INFORMATION TECHNOLOGY PROJECT FAILURE CAUSED BY INADEQUATE PROJECT SCOPING: AN EXPLORATORY QUALITATIVE INQUIRY ON INADEQUATE PROJECT SCOPES

by

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A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Information Technology

Capella University

March 2020

Abstract

The problem of failed IT projects is one that impacts companies across the world, costs millions in lost revenue, wastes resources, and prevents companies from reaching their business objectives. IT project failures affect many more industries than the IT industry alone because so many businesses in myriad industries rely on an IT infrastructure. The failure rate if IT projects is higher than almost any other industry. The most significant contributor to IT project failure has been linked to problems with IT project scopes. However, there exists a gap in the knowledge base regarding the root problems that lead to IT project scope inadequacy. This study was a qualitative inquiry into the specifics of IT project failure as related to inadequate IT project scopes. This study sought to answer two questions: What are the most common reasons that project scopes fail to adequately cover IT projects? What are some common practices, procedures, or workarounds that can mitigate the negative impact on project scopes? This study used semi-structured interviews of 20 IT project management professionals. The IT professionals all reside and work for companies within the United States. Participants were required to have had no less than two years of experience in managing IT projects. The average experience of participants was 12 years. The number of participants allowed the data collection to reach saturation. The data from the interviews were analyzed to identify emergent themes using Denzin's five levels of data analysis. The analysis was an iterative process that identified the following themes: inadequate requirements definition, poor communication, lack of technical knowledge, and stakeholder involvement as the most common causes that lead to IT project scope inadequacy. Two outliers were also emergent: lack of appropriate meeting regularity and not learning from mistakes. The RoCKS-ML model was created from the emergent themes and the prevailing methods of avoiding or mitigating the negative impacts of those themes. IT project

management professionals can utilize the RoCKS-ML model to identify, prevent, and work around the most common reasons IT project scopes are inadequate.

Dedication

I would like to dedicate this dissertation to my children, Hannah and Jacob. It is for them that I chose to return to school for this degree in the hopes of becoming a better provider for them. Additionally, I would like to thank every member of my family. Without their support, I would not have been able to make it through.

Acknowledgments

I would like to recognize the person that had the most significant impact on my dissertation: Dr. Kimberly Lowrey. Without her guidance and knowledge, I would have felt lost every step of the way. Dr. Kim has the gift of being able to break things down into manageable pieces and convey those pieces to her mentees. Without Dr. Kim applying this gift to my dissertation and me, I would have felt completely overwhelmed. Dr Kim's guidance has helped me take an idea and turn that idea into a useful model for IT project managers to use. The feedback of Dr. Kim, Dr. Valentine, and Dr. Woods was invaluable in helping me attain the dream I have had for my entire life: that of completing a doctoral degree.

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CHAPTER 1. INTRODUCTION

Introduction

Information Technology (IT) is the infrastructure that modern-day businesses rely on (Lawes, 2017). Information and communication technologies have the potential to revolutionize how economies and societies grow, providing opportunities for businesses to thrive in ways that were previously unattainable (Dutta et al., 2015). Technological progress is one of the main factors facilitating economic growth today (Gumbs, 2015) and has revolutionized so many aspects of numerous industries that technology truly forms the basis on which businesses operate (Vermont Department of Labor, 2015).

One key factor that contributes to a project's success is the development of a project scope (Murray, 2001; Whitney & Daniels, 2013). Unfortunately, many project scopes fail to adequately cover all aspects of a project (Murray, 2001; Whitney & Daniels, 2013). The prevalence of scope failure in IT contributes to an IT project failure rate that is higher than that of almost any other industry globally (Whitney & Daniels, 2013). Projects that do not have the critical components in place are doomed to failure (Murray, 2001). Problems in delineating a project's scope are a significant issue facing the IT industry because inadequate scoping is a significant contributor to project failure (Whitney & Daniels, 2013).

This chapter will provide some background information on the problem of IT project scope failure by briefly reviewing previous studies conducted on the topic and their findings. Furthermore, this chapter will detail a study to identify the most common reasons IT project scopes fail to adequately cover projects. This study also aims to determine possible solutions for the identified reasons for project scope failure.

Background

Initially, evaluation of a project's success was based on three metrics: time, scope, and money, before experts came to realize that such a limited view of project success was insufficient (Kerzner, 2014). The prevailing opinions regarding which metrics accurately measure success are ever-changing and difficult to keep up to date with (Kerzner, 2014). Jørgensen (2014) argued that the IT industry must redefine the criteria that characterize a failed project to assess the problem with greater accuracy. A precise definition of what constitutes a failure is necessary before any attempt to measure and alleviate the trend (Jørgensen, 2014).

Kusek and Hamilton (2013) asserted that success is not an all-or-nothing measure. The Chaos Report by Standish Group (2014) identified three possible outcomes of IT projects: success, challenged, and failure. Kerzner (2014) argued that possible outcomes could be more accurately defined with four categories: complete success, partial success, partial failure, and complete failure. Lehtinen et al. (2014) observed that there are many more opinions regarding what metrics should be used and how many outcomes a project might produce.

IT projects fail for many different reasons. Some projects fail because of incompatible demands from multiple involved parties (Kusek & Hamilton, 2013). IT software projects face many potential interruptions that sidetrack progress and often cause a project to fail completely (Tanner & Mackinnon, 2015). Leoncini (2015) argued that a greater emphasis on research and development (R&D) prior to a project's commencement could increase the likelihood of success. Stoica and Brouse (2014) approached IT project teams as mini-organizations to identify the critical factors leading to project failure. A study investigating the root cause of project failure

determined that projects fail for a wide range of reasons and that further research is needed to crystallize strategies for improving the success rate (Lehtinen et al., 2014).

Leoncini argued that companies should learn from the mistakes they have made with regard to previous failed projects. Välikangas et al. (2009) offer some insight as to why many companies may not be able to move on from a failed project. Jørgensen (2014) applied a binary logistic regression model to predict the likelihood of project success or failure, and met with some success, correctly predicting 74% of failures and 67% of successes. Jørgensen's study was limited in its scope, however, and may not generally be applicable to IT as a whole.

Whitney and Daniels (2013) found that an effective project manager increases the chance of success in IT projects. Standish Group (2013) discovered that a lack of project management competency is a key factor in project failure. Blaskovics (2016) also observed that project managers have a significant influence on projects' success or failure. The Los Angeles Unified School District's attempt to revolutionize grade-school learning with technology resulted in complete failure, and this failure was directly attributed to the poor management of the project (Alami, 2016).

Several panels have been formed to address the problem of high failure likelihood in IT projects, arguing that further research from new perspectives is needed (Dwiveldi et al., 2015). A study by Mäntylä et al. (2017) attempted to define better ways of measuring and improving success rates but left much yet to be determined. Because technology gives companies new ways to address problems and overcome challenges (Dutta et al., 2015), measures to increase the chances of project success in the IT sector are an essential aspect of maximizing innovations and the ways in which these innovations can enrich lives (Ramaswamy & Dawson, 2014).

Ramaswamy and Dawson (2014) discovered that because project management principles and strategies are being applied to IT projects, the IT project manager has become equally important as the principles and strategies. Ramaswamy and Dawson also concluded that new approaches and knowledge are required to reduce the rate of IT project failure and that these new approaches must center on IT project managers. Mackey (2015) discovered that some project managers lack the experience to properly manage IT projects and develop adequate project scopes.

Because project managers are responsible for developing a project's scope, they must be familiar with the process of creating a scope and must be provided with the necessary tools for this task (Murray, 2001; Standish Group, 2013). Project managers rely on established models, principles, and practices to augment the knowledge that they have gained from previous experiences to create project scopes (Blaskovics, 2016). When these are lacking, project managers must rely on their limited experiences, thereby increasing the chances that they will create an inadequate project scope (Mackey, 2015).

Business Technical Problem

IT projects are often more complex than other projects due to the fact that they have many different pieces that must integrate seamlessly (Poveda-Bautista, Diego-Mas, & Leon-Medina, 2018; Stepanek, 2005). Nazeer (2017) found that the complexity of IT projects stems from their numerous operations that each have diverse inputs and outputs, their multiple technical features, their variety of tasks that have potentially conflicting norms and standards, the required experience levels with regard to specific technologies, and the varying compliance regulations that must all work in unison and complement one another. IT projects may have a

recurring cycle of development and revision that adds complexity in the form of version management and compatibility with evolving technology (Nazeer, 2017; Poveda-Bautista et al., 2018).

For every $1 billion invested in IT projects, approximately $122 million is wasted (Project Management Institute [PMI], 2016). Over half of all projects result in fewer features than planned during the project scoping stage and at higher costs than initially budgeted for (Standish Group, 2014). Seventeen percent of IT projects will fail completely such that the outcome has the potential to bankrupt the company (Bloch, Blumberg, & Laartz, 2012). IT investments increase by approximately 3.5% annually (Stoica & Brouse, 2014), and, in 2000, total spending on IT projects amounted to almost 20% of the world's Gross Domestic Product (Bredillet, 2007).

IT projects provide opportunities for growth, but also entail the possibility of costly failure (Clarizen, 2016). For example, a single project that began in 2007 cost Australia more than $9 billion over eight years (Blackmore, 2013). In the 1990s, an American drug corporation filed for bankruptcy as a direct result of a failed IT project (Fadlalla & Amani, 2015). Hamrouni (2017) attributes this failure and the resultant bankruptcy to poor planning of the IT project. According to McManus and Wood-Harper (2008), however, IT projects continue to attract funding despite the high failure rate.

Clarizen (2016) reported that IT project failure is associated with costs that go beyond financial loss. For example, IT project failure can result in lost person-hours, since failed projects often require that work be redone, and result in business loss due to missed deadlines, as well as the stagnation of innovation (Clarizen, 2016). Matta and Ashkenas (2003) demonstrated that

failed projects demoralize employees and have long-lasting, adverse effects on employee motivation. In many situations wherein IT projects fail, companies are obliged to hire and train new employees to work on replacement solutions, which results in more lost revenue (Clarizen, 2016; Matta & Ashkenas, 2003).

IT projects continue to increase in complexity, and as complexity increases, so too does the difficulty in managing a project (Wills, 2015). Delays, security risks, and compliance risks are all potential consequences of IT projects not being completed successfully (Wills, 2015). Customer satisfaction is often adversely affected when planned IT solutions fail to deliver promised features or entirely fail to launch (Wills, 2015). If IT projects continue to fail at the current rate, it will have an ever-increasing impact, since technological growth is rising (Clarizen, 2016).

One of the most critical steps in a project's life cycle is the development of a project scope, which defines the project's intended goals and features, yet many project scopes fail to sufficiently represent all facets of the project (Murray, 2001). Murray analyzed the most common causes of IT project failure and discovered that two significant contributors are inadequate creation of a project scope and failure to adhere to the scope. Project managers are responsible for creating a project scope that defines each aspect of the project as precisely as possible (Whitney & Daniels, 2013). The specific problem is the fact that an estimated 83% of all IT projects fail each year (PMI, 2016), with 15% of all projects being abandoned as failures; 40% of the failed projects fail due to inadequate project scopes (Kendrick, 2015; Murray, 2001; PMI, 2016; Whitney & Daniels, 2013).

This study is merited since Chief Information Officers (CIOs) rely on the successful completion of IT projects for the delivery of adequate solutions and greater value to the company (Banker, Hu, Pavlou, & Luftman, 2011; Krotov, 2015; Nash, 2014). When projects fail, CIOs must pursue alternative solutions that fulfill the requisite functions (Chun & Mooney, 2009). This study sought to identify the most common reasons that project scopes fail to adequately cover IT projects. The results of this study can benefit CIOs by providing a list of common causes of IT project scope failure so that they, along with IT project managers, can make plans to avoid these pitfalls (Larson & Larson, 2009; PMI, 2016).

Research Purpose

The purpose of this qualitative inquiry was to identify the most common reasons that IT project scopes fail to adequately cover IT projects by interviewing 20 IT project managers within the United States. Furthermore, this study provided insights into practices that can help to either avoid these common problems or, at the very least, mitigate the adverse effects that these problems have on a project's scope.

Companies and IT leadership rely on the IT systems that allow the company to attain the company's goals. C-level executives must have accurate project scopes and projects that stay within the scope as much as possible so that they can make the best decisions from the perspectives of the companies that they each work for. However, leaders are often unable to make the most effective decisions due to the high likelihood that each project will fail. To enable a company to achieve the goals that have been set by its executives, projects' chances of success must be raised. A significant step in that process is to determine why project scopes are inadequately defined and where further research should focus on enhancing IT project scoping.

Research Questions

What are the most common reasons that project scopes fail to adequately cover IT projects?

What are some common practices, procedures, or workarounds that can mitigate the negative impact on project scopes?

Rationale

IT projects continue to fail at extremely high rates (Clarizen, 2016), which are increased because many project scopes constitute inadequate definitions of projects and their components (Giles, 2015). Determining each actor's role in the development of a project scope could be critical in achieving higher chances of the project's success. Enhancing project scope adequacy could yield several benefits, including reduction of lost revenue or faster time to completion, in every industry that uses technology (Giles, 2015; Hassan, Ahmad, & Zuhaira, 2017; Larson & Larson, 2009; PMI, 2016).

