations through cost avoidance and improved project performance (Wysocki, 2014).

Expanding the understanding of critical internal factors and the strategies employed by IS project managers in ISD projects contributes to positive social change. Project managers who successfully manage ISD projects could promote positive social change by providing innovative services to society and reducing the cost of telecommunication services for customers. Effective administration of IS projects is important to the success and survival of any company (Cârstea, 2014). Increased success rates mean that organizations would be able to implement the necessary changes to meet their strategic business goals, which in turn improves the sustainability and competitive advantage of the company. Improving the organizational position could contribute to a positive social change by providing jobs and economic stability to the employees and the community where the company operates.

Recommendations for Action

The findings of this study may contribute to the existing body of knowledge and could benefit IS project managers by providing a guideline regarding the most frequent factor in the different phases of a project and the corresponding strategy to control that factor. The findings of this study, provide two recommendations for actions that IS project managers should consider to improve the success rates of ISD projects. The first recommendation for action is that IS project managers may consider evaluating the PM methodology to include special monitoring of the identified factors throughout the different phases of the project life cycle. Determining the factors influencing project success throughout the phases of a project life cycle have a positive influence and increase project success rates (Kocherla, 2012).

The second recommendation for action is that IS project managers may consider evaluating their current strategies to incorporate the strategies presented in this study. Having a better understanding of strategies used in ISD projects could benefit because project management strategies vary significantly according to the type of project (Golini, Kalchschmidt, and Landoni, 2015). The findings of this study provided specific strategies that controlled internal factors in ISD projects, which could be a guideline for ISD project management. This recommendation for IS project managers could increase the success rates of ISD projects within their organization by implementing specific strategies to control the TCF in each phase of the project life cycle.

Project managers, senior IT leaders, IT professionals, and project stakeholders should pay attention to the findings of this study because they could benefit from the

participants' understanding of the frequent internal factors encountered in the different phases of an ISD project. I will disseminate the results of the study through PMI-PR chapter conferences, and scholarly journals. Furthermore, I may present the findings of this study through training and seminars regarding the most frequent internal factors encountered in the different phases of an ISD project and the strategies to control these factors.

Recommendations for Further Research

This study findings warrant additional research on the strategies used to control critical factors in ISD projects because technical innovations are crucial in driving competitive business advantage and sustainability (Poonpool et al., 2013). Although, in this study I provided a guideline project managers could use to control the internal factors in ISD projects, the findings warrants further research exploring other alternatives not included in this study.

I focused on the internal critical factors of ISD projects. Therefore, researchers could conduct further research focusing on the critical external factors that affect the different phases of ISD projects. Focusing on the external factors could compliment this study and provide project managers with a complete guideline of the factors they could encounter in each phase of the project. In addition, further research could expand to include other IS project types such as infrastructure, migrations, or web-based customer applications.

Further research could expand the pool of participants by extending the study to other geographical areas. One limitation of this qualitative case study was the small

population size because of the geographical area selected. Additionally, researchers could conduct further quantitative research to include other industries. Further quantitative research including other industries or further research in other geographical areas would enhance the generalizability of the findings of the study.

Reflections

I started this DBA journey with Walden University as part of a personal goal to further my education and professional career. This experience has been rewarding and enlightening. Walden University doctoral study process is full of challenges, lessons, and opportunities to grow and reach this goal. The DBA process includes: (a) the selection of the committee members, (b) proposal, (c) proposal oral defense, (d) IRB review, (e) final study analysis, (f) form and style review, (g) final oral presentation review, (h) final overall quality analysis, and (i) CAO approval. Each phase helped me became a scholar and proficient in my topic. Although this is a challenging journey, having a committee that was eager to help and committed to my success kept me motivated every step of the way.

I did not have any preconceived conclusion regarding the results of this study. However, as a project management professional with over 10 years of experience in the telecommunication service industry, the results of the study support my professional experience. To mitigate the potential for my bias, I identified the bias and engaged in bracketing to avoid influencing the participants' description of the experience (Dowling & Cooney, 2012). I used NVIVO 10 qualitative software to generate the themes and interpreted the results based solely on the participants' responses. Additionally, I used

member checking to validate if I correctly interpreted the participants' answers. Furthermore, I applied a proper protocol to ensure participants felt comfortable during the research process.