The IT project success rate has remained consistently lower than many other project types (Hassan et al., 2017). While the low success rate may not be a new problem, it is a problem nonetheless, and one for which a solution has not yet been discovered (Blaskovics, 2016; Standish Group, 2013; Whitney & Daniels, 2013). Consequently, companies continue to close down and file for bankruptcy, waste resources, and start projects that will never be completed or that will fail to deliver their intended outcomes (Hughes, Rana, & Simintiras, 2017; Lehtinen et al., 2014; Ramaswamy & Dawson, 2014).

This research and its outcomes address the methods by which IT project scopes are created. The study's results were analyzed using the framework presented in the next section.

The results of this study and the review of existing literature contribute to a better understanding of how a company can create an effective and adequate project scope through analysis using Normalization Process Theory (NPT).

Conceptual Framework

The framework that was used in this study was a subset of NPT created by May et al. (2019), as described on the Normalization Process Theory website. NPT is a conceptual framework by which the dynamics involved in implementing new technology can be analyzed (May et al., 2019). NPT was originally developed for IT in healthcare but has been successfully applied to many other industries' implementation of technology (May et al., 2019; May & Finch, 2009; McEvoy, Ballini, Maltoni, O'Donnell, Mair, & MacFarlane, 2014).

NPT consists of four concepts and a toolkit for assistance in its implementation (May et al., 2019). NPT is designed to assist in the implementation and evaluation of complex IT interventions, or the institution of new technology or processes (May et al., 2019). NPT assumes the involvement of multiple actors in most IT projects and assists in the analysis of each actor's influence on a project (May et al., 2019). NPT centers on four fundamental constructs: coherence, cognitive participation, collective action, and reflexive monitoring (May et al., 2019).

This research focused on the first construct: coherence. Coherence is divided into four components: differentiation, communal specification, individual specification, and internalization (May et al., 2019). Differentiation applies to distinct processes and technologies, and the advantages, disadvantages, and differences of each (May et al., 2019). Communal specification focuses on the interaction between the actors involved in a project and how they reach an understanding (May et al., 2019). Individual specification applies to each actor's

understanding (May et al., 2019), while internalization concerns how each actor understands the potential benefits or value of an intervention (May et al., 2019).

This study intended to apply NPT's coherence construct to key stakeholders, project managers, and other actors to analyze how each actor affects the creation of a project's scope. The high failure rate in IT projects, which is attributed to unsatisfactory project scopes and the lack of studies aimed at key actors and each actor's influence on the project's scope, motivate the use of NPT to gather new data on the subject (May et al., 2019). Identifying positive impacts actors have can be used to reinforce those interactions and potentially attain a higher degree of success.

The argument in support of applying the NPT construct of coherence is that the results will provide a basis on which IT project scoping techniques can be built. For example, a superior IT project scope may be accomplished through a better technical explanation of the critical technologies to be used to some actors at the beginning of or during the process of scope creation. An adequate scope may be created if all actors understand the project more fully, which could lead to higher chances of IT project success, fewer wasted resources, and higher IT portfolio values.

Significance

The value that organizations, companies, consumers, and individuals gain from IT projects is drastically diminished by the overwhelming rate of partial or complete failure (PMI, 2016). With the prevalence and continued growth of technology and its impact on the business world, higher project success rates will help to generate more revenue, improve the experience of end-users, allow greater efficiency, improve the IT industry, and extend this improvement to

many other industries (Blaskovics, 2016; Kerzner, 2015; Mizera-Pietraszko & Fong, 2015; Viira, 2018). Information infrastructure and technology solutions are critical must-haves and are an indispensable aspect of businesses today (Mizera-Pietraszko & Fong, 2015; Viira, 2018).

While several studies have focused on the rate of IT project failure, its causes, and its repercussions, very little research has examined how an actor affects a project scope, whether negative or positive (Blaskovics, 2016; Kerzner, 2014). The problems that persist due to this lack of research affect not only IT companies, but also impact every company that uses IT solutions (Blaskovics, 2016). Although the cost of failure is often built into IT solutions, this pre-planned overcharge does not address the actual problem—that of IT project failure (Hughes et al., 2017; Lehtinen et al., 2014; Ramaswamy & Dawson, 2014).

A key factor contributing to the IT project failure rate is a lack of understanding of how adequate project scopes are created and how the actors involved affect the project scope creation process (Kerzner, 2014). The outcomes of this study have the potential to provide insight into the social aspects of IT project scope creation and how companies worldwide can alter processes and procedures to achieve an IT project success rate that is higher than was previously possible. Companies across all industries use IT solutions to conduct business daily, and, as such, this study's findings will have far-reaching implications (Kerzner, 2014). This study addresses the gap between traditional project management practices used for creating project scopes and the ways in which these need to be modified for improved IT project scopes.

Definition of Terms

The following are key terms whose definitions can impact the validity of this document. The definition of each term within the context of this study is explained below. Each definition is

not a new concept: rather, each term listed below can have multiple meanings or may not be firmly defined in the IT industry.

Actor. Actors are the people involved in the planning and implementation of an IT project (May et al., 2019). Examples include stakeholders, project managers, and executives, among others.

Intervention. Interventions are any attempt to introduce new technologies, processes, procedures, or changes to existing technologies, policies, or procedures (May et al., 2019).

Project success. PMI (2013, p. 34) defined success as, "completing the project within the constraints of scope, time, cost, quality, resources, and risk as approved between the project managers and senior management."

Project scoping. Project scoping is the process by which the requirements, limitations, and capabilities of an IT project are defined (PMI, 2018). The project scope functions as a roadmap that defines each step in the process (PMI, 2018). Scopes also lay out the different phases involved in a project and the order in which each step, or phase, must be completed (Cooper & Schindler, 2014; Leedy & Ormrod, 2016; PMI, 2018).

Stakeholder. Stakeholders are defined as key people that initiate, plan, or otherwise affect an IT project (Cooper & Schindler, 2014). Stakeholders may be customers, upper management, project managers, or others (Cooper & Schindler, 2014).

Stakeholder investment. Stakeholder investment concerns the amount of resources that stakeholders put into a project (Cooper & Schindler, 2014). These resources may be in the form of funds allocated from a budget, teams, or personnel assigned to a project, and time spent planning, monitoring, and working on a project (Cooper & Schindler, 2014).

Scope creep. Scope creep occurs when disruptions that significantly alter the scope of a project arise after the planning phase has been completed (McCray, 2015).

Scope statement. A scope statement is a brief statement of what the project is intended to include and exclude (Coplan & Masuda, 2011).

Subject Matter Expert (SME). A subject matter expert is an individual that possesses expert-level mastery and familiarity with a specific technology or subject (Reh, 2019).

Work package. Work packages are the smallest groupings of tasks required to complete an objective (Coplan & Masuda, 2011).

Work breakdown structure. This is the hierarchical list of deliverables for a project (Coplan & Masuda, 2011).

Scope verification. This is the periodic comparison of project scope and completed and planned objectives to help ensure the project does not veer too far from the expected plan (Keyes, 2009).

Critical success factor. This denotes the objectives that a project must fulfill to be considered successful (Blaskovics, 2016).

Assumptions and Limitations

Assumptions

The following assumptions were made throughout the course of this study. The first assumption is that participants understood the questions as presented in English. The second was that participants answered the interview questions as truthfully and accurately as possible. The third was that the participants understood project management concepts to the degree that they could accurately assess the success or failure of the projects managed and knew how to develop a project scope. The researcher may have held several assumptions regarding the subject that will be mitigated through adherence to the model's framework. The final assumption is that this study can produce data that will improve the likelihood of success for many IT projects.

Limitations

The first limitation is that, due to the small sample size, this study is not applicable to all IT organizations (Leedy & Ormrod, 2016). The second limitation is that this study may not be applicable to all enterprises and businesses in fields other than IT. The third limitation is that this study does not represent every IT project and every IT project scope, and does not provide a solution for every future IT project or IT project scope.

The fourth limitation is that project scope creation is a complicated process that has several influencing factors that cannot all be considered in this study. Potential bias in data collection was addressed through thorough vetting and development of the interview questions.

Organization for Remainder of the Study

The remainder of the study consists of four chapters. Chapter 2 will include a closer look at the existing literature on this subject and will provide a greater degree of background that

supports the rationale for this study. Chapter 3 will detail the study's design and methodology and will explain the rationale used to select the participants, give the context of the study, detail the data collection and analysis processes and methods used, and outline the ethical considerations relevant to this study.

Chapter 4 will detail the results of the data collection, and the results gathered from the analysis. Chapter 5 will evaluate the results within the context of the research questions and assess whether the research purpose was successfully achieved. Chapter 5 will also demonstrate the ways in which the study's results can impact the IT industry and address the observed business technical problem, and, finally, will offer recommendations for future research, and present the conclusions reached as a result of the analysis.

CHAPTER 2. LITERATURE REVIEW

Introduction

This chapter will provide a review of the literature related to the problem of IT project failure rates, and inadequate project scopes that lead to project failure. Further, solutions and suggestions that have been proposed in an effort to increase success rates in IT project management will be reviewed in this chapter. The background to IT project management will also be explored, including a brief history of how IT project management has evolved.

Methods of Searching

Several techniques were used in the literature review process for this study. The primary tool used was the library at Capella University. Google Scholar was also used to ensure that as many studies as possible were found and reviewed, with several search-term combinations, including *information technology project scope failure*, *project scope failure*, *information technology project failure*, and *information technology project scope*. Articles in peer-reviewed publications published in the past five years represented the most common search criteria, and each of the search terms listed was also included. Most articles that were found and reviewed led to further studies of note, which were also reviewed.

Search results were limited to the past five years, except when reviewing historical data for project management principles and IT project management history. Searches for dissertations from the past five years reviewed the study methods, instruments, and approaches recently applied to the subject of IT project scope failure. This literature is reviewed below to investigate project scope inadequacy leading to IT project failure.

Conceptual Framework for the Study

This study intended to use NPT to analyze the relationships between a project's scope and the actors that impact it during the scope's creation and throughout the duration of the project. NPT's four constructs are designed to analyze IT projects before, during, and after implementation (May et al., 2019). The theory was deemed applicable to this study because it recognizes the many interactions among the actors involved in project scoping, project planning, and project completion (May et al., 2019).

Several studies have helped to elucidate the root causes of project failure. These studies identified project scopes as the most common root of failure (Blaskovics, 2016; Mackey, 2015). While these studies have yielded insight into project scopes' vital role in successful projects, few studies have addressed why project scopes so often lead to project failure. The present study provided data that helped determine what causes project scopes to be inadequate. The results of this study were useful for developing a framework for IT project scope creation that is designed to reduce or eliminate common causes of scope inadequacy by offering project managers and CIOs ways of identifying and planning for problems that are likely to arise.

NPT is broadly applicable to IT projects in many industries and companies (May et al., 2019; May & Finch, 2009; McEvoy et al., 2014). However, NPT has not been explicitly applied to IT project scoping. This approach yielded insight into the interplay between actors and all aspects of a project, procedure, or process (May et al., 2019; May & Finch, 2009; McEvoy et al., 2014).

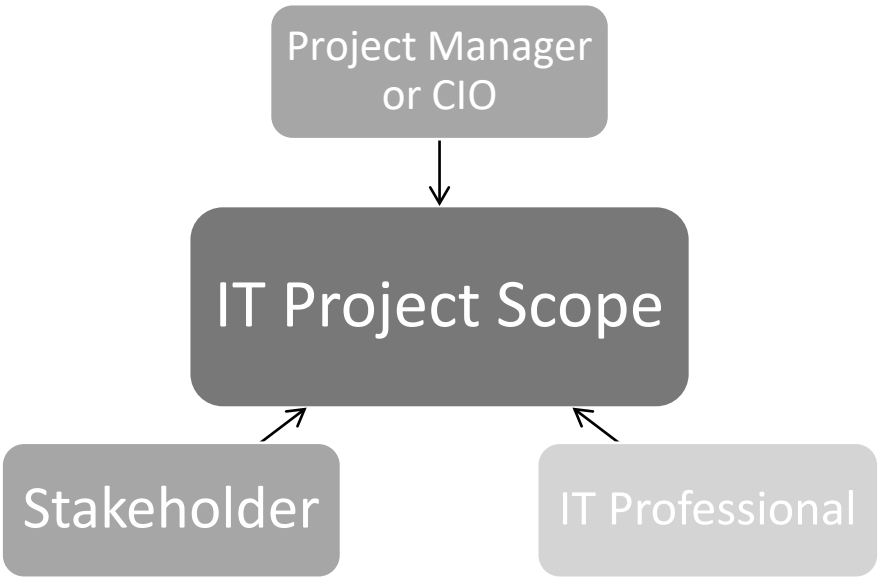

Figure 1. Many actors affect project scope creation.

This study intended to apply the first construct of NPT, coherence, to analyze the interactions between actors and to yield vital data regarding the processes involved in each project management phase, how each actor understands the project and its scope, how all actors collectively understand the project and its scope, and how each actor understands the potential benefits of a project (May et al., 2019). Application of the coherence construct to the topic of IT project scope inadequacy could have yielded relevant results leading to valuable insights into

which interactions between actors will influence project scope creation. The section that follows will review the existing literature on project management and project scoping.

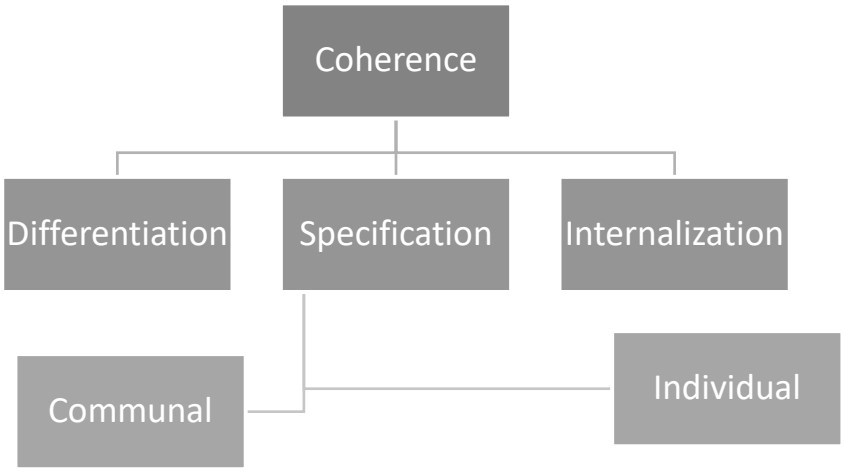

Figure 2. An overview of the Coherence Construct of NPT (May et al., 2019).

Review of the Literature

Project Management Beginnings

Modern project management principles began to be defined in the 1940s and 1950s and were based on operations research (Bredillet, 2007). Early project management utilized various tools, such as critical path networks, Gantt charts, resource allocation, the theory of constraints, and simulations, as a means of promoting optimization (Bredillet, 2007). The operations approach to project management succeeded in helping project managers to define a project's objectives, break a project into smaller, more manageable components, and conform to time and budget constraints (Bredillet, 2007).

During the 1960s, many project managers shifted their focus to projects' budgets and time constraints (Bredillet, 2007). This simplified approach was called "modeling" and helped companies to achieve greater efficiency in their projects (Bredillet, 2007, p. 2). Eventually, the modeling approach was modified to consider the external factors that often affect projects (Bredillet, 2007). External factors were recognized as having an impact on projects, which had not been adequately addressed by the optimization school of thought (Bredillet, 2007).

The accepted approach to project management shifted focus again to what became known as the 'success' approach (Blaskovics, 2016). The success approach used success criteria and success factors as a means of managing projects (Blaskovics, 2016). Success factors increase the chances of project success (Blaskovics, 2016). Success criteria are goals used to assess a project's success or failure after its completion (Blaskovics, 2016). Project management practices served as the basis upon which IT-specific project management principles were built (Chun & Mooney, 2015). While IT project management has its roots in traditional project management, IT project managers have additional concerns that will be detailed in the following section (Chun & Mooney, 2009; Giles, 2015; Lawes, 2017).

IT Project Management

As IT projects have increased, IT professionals have had to overcome several challenges, such as determining the appropriate reporting structure for IT management, which project management principles to apply in IT project management, how to measure the success of IT projects, and how to manage the diverse range of IT teams (Chun & Mooney, 2009; Giles, 2015; Lawes, 2017). Many IT project managers customized traditional project management practices in ways that were better suited to working with IT projects (Krotov, 2015). This transition from

traditional project management practices toward project management practices customized for IT projects had a significant impact on how companies are structured, how IT is viewed by shareholders and C-level executives, and how companies conduct their business (Chun & Mooney, 2009; Krotov, 2015).

IT professionals, IT project managers, and executives soon realized that the traditional definitions of project success could not always be directly applied to IT projects (Dwiveldi et al., 2015; Jørgensen, 2014; Mäntylä, Jørgensen, Ralph, & Erdogmus, 2017). Defining success and failure in relation to IT projects has been the subject of many debates, studies, and articles (Dwiveldi et al., 2015; Jørgensen, 2014; Mäntylä et al., 2017). IT project management has shifted from short-lived, task-oriented projects to large, often industry-defining projects that require more refined management principles and practices (Giles, 2015; Mäntylä et al., 2017; Viira, 2018; Mizera-Pietraszko & Fong, 2015).

During the 1980s, many companies designated a new role for the purpose of managing the increasing reliance on IT, that of CIO (Banker et al., 2011; Nash, 2014). The role of CIO increased in influence throughout the 1980s and 1990s, as IT continued to grow in complexity and versatility (Banker et al., 2011; Lawes, 2017; Mizera-Pietraszko & Fong, 2015; Nash, 2014; Viira, 2018). CIOs began to influence company strategies, as IT budgets increased and IT departments became a regular feature of most company structures (Banker et al., 2011; Lawes, 2017; Nash, 2014).

During the growth of the CIO's role, its place in the structure of the organization became the subject of many debates, and several different opinions emerged on the optimal reporting structure for the new role of CIO (Banker et al., 2011; Krotov, 2015; Nash, 2014). Many

companies considered it best practice for a CIO to report directly to CEOs, while other companies had their CIOs report to the topmost financial office, such as the CFO (Banker et al., 2011). Several other companies did not require their CIOs to report directly to C-level executive at all (Banker et al., 2011; Krotov, 2015; Nash, 2014). CIOs' reporting structures can have a significant impact on how IT is used to achieve the company's business objectives (Banker et al., 2011; Chun & Mooney, 2009).

The CIO reporting structure is often determined by the type of orientation that IT has within a company (Banker et al., 2011; Krotov, 2015). In a strategic orientation, the CIO and IT solutions are an integral part of strategic planning for the company (Banker et al., 2011). Many companies adopt a strategic orientation whereby business decisions are made within the capabilities of the IT department (Banker et al., 2011). Conversely, operational orientations generally focus mainly on which IT solutions are needed to simply conduct business, and are not concerned with how IT might be used as a driver of innovation and growth (Banker et al., 2011).

IT systems have increased in importance for various industries worldwide (Bloch et al., 2012; Clarizen, 2016; Dutta et al., 2015; Institute of Electrical and Electronics Engineers [IEEE], n.d.; Krotov, 2015; Lawes, 2017; Mizera-Pietraszko & Fong, 2015; Viira, 2018). This is largely due to the fact that IT systems have become integral to companies' operation (Bloch et al., 2012; Dutta et al., 2015; IEEE, n.d.; Lawes, 2017; Mizera-Pietraszko & Fong, 2015; Viira, 2018). Companies rely on IT systems for payroll, human resources, training, tracking, communicating, and more, regardless of industry (Bloch et al., 2012; Dutta et al., 2015; IEEE, n.d.; Krotov, 2015; Lawes, 2017).

Over $250 billion is spent annually on IT projects in the United States alone (Standish Group, 2014). Approximately 175,000 projects are underway in American companies at any given time (Standish Group, 2014). The cost of each project, depending on the company's size, ranges from $434,000 to over $2 billion (Standish Group, 2014).

The IT project manager manages the scope, cost, timeline, and goals of IT projects (Ramaswamy & Dawson, 2014). IT project management can also be a source of competitive advantage (Ramaswamy & Dawson, 2014), as many industries use IT solutions to facilitate organizational success (Ramaswamy & Dawson, 2014). Ramaswamy and Dawson (2014) discovered that project managers are as crucial to IT projects as project management itself. Moreover, project managers are also the creators of project scopes at the beginning of every project (Blaskovics, 2016). The section that follows details how project scopes are defined and what observations have been drawn by earlier studies on the subject.

Project Scopes

Success factors and criteria for projects are defined in a document called a project scope (Blaskovics, 2016). Project scopes are used to define projects' goals, budget, constraints, limitations, and timelines (Blaskovics, 2016; Keyes, 2009), and are the mainstay of a planned project (Hassan et al., 2017; Keyes, 2009). Project scopes contain limits, boundaries, capabilities, budget, and timeline details (Hassan et al., 2017; Keyes, 2009). Project scopes are among the most critical aspects of successful project management (Hassan et al., 2017).

Project scopes break the intended end product down into smaller, more manageable, and detailed components (Coplan & Masuda, 2011). The first step in project scope creation is that of defining the scope statement (Coplan & Masuda, 2011). The scope statement broadly defines the

project's intention, what the end product will be, whom the end product will benefit and how, and how the end product will assist the company in reaching its business goals (Coplan & Masuda, 2011). Project objectives identify in greater detail the objectives that each individual aspect should achieve (Coplan & Masuda, 2011; Keyes, 2009). The objectives are often paired with and detailed by key stakeholders whose responsibilities will be affected by the desired solution (Coplan & Masuda, 2011; Keyes, 2009).

When the project's end result has been adequately defined, the project manager must take the intended objectives and break them down into specific tasks and deliverables (Coplan & Masuda, 2011; Keyes, 2009). This is the first step in creating a work breakdown structure (Coplan & Masuda, 2011). A work breakdown structure is a hierarchical list of planned objectives grouped by category (Coplan & Masuda, 2011). Each part in the breakdown structure is often defined in greater detail using a work breakdown structure dictionary (Coplan & Masuda, 2011). This dictionary is crucial in ensuring that all actors involved have a single reference point where they can review the definition of each deliverable component of a project (Coplan & Masuda, 2011).

Once the project's objectives have been adequately defined, work packages are created (Coplan & Masuda, 2011). Work packages comprise a list of tasks and solutions needed to fulfill each objective (Coplan & Masuda, 2011), and collectively serve to affirm the project's objectives (Coplan & Masuda, 2011). Work packages often identify the teams or individuals that are expected to complete each work package (Coplan & Masuda, 2011).

The final step in the scope creation process is verification (Coplan & Masuda, 2011; Keyes, 2009). Scope verification entails comparing the defined deliverables in the scope with the

pre-determined objectives (Coplan & Masuda, 2011; Keyes, 2009). Furthermore, a scope's work packages are checked against existing policies and procedures to ensure that the work package will be completed within the confines of the company's policies (Coplan & Masuda, 2011; Keyes, 2009). If any project deliverables are to be delivered by partners or vendors, the project manager must liaise with these parties and obtain a signed agreement identifying the deliverables and limitations (Coplan & Masuda, 2011).

The IT industry has had less success than other industries in using traditional project management principles to create and manage project scopes (Coplan & Masuda, 2011). One reason for this is the complexity of project scopes, which require a diverse skill set to adequately create (Coplan & Masuda, 2011; McCann, 2013).

Project scopes are complicated because they must detail the numerous different aspects of a project (Hassan et al., 2017; McCann, 2013). A project scope must define the product being produced, as well as the details of how the project will be completed (Hassan et al., 2017; McCann, 2013). Not only are these requirements complex, but defining the end product requires a different skill set to that required to define the processes, teams, and technologies that will be required to complete the project, and both these skill sets are required when creating a project scope (Hassan et al., 2017). In addition to the broad skill set needed to create an adequate project scope, the scope creation process is often adversely impacted by a lack of reliable data, which become available only after a project has been started (Hassan et al., 2017).

Once a project scope has been created, and the project commences, the scope must be managed throughout the project's life, which again necessitates a distinct skillset (Coplan & Masuda, 2011; Keyes, 2009; McCann, 2013). A project manager must plan for and manage

project scope change (McCann, 2013). Scope changes often result in budget and schedule overrun (McCann, 2013). Because scope change is a significant contributor to project failure, project managers must continuously manage the scope throughout the project's execution and keep scope change to a minimum to avoid common IT project problems (Shiv & Doraiswamy, 2012). Common IT project problems are detailed in the following section.

IT Project Problems

IT project failure has been a widespread problem among companies and organizations, regardless of whether the company is directly part of the IT industry or technology is used merely as a means of conducting business (Blaskovics, 2016; Bredillet, 2007; Giles, 2015; PMI, 2013; PMI, 2016; PMI, 2018; Standish Group, 2014). IT projects have had high failure rates for at least 40 years (Giles, 2015). Australia's Queensland Healthcare system initiated a project in 2007 that was intended to replace the existing payroll system for the organization's 80,000 employees (Blackmore, 2013). The contract for this project was given to IBM, at a value of over $59 million, with an expected completion time of six months (Blackmore, 2013).

The project was not completed on time, and spending exceeded the initial budgeted amount (Blackmore, 2013). In March of 2010, the new system was in place, and usage began (Blackmore, 2013). However, several parts of the system failed to function correctly (Blackmore, 2013). Queensland Healthcare was obliged to hire over 1,000 additional staff to manually complete payroll activities that should have been included in the new system (Blackmore, 2013).

IT project success rates are lower than those of most industries, with approximately 30% of projects being completed (Blaskovics, 2016). Projects continually take longer than expected, cost more than budgeted for, and under-deliver on promised features and functionality

(Blaskovics, 2016). Twenty percent of IT projects are canceled before they have even commenced (Blaskovics, 2016). Large IT projects with budgets exceeding $15 billion typically run 45% over budget, take 7% longer than planned, and accomplish 56% less than expected (Bloch et al., 2012). Only 16.2% of projects are completed within budget and time frame as planned (Standish Group, 2014). IT project failures have substantial, widespread consequences (Bloch, Bloomberg, and Laartz, 2012), as detailed in the section that follows.