My views on the topic did not change after interpreting the participants' responses, on the contrary, the findings align with my professional experience. Although my views did not change, this doctoral process did change me as an individual and professional. This process was ardous but worth it. This journey helped me tremendously by becoming proficient in the English language as well as in the project management field. I intend to share this study with my peers through conferences because it is my strong believe that this study could benefit IS project managers in Puerto Rico.

Conclusion

The purpose of this qualitative multiple case study was to explore strategies IS project managers used to control internal factors in ISD projects in the telecommunication service industry in Puerto Rico. Although there is a plethora of IS project management research, several studies concluded that it was important to conduct further research specific by region, project type, industry, and the project life cycle (Müller & Jugdev, 2012; Nwakanma et al., 2013; Zhou, Goh, & Li, 2015). The findings of this study adds to the existing PM literature by focusing on a specific region, project type, industry, and the life cycle phases of the project.

The high failure rates are detrimental to the execution of strategic business goals (Young et al., 2012), which affect the business competitive advantage (Mavengere, 2013). There are several studies addressing IS projects high failure rates, which

concluded that internal factors such as top management support, clear requirements, and communication were critical factors to ensure IS project success (Aagaard et al., 2014; Alsudiri et al., 2013; Boonstra, 2013; Liu et al., 2015; Ofori, 2013). In concurrence with these previous studies, the findings of this study imply the importance of applying the proper strategies to control these internal factors successfully.

The main contribution to the business practice is by identifying the top critical factor in each phase of an ISD project and the corresponding strategies to control these factors. The study findings could benefit IS project managers and IT leaders by providing guidelines to control these internal factors. The implication for positive social change is by reducing ISD projects failure rates, organizations could improve their sustainability, thus providing jobs and economic stability to the employees and the community where it operates.

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Appendix A: Interview Protocol

Interview Protocol

Provide interview questions, located in Appendix B: Interview Questions, to all participants for their review. In-person or phone interviews will focus on the exploration of strategies used by project managers to control internal factors of ISD projects in the telecommunication service industry. During the interview, the researchers will emphasize the perspectives of the participants and will assess the emergence of any new themes not specified in the interview questions.

Initial Reminders: This interview will be recorded, and the researcher will not include your name or anything else that could identify you in any reports of the study. You may skip any questions that you feel are too personal or stop the interview at any time.

Date of Interview:	Study Participant:
Duration of Interview:	Interview #:

Interview Questions

1. Which ISD project you successfully managed?
2. Positioning yourself in that project, which were the internal factors you encountered throughout the project?
3. In which of these project phases; initiating, planning, executing and closing did you encounter the mentioned factors?

4. Which of these factors would you consider as the most critical?
5. Which of these factors were present in every phase of the project?
6. Which strategies did you adopt to control these factors successfully?
7. Among these strategies, which is the one that you adopt to control the most critical internal factor?
8. How did you coordinate all the activities to complete the project?

Final Reminders: Remind participants that they will receive a copy of the findings and interpretation later for their review. Express gratitude to the participant acknowledging the time and effort spent during the interview.

Appendix B: Interview Questions

Interview Questions

Dear Participant,

The following set of questions will help the researcher achieve the goal of the study, which is to understand the strategies used by project managers to control internal factors of ISD projects in the telecommunication service industry.

1. Which ISD project you successfully managed?
2. Positioning yourself in that project, which were the internal factors you encountered throughout the project?
3. In which of these project phases; initiating, planning, executing and closing did you encounter the mentioned factors?
4. Which of these factors would you consider as the most critical?
5. Which of these factors were present in every phase of the project?
6. Which strategies did you adopt to control these factors successfully?
7. Among these strategies, which is the one that you adopt to control the most critical internal factor?
8. How did you coordinate all the activities to complete the project?