Effects of IT Project Problems

Seventeen percent of project failures result in company bankruptcy and closure (Bloch et al., 2012). By the time the Queensland Healthcare project was fully functioning, the company had spent over $245 million, and additional employees were required (Blackmore, 2013). The additional employees hired to complete the manual payroll processes for Queensland Healthcare cost $1.15 billion (Blackmore, 2013), and the organization spent over 200 times the initial budget for their payroll system (Blackmore, 2013). FoxMeyer went from being the fifth-largest pharmaceutical company in the world to filing for bankruptcy due to a single project that exceeded its budget and failed to meet the company's needs upon completion (Hamrouni, 2017).

Not only do failed projects cost companies billions of dollars each year, but companies also consequently experience an inability to meet business requirements, failure to innovate, and inhibited growth (Clarizen, 2016). Companies are often faced with situations wherein resources and focus have been redirected to a project (Clarizen, 2016). This redirection in and of itself is not detrimental, so long as the project is completed and is successful in helping the company achieve its goals (Clarizen, 2016). When projects fail, resources must often be directed toward recovery from the project's failure, rather than allowing a company to look ahead toward

improvements and innovations (Clarizen, 2016). Clarizen (2016) further argued that talented individuals within organizations are more likely to seek other opportunities rather than remain with an organization that consistently fails to complete projects successfully (Clarizen, 2016).

FoxMeyer, a healthcare company in the United States, grew to be the fifth-largest pharmaceutical wholesaler during the early 1990s (Hamrouni, 2017). FoxMeyer initiated a project with a budget of $65 million dollars that was intended to revolutionize the pharmaceutical industry (Hamrouni, 2017). Due to poor planning and implementation, however, the project's expenses ran over 150% beyond the budget and realized less than half of the expected operational savings (Hamrouni, 2017).

In 1996, a rocket that cost $7 billion and took over a decade to make was launched and exploded 36 seconds into its first flight (Hamrouni, 2017). This catastrophe was caused by a software development bug that was located in a system that was not even required to be turned on once the rocket was airborne (Hamrouni, 2017). The Ariane project was obliged to spend an additional $370 million to clean up the crash site (Hamrouni, 2017). Leoncini (2015) observed that, while failed innovative projects can inspire those involved to achieve better results in future endeavors, project failure can also cause employees to lose their drive toward innovation, particularly in situations where project failure is a frequent occurrence.

Matta and Ashkenas (2003) discovered that continued project failure could have demoralizing effects on employees, leading to underperformance, lethargy, and apathy toward the quality of their work. According to McManus and Wood-Harper (2008), project failure cost the European Union €142 billion in 2014 alone. Grant (2016) observed that project failures lead companies' inability to fulfill their business objectives. Companies are unable to increase value

for customers when IT projects fail to deliver on IT solutions (Grant, 2016). Standish Group (2014) discovered that only 42% of completed projects contain the intended features as laid out in the project scope. The causes of these project failures have some variance, but many have inadequate project scoping as their root cause (Standish Group, 2014). These causes are covered in the following section.

Causes of IT Project Problems

Numerous factors contribute to projects' failure (Blaskovics, 2016; Clarizen, 2016; Giles, 2015; Hughes et al., 2017; PMI, 2016). Project managers often fail to understand how success factors and criteria impact one another, and how they themselves impact both success factors and success criteria (Blaskovics, 2016). The role of CIO has not always been adequately defined, which has led to confusion about the proper chain of command and exactly what the CIO's role should be (Chun & Mooney, 2009). This confusion has led to several different traditional definitions of the role, power struggles among CIOs and other C-level executives, and multiple approaches to IT project management (Chun & Mooney, 2009). The lack of definition of success and failure in the IT context is a contributing factor to inadequate project scoping, which leads to failed projects (Dwiveldi et al., 2015; Giles, 2015).

The Queensland Healthcare payroll project had several factors that contributed to its failure (Blackmore, 2013). The procurement process of selecting a vendor was rushed due to the existing payroll system's scheduled end of life (Blackmore, 2013). The project scope of the new payroll system was never adequately defined (Blackmore, 2013). Furthermore, the Queensland Healthcare payroll project was not continually assessed using critical success factors and success criteria (Blackmore, 2013).

Dutta, Geiger, and Lanvin (2015) discovered that a lack of data on IT solutions leads to misguided policies and misallocation of resources. Executives use data to make informed decisions (Dutta et al., 2015). Without accurate data, executives often make decisions that can too easily result in failed projects (Dutta et al., 2015). Many project managers overestimate their own capabilities and competence (Dwiveldi et al., 2015).

The root causes of many project failures have been linked to project scope (Dwiveldi et al. 2015; Standish Group, 2014). Hughes et al. (2017) identified inadequate project definition, inadequate planning for and management of changes, and poor project definition, all of which are aspects of project scope development, as reasons often leading to failed IT projects. Many projects are managed in accordance with project scopes that are flawed from the outset (Giles, 2015; Lavanya & Malarvizhi, 2008). Stakeholders often lack the depth of technological knowledge required to adequately understand the intricacies and complexity involved in creating project scopes (Giles, 2015; Nazeer, 2017; Phelps, 2014). McManus and Wood-Harper (2008) discovered that most projects were abandoned in the planning stages as a result of problems encountered during project scope creation.

Matta and Ashkenas (2003) argued that IT project managers have shifted their focus away from projects' end results to focus instead on recommendations, new technologies, and partial solutions. This shift in focus results in projects that fail to deliver the required solution because a project's end goal is defined in the project scope, and the omission of this refined definition eliminates the metric by which the project and solution are measured from beginning to end (Matta & Ashkenas, 2003).

Project complexity has increased in tandem with the prevalence of IT solutions (Nazeer, 2017). This complexity has often evolved at a faster rate than project managers' knowledge acquisition, resulting in project managers that lack the needed tools to effectively manage a successful project (Nazeer, 2017). Project scope creation is a challenging process that only increases in difficulty as a project's complexity increases (Hassan et al., 2017).

Ramaswamy and Dawson (2014) identified strong project management and stakeholder management skills as the capabilities that IT project managers require to be successful. Shirazi et al. (2017) discovered that scope creep contributes to project failure rates. Standish Group (2014) found that the three most common issues leading to project failure are project scope related and that four out of the top ten critical success factors are aspects of the project scoping process. It would stand to reason that, since many root causes of IT project failure have been identified, solutions centered on countering these common root causes may be developed. Earlier studies have researched possible solutions to the problem of failed IT projects. These studies are covered in the next section.

Possible Solutions to IT Project Problems

Before a project's success or failure can be determined, the success criteria must be defined (Blaskovics, 2016). Critical success factors must also be defined before a project can begin (Blaskovics, 2016). Gaining a better understanding and definition of success factors and success criteria, in addition to the ways in which factors, criteria, and project managers interact with and impact one another, may increase the likelihood of project success (Blaskovics, 2016). A better understanding of the interactions between success factors and criteria can aid project managers in creating a project scope and managing a project (Blaskovics, 2016).

Bloch et al. (2012) argued that a greater focus on strategy and stakeholders, instead of solely focusing on time and budget, could be beneficial in increasing project success rates. Assembling the necessary talent for a project, creating effective teams, and adhering to short project assessment intervals with strict guidelines are important factors that contribute to the project's success (Bloch et al., 2012). Communication of a project's strategic value to all involved can enhance each team's or stakeholder's focus on success (Bloch et al., 2012). An accurate understanding of a company's existing projects, departments, and teams is essential when planning a new project (Bloch et al., 2012). Revisiting and revising a project scope just before a project's commencement can help align the scope with the company's needs (Bloch et al., 2012).

As the role of CIO has evolved, two main approaches have emerged (Chun & Mooney, 2009). The first focuses on how IT costs can be mitigated or reduced, as IT systems are simply considered to be a necessary, but undesirable, cost of doing business (Chun & Mooney, 2009). The second approach focuses on how IT solutions can be leveraged to help a company achieve its goals (Chun & Mooney, 2009). Companies whose CIOs focus on how IT solutions can be used for innovation, expansion, and market differentiation have traditionally experienced greater profits and slightly higher chances of project success (Chun & Mooney, 2009).

Fadlalla and Amani (2015) demonstrated that Enterprise Resource Planning (ERP) systems could help companies maintain day-to-day operations while also managing projects. Fadlalla and Amani also learned that ERP systems have high loss potential and high failure rates. For example, the Hershey Company lost $150 million of sales, accompanied by a 19% drop in earnings, as a direct result of a failed ERP implementation (Fadlalla & Amani, 2015). Dell

wasted $200 million on a project that was eventually abandoned due to a failed ERP system (Fadlalla & Amani, 2015). While ERP systems can assist in the execution of IT projects, Fadlalla and Amani discovered that an ERP system alone could not ensure the success of a project.

Gathering data that is more reliable, granular, and complete can help project managers and CIOs to plan for and make decisions that lead to success (Dutta et al., 2015). Better data could contribute to a more distinct and precise definition of project success and failure (Dwiveldi et al., 2015). Correctly implemented change management can be a contributing factor to success (Dwiveldi et al., 2015).

Jørgensen (2014) argued that considering potential problem factors before a project's commencement can help project managers to anticipate problems and pre-plan strategies for dealing with potential problems. Lehtinen et al. (2014) argued that better cooperation between project stakeholders could mitigate potential problems. Leoncini (2015) suggested that companies should learn from their mistakes to avoid making the same mistakes in future projects. Greater understanding and management of project complexity could aid project managers in planning for and scoping a project (Nazeer, 2017).

Stoica and Brouse (2014) developed a framework to help boost IT project success rates called Adaptable and Preemptive IT Project Management, or AdaPIT. AdaPIT is intended for use alongside any existing project management frameworks (Stoica & Brouse, 2014). Despite the identification of many root causes of failure, no conclusive solutions have been discovered or developed (Dwiveldi et al., 2015). In the section that follows, I detail my reasoning for determining that further research is required on the topic of inadequate IT project scopes.

Need for Further Research

Despite the suggestions outlined above, which aim to achieve greater project success, there are many gaps within the knowledge base regarding project scopes and the causes of project scope inadequacy (Dwiveldi et al., 2015). Inadequate project scoping is the most common cause of project failure (Clarizen, 2016; Dwiveldi et al., 2015; PMI, 2018). Because IT solutions have been shown to provide value and innovation for companies and their employees, increasing project success rates by identifying the factors that lead to inadequate scopes is likely to increase productivity, innovation, and value for many companies, their employees, and ultimately, their customers (Dwiveldi et al., 2015).

Existing research on how project managers affect projects they manage has been limited, resulting in an incomplete model of the interactions between project managers, success criteria, and success factors (Blaskovics, 2016). This gap in knowledge has created a lack of understanding in many project managers regarding how to influence and improve project scopes (Blaskovics, 2016). Research on the most effective role of CIOs has been limited by small sample sizes and a scarcity of studies and has not addressed how CIOs can help facilitate the creation of superior project scopes (Chun & Mooney, 2009).

In their panel on success and failure, Dwiveldi et al. (2015) argued that a professional, positivist approach that focuses on each project's unique qualities, including which factors adversely affect project scope creation, can help CIOs and project managers achieve a higher degree of success. Because many project managers require such an extensive toolset, the provision of a list of common factors that often lead to inadequate project scopes could assist

project managers in creating plans aimed at avoiding common pitfalls as much as possible (Dwiveldi et al., 2015).

Fadlalla and Amani (2015) stated that their study on ERP, which includes project scoping, is limited by its focus on scholarly journals. Due to this limitation, Fadlalla and Amani recommend further research on the topics encompassed by ERP. Giles (2015) learned that complexity and stakeholders' lack of understanding often impact project completion, but did not explore how stakeholders' understanding affects project scope development (Nazeer, 2017; Poveda-Bautista et al., 2018).

While Hassan et al.'s (2017) model for measuring project scope completeness can be effectively used to assess project scopes, the model is limited to software project scopes. Data on the reasons for project scope inadequacy could be combined with Hassan et al.'s model to better equip managers of software projects and could potentially lead to higher success rates, although limited to software projects. Hughes et al. (2017) identified poor project planning as a significant factor leading to project failure. Because project scopes are an integral aspect of project planning, research that uncovers the reasons behind project scopes' inadequacy can help to improve planning success in IT projects (Hassan et al., 2017; Hughes et al., 2017).

Jørgensen (2014) discovered that further research is warranted to help identify the causes of project failure, such as what causes scopes to be inadequate, and methods for improving success rates. Lehtinen et al. (2014) found that better communication may facilitate the creation of more adequate project scopes, but also argued that more research is needed to determine the degree to which this increase in communication could affect project scope creation. Hassan et al.

(2017) argued that the tools currently used in project scope completion are inadequate and that studies focusing on project scope improvement would be useful to the IT industry.

NPT's application has been shown to be effective in qualitative studies as a means of analyzing a diverse range of complex interactions (McEvoy et al., 2014). NPT is an informative tool for guided implementation processes because NPT constructs have high stability (McEvoy et al., 2014). McEvoy et al. (2014) recommend NPT for use in gaining incremental knowledge and analyzing data.

Ramaswamy and Dawson (2014) discovered that advances in IT project management have not sufficiently curtailed the high failure rate, and argued that the problem merits further study. The challenges associated with IT project management differ from the challenges that project managers in other fields may face, which justifies the development of new solutions and acquisition of new data (Ramaswamy & Dawson, 2014). Stoica and Brouse (2014) acknowledged that the AdaPIT system could only serve to help increase successes, but cannot determine the causes of IT project scope inadequacies. The findings and conclusions of this literature review are detailed in the following section.

Findings of the Literature Review

While a considerable amount of research has focused on IT project failure, no studies have investigated why project scopes inadequately define projects (Hassan et al., 2017). The goal of a project scope is to completely define a project, its capabilities, its limitations, its budget, and its time frame (Hassan et al., 2017). CIOs and project managers use scopes as blueprints that clearly lay out the project so that all actors involved are familiar with all defined aspects of a project before taking any actions (Hassan et al., 2017).

Neither traditional project management nor IT project management principles and practices have succeeded in ensuring a high success rate for IT projects (Hughes et al., 2017; Shirazi, Kazemipoor, & Tavakkoli-Moghaddam, 2017; Standish Group, 2014). Additionally, project management practices have been unable to guarantee the creation of adequate project scopes (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014). Adequate project scopes are indispensable for CIOs and IT project managers as the basis on which successful projects are built (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014).

Organizations continue to rely on traditional approaches to project scope creation (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014). Unfortunately, these approaches have not been shown to be wholly effective (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014). Project managers face difficult decisions at the beginning of every project with regard to determining which methods will be optimal in building their project scope (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014).

Numerous studies have focused on various aspects of IT projects (Blaskovics, 2016; Bredillet, 2007; PMI, 2016), including attempts to find a more conclusive definition of project success and failure (Kerzner, 2014; Kusek & Hamilton, 2013). Other studies have sought to determine why IT projects have such a high failure rate (Kusek & Hamilton, 2013). CIO reporting structure, reliance on IT solutions, and the negative impact of failed projects have all been considered (Chun & Mooney, 2009; Giles, 2015; Lawes, 2017).

The nuances of IT project success and failure have been explored, and several sets of definitions have emerged (Kerzner, 2014; Kusek & Hamilton, 2013). Several causes of IT project failure have been identified and studied (Kusek & Hamilton, 2013). CIO reporting

structure has been shown to be most effective when the CIO reports directly to a CEO if a company wants to innovate and integrate IT into driving the company's goals (Clarizen, 2016; Chun & Mooney, 2009; Giles, 2015; Lawes, 2017). Reliance on IT solutions has been firmly established in many of today's industries (Lawes, 2017; Stoica & Brouse, 2014). The global impact of failed IT projects has been established and is recognized as a significant problem that has many detrimental, and often disastrous, effects on companies worldwide (Clarizen, 2016; PMI, 2016).

Previous research has been useful in providing the background regarding IT project failure, its impact, and its causes (Chun & Mooney, 2009; Giles, 2015; Lawes, 2017). However, there is a gap between our understanding of how significant an impact project scopes have on IT project success and what causes projects scopes to fail in this way (Blaskovics, 2016; Standish Group, 2013; Whitney & Daniels, 2013). IT project scope creation practices have not been sufficiently studied to determine why they so often fail (Hassan et al., 2017).

This research offers an opportunity to address the causes of IT project scope inadequacy. The current processes do not ensure a high enough likelihood of success (Hassan et al., 2017), and this research may uncover problems that could be easily avoided in IT project scope creation (Coplan & Masuda, 2011; Hassan et al., 2017; Keyes, 2009; McCann, 2013). The application of NPT analysis to IT project scope creation has the potential to assist project managers in creating adequate project scopes that have higher rates of success than was previously observed, by positively identifying the factors that impact project scopes. The limitations of earlier studies are specified in the next section.

Critique of Previous Research Methods

Several studies have investigated IT project failure. However, the IT project failure rate continues to be higher than that of other industries (Bloch et al., 2012; Clarizen, 2016; Ramaswamy & Dawson, 2014). PMI (2018) offers a useful set of practices, models, frameworks, and certifications on the subject of project management. Several completed studies have failed to adequately address the problem, having focused on traditional project management principles. These guiding principles are not always as effective when applied to IT projects (Hughes et al., 2017; Shirazi et al., 2017).

Poveda-Bautista et al. (2018) identify complexity as a key contributor to IT project failure. Poveda-Bautista et al. (2018) developed an assessment tool that can be used to measure the complexity of IT projects (Poveda-Bautista et al., 2018). While the complexity of IT projects is a factor that adds to a project's likelihood of failure, complexity management itself is insufficient to address the most common causes of IT project failure, which are project scope-related (Giles, 2015; Nazeer, 2015). Further, Poveda-Bautista et al.'s (2018) tool was an evolution of existing complexity assessment and only served to clarify that not all components of a project need to be measured for complexity, as only key components offer the greatest chance of improvement through complexity analysis (Poveda-Bautista et al., 2018).

Lehtinen et al. (2014) analyzed the relationship between software projects and the most common causes of failed IS projects, acknowledging that their work is only a base upon which further research may be built, and their work has not been verified by other studies. Finally, Lehtinen et al.'s study is limited to software development, which represents only a portion of IT projects overall. Mäntylä et al.' (2017) article comprised four studies that revealed several

factors that contribute to software development project failure. Their paper added to the collective knowledge of how software project success can best be understood and measured. Mäntylä et al.' studies focused on software development and, as such, cannot be universally applied to IT projects in general.

Leoncini (2015) and Välikangas et al. (2009) have addressed the possibility of learning from mistakes made in earlier projects. Välikangas et al. identified many barriers that prevent companies from taking this approach. Välikangas et al. observed that failed projects often hamper ensuing projects, due to disappointment, low morale, and employees' inability to commit as heavily to a new project. Leoncini found evidence that companies can learn from their mistakes. Some companies have had failure completely destroy the business, to the point that no learning could be applied because the company had ceased to exist as before, usually in the form of filing for bankruptcy (Dwiveldi et al., (2015).

Dwiveldi et al. (2015) formed a panel with the intention of identifying the next steps in measuring IT project success, analyzing successful projects' implementation, and identifying subject areas in need of further research. Dwiveldi et al. argued that IT project failure is a multi-faceted, complex problem that needs to be addressed from many perspectives. Dwiveldi et al. identified several viewpoints that they say merit further research, most notably regarding the ways in which success is measured. I argue, however, that identifying measurements of success does little to alleviate IT project failure rates.

Grant (2016), McCann (2013), McCray (2015), and Shirazi et al. (2017) all focus their studies on managing project change, which is an aspect of project scoping in the form of managing scope creep or scope change. Grant found that Karl Lewin's Unfreeze-Move-Freeze

theory can help manage change, while McCann argued that analyzing changes can help measure the impact of the potential scope change. While managing scope change is an integral part of a project manager's job, change management will not resolve all problems associated with project scopes that contribute to IT project failure (McCann, 2013; Shirazi et al., 2017).

Hassan et al. (2017) developed a means by which project scope completeness can be measured such that the measurement can be used to ensure an adequate project scope prior to the project's commencement. They acknowledge, however, that their study only covers one aspect of project scoping and that its applicability is limited due to the changing nature of project scopes. Complete scope definition can contribute to IT project success, though it cannot fully solve the IT project failure problem (Hassan et al., 2017).

Earlier studies have yielded insights into several different aspects of IT project failure, including Stoica and Brouse's (2014) AdaPIT Theory, Lavanya and Malarvizhi's (2008) article on risk management, Wills (2015) study on IT Governance, and Kerzner's (2014) study of project failure recovery. However, no studies have addressed the reasons behind scope inadequacy and failure, resulting in a gap in our knowledge regarding the causes of project scope inadequacy and how to mitigate their negative impacts. This knowledge gap can, potentially, be filled by an understanding of what causes IT project scope inadequacy.

Summary

Research on identifying the causes of IT project scope failure has been limited (Standish Group, 2014; Shirazi et al., 2017; Hughes et al., 2017). This literature review explored the existing articles and studies centered on IT project scoping, project management, and project failure. The findings of these studies have determined that project scope problems are the most

common cause of IT project failure (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014).

This review analyzed existing research on the subject of IT project failure, the impact of project scopes on project success, and the outcome of the existing studies. The review began with the history of project management, to provide background data on the basis on which IT project management was built. This review briefly examined the evolution of IT project management, and gave the history of the CIO role, to contextualize CIOs' reliance on project success.

Regarding CIOs and their responsibilities, this review summarized the epidemic problem of disproportionately high IT project failure rates. First, the problem was addressed to demonstrate its prevalence. The predominant reasons that projects fail are all related to project scopes (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014). This realization provided validation for a new study focused on the factors that are most likely to adversely affect project scopes. Earlier studies and attempts to resolve the problem of IT project failure were highlighted, along with any flaws. The review grounded the research in the interactions between actors and project scope creation and analysis of those interactions and relationships, using the coherence construct of NPT, and provided justification for conducting this study. Chapter 3 will describe a proposal for research that can provide critical insight into the problem of inadequate IT project scopes.

CHAPTER 3. METHODOLOGY

Introduction

The success rate of IT projects is lower than in other industries (Whitney & Daniels, 2013). IT project failure costs companies billions of dollars every year (PMI, 2016). Not only do companies waste money, but companies are wasting other resources as well, such as employee skills and time (Clarizen, 2016; PMI, 2016). CIOs rely on IT projects success and completion, and failure can have far-reaching consequences (Banker et al., 2011; Krotov, 2015; Nash, 2014). Further, customers are also affected through the resulting lack of IT solution to meet the customers' needs (Chun & Mooney, 2009). The most common reasons IT projects fail are related to the project's scope (Giles, 2015; Hassan et al., 2017; Larson & Larson, 2009; PMI, 2016). IT project scopes often fail to inadequately cover the intended project (Murray, 2001; Whitney & Daniels, 2013). Discovering some of the reasons IT project scopes are inadequate, and solutions for these reasons could lead to higher IT project success rates (Murray, 2001; Whitney & Daniels, 2013).

Chapter 3 details the research design and the gap in the existing literature that necessitated this research and how that gap helped to inform the research design. The literature review in Chapter 2 supports the conclusion that the existing literature fails to address the reasons why IT project scopes are often inadequate. Specifically, this study identified some significant contributing factors to the inadequacy of IT project scopes.

To identify these factors, in addition to those that inhibit the creation of adequate project scopes, an evaluation exercise was conducted to determine the optimal methodology for addressing this critical problem in today's IT industry. The iterative nature and focus on the

improvement of NPT combined with interviews allow for a study that can encapsulate the purpose of this research. Due to the unique characteristics of IT projects, a qualitative inquiry approach was deemed to be the most effective for gathering relevant data. The data were gathered through interviews with 20 IT professionals.

This chapter begins by presenting the research design, the rationale for choosing the methodology, the participants, the interview questions, and the framework within which the results were analyzed. The rationale and method of selecting a target population and representative sample are included, so that future investigations can replicate or build on this study. To ensure accuracy and reliable findings, the procedures for data collection and the analysis plan required to replicate this study are included in this chapter.

Design and Methodology

This study employed a qualitative inquiry design that included interviews with 20 IT project managers from companies within the United States. The exploratory study design permitted the discovery of the root causes of IT project scope inadequacies. The exploratory design also identified potential solutions to the identified problems.

A quantitative research method would not have served this study as well as a qualitative approach (Cooper & Schindler, 2014; Leedy & Ormrod, 2016). While a quantitative approach may have identified correlations between factors, the aim of the study was to identify factors, rather than connect the factors to one another (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). Due to the depth of detail and open-ended nature of the interview questions, a qualitative study was warranted (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016).

The qualitative inquiry approach offers the best method of collecting data and context from the perspective of each participant (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). The participants' responses to the same base questions facilitated more efficient and useful data processing in preparation for analysis, while the open-ended questions allowed each participant to add their own specific viewpoints, as developed through their unique experiences.

Participants

The target population for this study is IT project managers in the United States. Each participant had at least two years' experience in the position of IT project manager or equivalent. Each participant had experience in creating a project scope and managing a project scope during the execution of an IT project. Participants must have completed an IT project or have been a manager of an ongoing project for at least one year at the time of the study. Because many IT projects span several years, I did not want to exclude any portion of the population that might offer useful insight into the issue at hand. Twenty IT project managers made up the sample for this study.

Recruitment took place in a project management Facebook group that has almost 20,000 members. This sample size was relatively small, as is appropriate for qualitative studies (Cooper & Schindler, 2014; Leedy & Ormrod, 2016). Qualitative study samples are often small to allow for an in-depth analysis of the collected data (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Fusch & Ness, 2015; Leedy & Ormrod, 2016). This in-depth analysis helps achieve saturation, that is, the point at which no more useful data can be gathered by adding more participants (Corbin & Strauss, 2008; Fusch & Ness, 2015).

Twenty participants from the Facebook group that contacted the researcher and match the inclusion criteria were accepted. The participants had to meet the following criteria to be eligible for interview: had worked in an IT project manager position for at least two years; had completed projects as an IT project manager; had developed or helped develop an IT project scope. This selection ensured that each participant had the knowledge and experience to answer the questions about IT project scopes' inadequacy.

The participants are employees of companies within the United States. The Facebook group has many members and provided 20 IT project managers from an array of companies. The companies were not limited to the IT industry. However, all participants had to be IT professionals and have managed IT projects. Utilizing project managers from several industries and companies diversified the data gathered, and yielded an informative set of varied experiences.

A non-probability purposive judgment sampling technique was used to determine the minimum criteria needed for a participant to be a representative sample (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016; Suri, 2011). Judgment sampling is characterized by the requirement of one criterion or more for participation (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016; Suri, 2011). In this study, the criteria were: two or more years of experience, experience creating a project scope, and completion of at least one project from start to finish. Once the required criteria were determined, the solicitation on the Facebook group was presented with the study and a solicitation for participants.

Setting

This study consists of multiple settings. For the interviews, the settings were a Facebook group, digital communication platforms, and several companies. Each participant provided a unique perspective because of the diverse companies that they each work for. The interviews for this study were conducted via phone calls. The potential participants contacted the researcher using email, phone call, or text message. Further communication was conducted to determine if eligibility criteria are met. Once eligibility was determined, the participants were emailed the consent form. Once informed consent was received by the researcher, the researcher and participant determined an appropriate time for the interview and which method of communication was to be used: phone call or Zoom meeting.

Once the contact info was provided, the researcher contacted the participant to discuss the study, the interview, and the communication method. Their preferred communication methods were determined and used on an individual basis. Informed consent letters were sent via email as PDF attachments and were digitally signed by each participant using the Adobe Acrobat system.

Instrument

The instrument used in this study was an interview schedule. The interview schedule used for this study consisted of several demographic questions. The demographics questions were followed by guiding, open-ended questions.

The Role of the Researcher

The researcher has worked in the information technology industry for 20 years performing many roles, including IT project manager. This breadth of experience and knowledge allowed the researcher to be an effective instrument in the data collection and interview process.

The researcher's work history has developed the skills needed to maintain organization and confidentiality despite interfacing with many different individuals. The researcher has performed IT consulting, which necessitates interviewing clients and stakeholders to determine the client's and the business' needs. During the course of these roles and experiences the researcher has developed the necessary interview schedule development and interviewer skills to conduct this study.

Because of the researcher's previous experience, there were concerns of potential bias that were addressed. The first potential bias related to the researcher was that of potentially knowing participants. To reduce this bias the researcher gathered participants from a Facebook group that was firmly established before the study and included over 20,000 members.

The second type of potential bias addressed was that of confirmation bias. This potential bias was mitigated using best-practice research methods as well as using a semi-structured interview format. Further, the interview schedule was developed with neutral, open-ended questions that allowed participants to frame their answers without any suggestive language or questions that limited the scope of a question in a predefined manner.

After developing the interview schedule, the researcher utilized several industry experts to refine the schedule questions. These experts were not eligible to be participants in this study to avoid bias in their analysis of the questions. As a final means of avoiding bias, the interviews were conducted in an open fashion that allowed each participant to answer each question with as much or as little detail as they were comfortable with and knowledgeable about.

Guiding interview questions

The interview schedule consisted of several background questions regarding the participant's experience as an IT project management professional. Second were questions regarding the participant's experience working with and developing project scopes. Finally, the schedule contained questions to draw out the participant's experiences, knowledge, adaptations, successes, and failures when developing and managing an IT project scope. The questions are detailed below.

1. About how many of your project scopes adequately defined the project (those created by you and those created by others)?

    I. What measures, if any, did you implement when creating these project scopes to ensure they were adequate?

    II. Did previous project failures or scope inadequacies lead to the development and use of any of these measures?

2. About how many of your project scopes could be considered to inadequately define a project?

    I. What were the root cause(s) of the inadequacy?

    II. Did you develop any measures because of any of these failures that you now utilize when creating project scopes?

        If so, what are they and how successful have they been?

3. Are there any other root causes that you have determined lead to a scope inadequately defining an IT project?

4. Are there any other measures you would suggest that can be used to increase a project scope's adequacy?

Analysis of Research Questions

This study explored inadequate project scopes and what factors may potentially cause project scopes to be inadequate and practices that can be used to mitigate the negative impact of inadequate project scopes. The problem of inadequate project scopes has led to billions of dollars being wasted (Murray, 2001; Whitney & Daniels, 2013). This waste could be redirected into

successful projects if the causes of inadequate project scoping were discovered and avoided or mitigated (Murray, 2001; Whitney & Daniels, 2013). Many IT project managers realize that the problem of inadequate project scopes is a widespread problem in the IT industry (Murray, 2001; Whitney & Daniels, 2013). However, the root causes of IT project scope inadequacy had not previously been determined (Murray, 2001; Whitney & Daniels, 2013). It follows logically that if the causes of IT project scope inadequacy have not been found, neither have the solutions been identified.

The goal of this study was to answer the following research question: What are the most common reasons that IT project scopes fail to adequately cover IT projects? Further, this study also aims to answer this research question: What are some common practices, procedures, or workarounds that can lessen the negative impact on a project scope? By answering these questions, IT project managers and IT executives could make plans to avoid or mitigate the adverse effects of the identified reasons that IT project scopes fail to adequately cover IT projects. The following section describes the steps taken to ensure the credibility and reliability of the study results.

Credibility and Dependability

The first step was to develop a set of instructions vetted by a small group of experts that were then provided to each participant both at the time of giving informed consent and at the beginning of the interview. The experts had a minimum of 10 years of experience as an IT project manager and held an appropriate certification, such as PMP, CompTIA Project+, MPM, or equivalent. Included in the instructions was a list of definitions to ensure a shared vocabulary of participants. To ensure quality and accuracy, the participants were given a chance to review

and approve the interview results. This portion of the data collection process allowed the participants to review, edit, and add to their responses to each interview question. The participants were each be given a week from the time of interview completion to complete this review process. Once the results were approved, data processing and data analysis began.

To reduce the likelihood of researcher bias, that is, bias introduced by the research through the phrasing of questions and answers, the researcher formulated the interview schedule while considering several best-practice research concepts. An alternate response strategy was implemented, so that the questions were worded neutrally, to limit leading questions and bias (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). Further, the interview schedule was presented to a small group of experts for review to ensure that the interview schedule would yield appropriate data from which accurate results could be drawn (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). The experts and other IT professionals assisted the researcher in ensuring the reliability and stability of the interview schedule and each of the questions contained therein (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016).

Another type of bias is response bias, whereby a participant gives an inaccurate answer (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). While this cannot be avoided entirely, several measures were taken in the design of the interview schedule to reduce the likelihood of its occurrence (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). Simple questions were used to begin the interviews, progressing into deeper topics, so that the participants were eased into the interview, as starting with complex

questions often leads to more Don't Know (DK) answers (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016).

Starting with a non-controversial, human-interest question, such as non-sensitive information about themselves and their experiences, helps to keep the participant engaged throughout the in-depth questions that follow (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). The questions were grouped into appropriate sub-sections to prevent jarring transitions between subject matter and frame of reference (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016). No buffer questions were used, so as to reduce the overall interview time and provide participants with as much time for thought as they require (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016).

The researcher's role was one of interviewing participants, completing the literature review, and conducting the review of public policies. The researcher gathered, compiled, processed, and analyzed all the data that the researcher gathered regarding IT project scope inadequacy and the reasons for scope failure. The entry of data into NVivo was carried out solely by the researcher to ensure accuracy and privacy. The data analysis was performed by the researcher to ensure the reliability of the results. The next section details the data collection processes that was used.

Data Collection

The use of semi-structured questions allowed the participant to not only provide an answer to each question but also to expound upon their answers and provide additional data. This approach allowed the participants to provide as much detail and context as they desire, while still ensuring that relevant data could be collected even if a participant provided no extra detail

(Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016; Regnell, Rainer, Höst, & Runeson, 2012). Interviews are often used to gather qualitative data, as this method allows the participant to use all the time and space needed to fully answer the questions and provide as much detail as desired (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016; Regnell et al., 2012).

Data collection began by attaining data site approval from the administrator of the Facebook group and subsequent approval from the Capella IRB of the data source and the final interview questions. The data source was interviews of 20 IT project managers from U.S. companies and organizations. Once the participant chose a phone call or a Zoom meeting as their preferred method of communication and informed consent had been signed; the interviews took place at times and dates that were chosen by each participant with the researcher's agreement. The interviews were recorded with participants' consent and transcribed as part of the data collection process.

Data Analysis

For the processing and analysis of the data, Denzin's five levels of data analysis were implemented. Denzen's process begins by identifying major phrases and keywords that emerge during the content analysis process. The identified phrases and keywords were used to identify emerging concepts that allowed the researcher to fully capture the nature, intent, and content of the participants' responses. The emerging concepts were then taken and reviewed.

Once reviewed, the emerging concepts were refined, and the data analysis was performed again as an iterative process, as is standard in qualitative studies (Cooper & Schindler, 2014; Leedy & Ormrod, 2016). The researcher was able to use the iterative process to determine when

saturation was achieved (Fusch & Ness, 2015). Saturation helps ensure that the study is as applicable to the target population as possible (Fusch & Ness, 2015).

Ethical Considerations

To protect the identities and privacy of the participants, several measures were taken. First, each potential participant was given an informed consent form describing how the participant's information will and will not be used and how the participant's identity will be kept entirely confidential. Once informed consent has been established, online interviews were conducted.

To ensure privacy and security, participant data were only transported from system to system using encrypted and SSL certificate-secured communications. Interview data were stored only on a single password-protected computer with an encrypted file system. Interview data were not stored on Facebook as the interviews consisted of phone calls or Zoom video calls. The interviews were recorded with the participants' consent and will only be stored on the same single computer as other data will be stored on and will not be stored on the Zoom system. Data analysis was performed on the same computer used for storage. The single computer used for data storage and analysis employs a single user login so that the data cannot be inadvertently accessed by unauthorized users.

The data will also be backed up on a single USB drive with an encrypted and password-protected file system. Digital data will be retained on this USB drive for a minimum of five years, following which the USB drive will be erased through a process that not only removes all data but also resists recovery, by setting each bit of the storage device to a random zero or one.

The setting of zeroes and ones will be executed multiple times to ensure complete data destruction.

Summary

This chapter has detailed the methods and procedures used in this study. Necessary steps were taken to select a methodology, participants, an interview schedule, and an analytical process that would result in accurate, unbiased data that could be used to address the research question. Participants' privacy and anonymity was ensured throughout the process. The selection of a qualitative inquiry was an appropriate means of investigating the reasons for the inadequacy of IT project scopes and methods that can be used to avoid the problem. The following chapter details the data gathered using the concepts and practices outlined in this chapter.

CHAPTER 4. RESULTS

Introduction

The purpose of this qualitative inquiry study was to determine common reasons why project scopes inadequately define projects. This study was intended to gather methods, functions, procedures, or practices that could help avoid developing an inadequate project scope or help mitigate the negative impact of inadequate project scopes. This study collected data from interviews of 20 IT professionals that have managed IT projects. The study addressed two research questions.

Research Question 1. What are the most common reasons that project scopes fail to adequately cover IT projects?

Research Question 2. What are some common practices, procedures, or workarounds that can mitigate the negative impact on project scopes?

Multiple analyses were conducted on the dataset to ensure a thorough analysis of results and data saturation were both achieved. Data from the interviews were coded using in vivo coding into the coherence construct of NPT. These data were analyzed in an iterative process that revealed common themes. These themes were refined several times to yield an accurate, reliable, and actionable result set that is detailed in this chapter.

Chapter 1 detailed the business problem, which is negatively impacted by the problem and justification for conducting another study. Chapter 2 included a literature review of previous studies, scholarly articles, and a summary of the existing data. Chapter 3 described the design and methodology of this study. Chapter 4 will discuss the data collection, the results, and the analyses performed.

Participants were solicited from a Facebook group dedicated to project management. The solicitation in Appendix B was posted to the group's feed three times between October 14th, 2019, and November 14th, 2019. Individual members of the Facebook group were also contacted directly between the same dates. Each potential participant was given the opportunity to ask questions about the study, the researcher, and the participant's involvement. Participants scheduled times with the researcher to conduct the interviews.

Participants were sent the informed consent form for digital signature using Adobe's Fill & Sign service before the established time of the interview. Each participant was contacted by the researcher at the designated time via cell phone. Interviews were recorded and later transcribed by the researcher. Each participant was sent a copy of the transcript for review.

The interview process involved collecting some demographic data regarding years of experience, the number of project scopes created, and the number of individual projects managed, which is outlined in Figure 3. The average number of years in IT project management was 12.05. Each participant created 59.4 IT project scopes, on average. An average of 74.85 individual projects were managed by each participant.

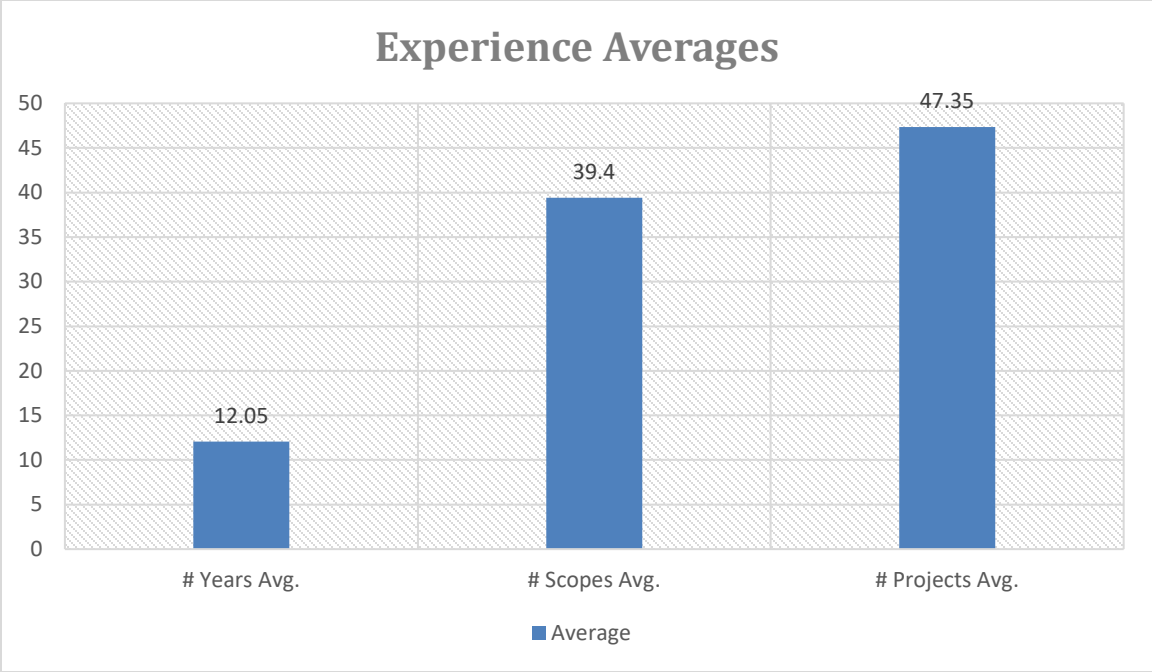

Figure 3. Experience averages of 20 participants.

Data Collection Results

The data collection method was one-on-one semi-structured interviews. The interviews were conducted over cellular phone calls. The interviews were recorded and transcribed for use in the analysis. The questions asked in these interviews were designed to gain insight on common reasons IT project scopes are inadequate and ways to counter these problems.

Data Analysis and Results

The participants represented IT professionals with multiple titles, ages, years of experience, and the number of projects managed. The average number of projects managed was 47. The most projects a participant had managed was 100 and the minimum was 6. The minimum number of years of experience was 2. The maximum number of years of experience was 25, with an average of 12. See Table 1 below for more demographic information.

Category	Minimum	Maximum	Average
Age	30	58	42
Company Size	11-50	10,000+	201-1000
Level of Education	Undergraduate	Doctoral	Postgraduate
Years of Experience	2	25	12
Number of Scopes	6	100	39
Number of Projects	6	100	47

Table 1. Demographics

Themes began emerging as early as the interview with Participant 4. More themes were added until Participant 11's interview, at which time data saturation was achieved. Lack of technical knowledge by involved parties, stakeholder involvement, lack of market research, poor requirements definition, and communication amongst involved parties not being established were the most common themes related to project scope inadequacies. Themes related to processes, methods, and procedures that can be used to avoid or mitigate the negative consequences of scope inadequacy were intentional communication, expert consultancy, regular and directed meetings, market research, and documentation. All themes are defined in more depth below.

	Theme	Mentions	Importance Avg.
Major Themes	Inadequate Requirements	32	1
	Poor Communication	29	2
	Lack of Technical Knowledge	145	3
	Stakeholder Involvement	35	4
Minor Themes	Lack of Meetings	5	5
	Repeating Mistakes	5	6

Table 2. Emergent Themes

Theme 1: Inadequate Requirements Definition Leads to Scope Deficiencies

A lack of a detailed set of requirements can lead to scope deficiencies, according to 12 participants. These 12 participants mentioned requirements definition a total of 32 times. Participant 2 noted that defining requirements is a large part of shaping the project scope.

Participant 8 stated that "poorly defined requirements or poor understanding of the problem itself" is a significant cause of scope inadequacy. Participant 15 noted that a common cause of scope inadequacy is "different ideas around what requirements should be." Participant 6 said that "the main problem is about a lack of information…therefore the project scope won't be 100% accurate."

Participant 1 said of previous failures that they "did not define the process requirement" as a reason for failure in past projects. Participant 5 stated that complex project requirements "must be done correctly." Participant 8 stated that "poorly defined requirements" led to failures in some of their projects. Participant 8 also noted deviations from the original scope caused contributed to failures. Participant 8 noticed less success when "scrambling to fit all of these ancillary requirements into a bucket that wasn't large enough to fill those requirements" in relation to adding requirements after the start of the project.

Participant 9 emphasized the importance of having a sufficient set of requirements. Participant 10 stated estimating the required resources is "the hardest thing" and that understanding the requirements is a difficult task. Participant 11 stated that they "didn't meet the requirements 100%" in many of their projects. Participant 15 said that a common problem was "[The] sponsor having different ideas around what requirements should be and what the overall vision is for the project." Participant 18 stated if the requirements were not exact that their "resources tend to start drifting," making it harder to complete the project.

Participant 8 stated that a project plan should have "distinct requirements" and that "having very specific requirements…is important in any project." Participant 8 stated that after determining a lack of requirements being a contributor to failure that they "focus[ed] more on

defining the requirements upfront" that could be referenced later in the project has helped them be more successful in their projects. Participant 15 noted that talking to the "right people" is an essential part of defining the requirements of a project.

Participant 3 noted that "requirements popping up" led to some of their failures. Participant 3 also stated that the requirements failures led to a changed process that has given them more success in that area. Participant 8 emphasized the importance of "making sure those requirements are defined really, really well." Participant 9 stated that adding in a buffer to the expected time requirement would allow for some cushion in the timeline, saying, "it's always good to…overestimate the amount of time you're going to need rather than underestimating."

Participant 14 noted that using a template of sorts that allowed them to define the project requirements was met with success. Participant 15 said that it was important to "go find the right people to talk to to gather the requirements." Participant 18 noted how important the process of "eliciting requirements, documenting, getting stakeholder feedback, and approval on the scope" was for the success of a project. Participant 11 observed, "we became much more successful and having what we delivered meet the requirements…once we started this approach where we do a proof of concept and then we have constant communication from that point forward."

Theme 2: Poor Communication Contributes to Inadequate Project Scopes

Ten participants noted in 29 references that poor communication between all involved parties could contribute to inadequate project scopes. Participant 8 said that "poor communication" is "probably the thing that makes most projects fail." Participant 16, when describing the most common reasons for project scopes to be inadequate, said, "Most common, I

think, is a general breakdown of communications." Participant 20 identified "lack of communication" as a common cause of project scope inadequacies.

Participant 2 stated that a lack of a shared clear structure of a project led to their first failure and has led them to communicate a clear structure to all parties involved from then on. Participant 4 noted that "teams latching onto things that they don't necessarily need" is one way they have seen project communication breaking down, because it resulted in teams not having a shared idea of what the project is and that this contributes to project failure. Participant 20 said a "lack of communication" contributed to project failure.

When asked about the largest contributor to failure in their projects, Participant 8 said, "this is probably the one that makes projects fail more than anything. Poor communication, really, really poor communication within the team, the stakeholders, the stake owners. I think that's probably the thing that makes most projects fail, especially when you're talking about the communication between the lines of business and the implementation teams. They need to be really well aligned." Participant 11 stated "it's very important that you have constant communication back and forth, that you don't let the whole project come to conclusion and then present that to the user on what's been built."

Several participants noted that good communication could contribute to fewer scope inadequacies. Participant 4 stated that "constant communication is certainly a huge asset when it comes to project management." Participant 6 focuses on communication and ensures that "every communication about the project is shared among the project members." Participant 8 said, "There really needs to be very good communication." Participant 6 noted times when team

members had failed to communicate their requirements effectively, leading directly to project scopes on those projects being inadequate from the very start.

Participant 1 stated that communicating a plan "can and will be seen integral to your project success," and that is important to "communicate it [vital information] accurately to everyone involved." Participant 2 said "communicating really well" is important for success. According to Participant 4, "constant communication is certainly a huge asset when it comes to project management." Participant 4 also noted that they don't feel it would be possible to communicate "too much."

Participant 11 said having "constant communication" is important for the success of a project. Participant 15 stated it's "really, really helpful…to have everybody collaborate and get agreement on the scope and kind of everyone's vision and the breadth of work that you would want to accomplish, rather than trying to piecemeal it all together, back and forth." Participant 16 noted a common cause of project failure is "a general breakdown of communications."

Participant 6 said, "Whenever I manage a project, I make sure I focus on communication. I make sure the project team and the project manager are well connected and every communication about the project is shared among the project members to ensure that everyone is caught up on what exactly is happening." Participant 7 said that "a big part of it [success] is establishing the good communication between all the teams." Participant 7 also stated that " it's really important to be thorough, and follow up, follow-through, and communicate with all the different teams."

According to Participant 7, "open communication, and clear communication, with accurate information…stops a lot of problems from happening." Participant 7 went on to say,

"open communication, make sure everyone's on the same page, and understanding where things are at" reduces delays. Participant 8 says "there really needs to be very good communication" and that good communication will reduce "a lot of friction."

Theme 3: Lack of Technical Knowledge Hinders Creation of Adequate Project Scopes

Lack of technical knowledge was a factor noted as contributing to scope inadequacy by 18 of the participants and was referenced 145 times. Participants that noted a lack of technical expertise identified that this lack of knowledge might relate to several actors within the entire project, including stakeholders, users/clients, project managers, team managers, and team members. Participant 9 stated that "an incomplete technical understanding," on the part of project managers, leads to scope problems regarding the timeline of delivery or the possibility of completing a task within the required confines.

Participant 11 stated that a lack of technical knowledge "confuses the people [clients] on exactly understanding what they are going to get and how it's going to function." Participant 14 also relayed problems related to clients and end-users when they said, "When you have somebody that's not tech-related trying to fit these [requirements] into these scopes, they don't really understand the process that it takes." As Participant 8 said regarding project managers and team members, "the areas where the in-house knowledge just isn't available," will cause delays and issues. Participant 10 said that the complexity of many projects today causes many of the actors to not have sufficient knowledge of enough aspects of a project.

Participant 1 noted that it is "key…trying to know what are the high-level requirements" for all the involved actors. Participant 4 said that everyone should "know the basics of a project" but that oftentimes "understanding of this expectation" was lacking in some actors and that this

contributed to project failures. Participant 5 said that "the level of expertise is one of the most important things" to creating an adequate project scope. Participant 7 noted "It really causes problems for organizations when they don't have…a…resource that knows certain technology well enough."

Participant 12 said of many teams that they worked with "didn't know what…they were doing. What happened was, is that we would actually have to go and actually find better people to do the actual work." Participant 13 said, "it's been very successful" when team members are knowledgeable. Participant 15 said that they have had better success as their understanding has grown. Participant 17 said they experienced failures when an actor's "understanding of the scope was not that clear."

Participant 16 said, "a lot of times, a user will come" asking for a feature "only to find that later on, you know when you really get into the heart of it, they don't actually need that. They need something completely different. It's just in their mind they thought they knew what they needed. But once I got all the facts, I realized that you're just doing it completely inefficiently and it would better be solved by this." Participant 16 stated that if those users had a better understanding of the features they request then the success of a project would be more likely.

Participants found that utilizing subject matter experts can help avoid this problem. Participant 2 said, "I value expert advice, and I try to include as many experts as possible, so they can take their opinion and validate what I'm making in scope." Participant 8 learned that countering a lack of in-house knowledge can be done by, "bringing in experts in the field or

outsourcing…to make things go smoother." Participant 9 stated that stakeholder confusion can lead to project failures, and that alleviating the confusion can lead to success.

Theme 4: Stakeholder Involvement Often Negatively Affects the Project Scoping Process

A lack of stakeholder involvement, overbearing stakeholders, and poor stakeholder management were identified as contributing to scope inadequacy by eight participants and mentioned a total of 35 times during the interview process. Participant 9 stated that a common problem in project scoping is "stakeholder confusion." Participant 2 noted difficulty when a key stakeholder is not available to approve an aspect of a project.

Participant 4 said that "once you get those [the requirements] together, you lay that out in front of the stakeholders and your executive project sponsor so that they know if they try to sneak something in, it's already been signed off by the team, that we're going to do it a specific way and have this as a specific outcome. And if they try to make any changes, then…we can try to make sure that [added features] don't get tossed in as well."

Participant 9 said that a problem in project failures is that "managers or stakeholders that for whatever reason do not get along. And you run into that a lot." Participant 9 also stated that when "stakeholders from one department or in one area are conveying problems they're having or basically whining and complaining to stakeholders in another area" happens, it will cause problems in completing the project successfully.

Participant 18 stated that "having stakeholders review the scope document before the project starts," and "build[ing] that stakeholder engagement and get[ting] their input," can help avoid problems later in the project. Participant 5 stated that the inclusion of all stakeholders is essential in developing an adequate project scope. Participant 1 said it is important "to set

expectations of stakeholders." Participant 1 also said it is important to communicate "vital information to all project stakeholders." Participant 2 said that you "should approve it by costumer and other stakeholders" as opposed to getting informal approval.

Participant 4 said that when a potential scope change is about to happen that you should "have a meeting with the stakeholders and explain to them where we are and why we're coming to this point where we may have to adjust the scope." Participant 4 says that this approach allows the stakeholders to "lend more input" or to say whether the change is integral to the project or not worth the scope change. Participant 8 said that communication with the stakeholders is important to succeed in a project. Participant 9 stated the importance of making "sure that everybody's on the same page" by meeting with all the stakeholders.

Outlier 1: Not Having Meetings Can Sometimes Cause Scope Inadequacies

Not having meetings was only mentioned by five participants as having a negative impact on IT project scopes. However, because there are certain situations where meetings being more common can often occur, this is an outlier. Specific teams and departments, particularly software development teams or projects, use a system called SCRUM that typically has short meetings daily and larger meetings every two weeks (de Moraes, 2016). Participant 2, Participant 4, Participant 11, and Participant 18 stated that there are several meetings they believe should happen in every project to develop a project scope that addresses every aspect needed. The main meeting the participants identified is a kickoff meeting.

Participant 9 stated several times the importance of meeting with stakeholders throughout the life of a project. Specifically, Participant 9 said you should have "a leadership meeting at the beginning of a project where you sit down, where you go to like a service area, meet with the

stakeholders…then having another meeting with stakeholders prior to implementation. So, basically, a meeting at the kickoff of the project in that service area and then a meeting with the stakeholders right before the actual implementation. And then usually a day one follow-up meeting with all stakeholders after everything's been implemented…In other words, I would say the biggest thing would be to increase the face to face meetings between myself and local stakeholders" as a means of increasing the chances of success.

Participant 4 stated that calling impromptu meetings when scope changes might occur can help redefine parts of a project scope while still addressing the needs, requirements, and all actor's point of view. Participant 11 said, "it's very important that you meet on a regular basis. Even if it's just a quick checkpoint." Participant 18 said that "having regular status meetings on progress" helps achieve project success. Participant 18 also stated discussing the project with the stakeholders after the project is deployed is an important meeting to have.

Outlier 2: Not Learning From Mistakes Can Lead to Future Scope Inadequacies

The second outlier is not learning from mistakes. This process was mentioned by 5 participants. Participant 3 stated, "every project that's either failed or succeeded, I've asked: What do we learn from it and how do we improve on those experiences for subsequent projects?" Participant 5 said "So to mitigate failures in the scope specifically, and to prevent them happening in the future, on each project, I do a lessons-learned documentation where we solicit feedback from not just the internal staff, but we also solicit feedback from the customers, where it helps us understand where the deficiencies are and we work tirelessly to correct them."

Participant 14 stated that when mistakes were repeated on subsequent projects, the mistakes caused delays and wasted resources that could have been avoided had a process of

addressing and learning from mistakes had been in place. Participant 4 said that "if you have examples of something else. Some kind of other endeavor that you were part of, that you helped to put into place" would be "lessons learned." Participant 12 said that their "first [project] was terrible, and I learned a lot."

Participant 14 stated that equipping a project manager with the necessary tools and processes to deal with past mistakes can aid in the creation of adequate scopes. Participant 14's method was to develop a template project scope where they have short reviews of past project mistakes that they can address and learn from. While creating a template for scopes may not be applicable in situations where projects vary widely, Participant 14 notes, having at least a shortlist of their past mistakes, can help build a list of practices that address the mistakes so that adequate project scopes can be created.

When asked about measures they've implemented to increase success, Participant 15 said that "a lot of what we do is we keep really good track of our lessons learned, and we keep a good lessons-learned database that…we consult first to see if there's anything applicable that we need to consider before formally signing off on a scope for the project." Participant 15 said that learning from mistakes is a way to help ensure project success. Participant 3 says after projects they review the lessons learned and ask themselves "What do we learn from it and how do we improve on those experiences for subsequent projects?" Participant 3 says this practice can lead to an increase in the chances of success.

Summary of Findings

Interviews identified four common causes of IT project scope inadequacies. The most common issue was determined to be the requirements definition that is the basis of project

scopes. A requirements definition that is inaccurate will most likely lead to inadequacies in the project scope, according to the interviews, literature, and policies. Having explicitly defined requirements was the most common method of countering this issue.

The second most common problem identified was the lack of proper communication. There are many avenues of communication throughout the life of a project, and there are many individuals and teams that must be included in the scoping process (Chun & Mooney, 2009; Odeh, 2018). If the communication breaks down at any stage, there is the possibility of the project and scope breaking down and becoming inadequate. The interview subjects noted that project managers instituting regular meetings and deliberate communication avenues could facilitate adequate communication.

The third most common cause of inadequate scopes was a lack of technical knowledge. There are several actors within a project scope creation and the course of a project that must understand on a technical level certain aspects of the project (Chun & Mooney, 2009). When actors lack understanding, it can cause scopes to be created that do not adequately address the real solution. Relying on subject matter experts was the most commonly suggested method of lessening the impact of actors that lack technical knowledge.

The fourth common problem encountered was stakeholder involvement. Stakeholders have crucial input at several stages of most projects (Chun & Mooney, 2009; Odeh, 2018). However, when stakeholders are not involved as they should be, or if they are overbearing in their involvement, it can cause projects to stray from the project scope. Project managers establishing and maintaining effective collaboration with stakeholders can keep stakeholders

from being overbearing and can also help keep stakeholders involved when they are most needed.

Two outliers were identified in the data analysis. The first outlier was a lack of meetings that could negatively affect a project scope. A lack of meetings lends itself to insufficient input and updating of key actors in some situations. The second outlier that emerged was not learning from past mistakes. When a project manager or team makes the same mistakes repeatedly, it reduces the effectiveness and wastes resources that could be better distributed.

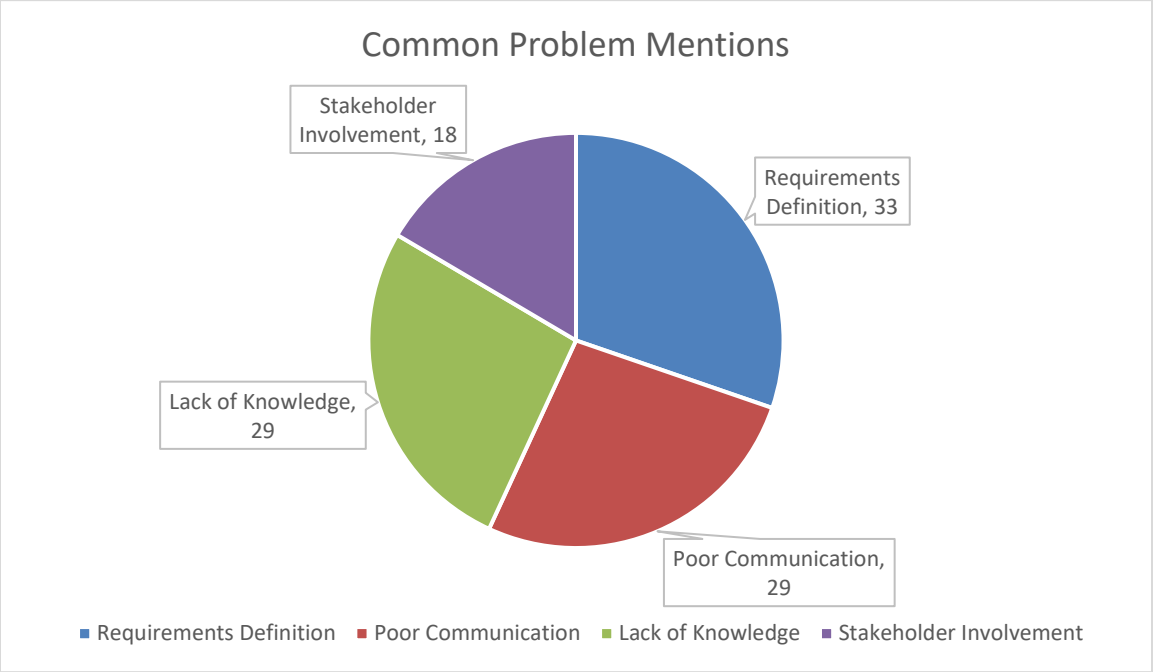

Figure 4. Common problems leading to scope inadequacies.

Conclusion

This study identified several of the most common issues that IT project managers face when creating, working with, and managing IT project scopes. A qualitative inquiry study with semi-structured interviews comprised the data source. The data analysis identified issues that

negatively affect IT project scopes. Four major themes emerged from this inquiry. Additionally, two outlier themes emerged.

There were several actions identified to reduce the negative impact of or remove the problems facing IT project scopes and project managers. It is possible that actively employing the suggested actions, processes, and policies can help IT project managers define and manage adequate project scopes. IT leadership that relies on these projects to achieve the organization's business goals may be able to have more reliable projects if IT project managers implement some or all of the identified solutions. Chapter 5 will detail the implications and recommendations that can be drawn from these data and analysis.

CHAPTER 5. DISCUSSION, IMPLICATIONS, RECOMMENDATIONS

Introduction

The problem of IT project failure has cost billions of dollars and other wasted resources in the forms of person-hours and expertise, to name a couple (PMI, 2016; Standish Group, 2014). While project scopes have been identified as the most significant contributor to this failure, there has been little research to determine why project scopes are inadequate and what can be done to reduce or remove some of these inadequacies (Clarizen, 2016; Dwiveldi et al., 2015; PMI, 2018). This study aimed to answer two questions whose answers have the potential to increase IT project success rates by eliminating or mitigating the negative effects of inadequate IT project scopes.

This study consisted of a qualitative inquiry that sought the expertise of seasoned IT project managers and those in equivalent positions. There were 20 participants interviewed that represented many different company sizes and industries. The analysis was performed on the interview data to identify any potential themes. A total of six themes emerged from the interview data source that can have a significant impact on IT project management.

Chapters 1 and 2 presented the problem and what research has and has not been completed on the subject. Chapter 3 included a description of the study designs and methodologies. Chapter 4 detailed the execution of the study, the data that resulted, and themes that emerged from the data. Chapter 5 will discuss the implications of the emergent themes, the study's fulfillment of the research purpose, and how these results may impact the IT industry as a whole.

Evaluation of Research Questions

Chapters 1 and 3 identified the problem of IT project failure caused by inadequate IT project scopes. The lack of knowledge on the issue was also demonstrated. The need combined with the lack of sufficient research led to the formulation of two research questions aimed at bringing some clarity and actionable practices that might aid IT project managers in developing and maintaining adequate and effective IT project scopes. The research questions are listed in the following section.

Research Question 1: What are the most common reasons that IT project scopes fail to adequately cover IT projects?

Research Question 2: What are some common practices, procedures, or workarounds that can lessen the negative impact on a project scope?

The researcher relied on the expertise of 20 practicing IT project managers, IT directors, and CTOs. These professionals were interviewed using open-ended interview questions related to IT project scoping and the reasons that cause scopes to be inadequate. Additionally, the study sought to find proven methods, policies, and practices that could help IT project managers avoid or mitigate the negative effects of the most common causes of inadequate IT project scopes. There were four themes identified in the data analysis. The data also revealed two less-significant themes that apply to a smaller subset of businesses and IT projects.

Theme 1: Inadequate Requirements Definition Leads to Scope Deficiencies

The first theme that emerged is that inadequate requirements definition can negatively affect an IT project scope's adequacy. Theme 1 was the most significant theme to arise from the interviews, public policies, and scholarly literature, due to being identified by 11 out of 12 public

policies, all scholarly articles, and 11 out of 20 interview participants. Inadequate requirements definition is when a project scope is created that does not entirely cover the project's aims or the scope does not adequately address the need that the project must fulfill. Utilizing a requirements plan can aid IT project managers in ensuring accurate definitions are created for project requirements (PMI, 2018).

Inadequate requirements definition is not a new problem in IT project management (Cooper & Schindler, 2014; Leedy & Ormrod, 2016; PMI, 2018). However, it has not been identified in previous studies as a significant contributing factor to IT scope inadequacies (Hassan et al., 2017). Theme 1 is a new finding in IT project management and partially fills an existing knowledge gap. IT project managers that are aware of the risk associated with inadequate requirements definition may be able to take actions that can increase a scope's adequacy. Not only has this problem been identified by this study, but the potential solution of using a requirements plan has been newly identified as a potential mitigation strategy.

Theme 2: Poor Communication Contributes to Inadequate Project Scopes

Theme 2 stated that poor communication could have negative effects on IT project scopes. This theme was significant enough to be mentioned by 12 participants, 11 policies, and six scholarly articles. Participants stated that a breakdown in communication could inhibit the development of a scope that addresses all involved parties' needs and input. Developing a deliberate communication plan can aid IT project managers in creating and maintaining effective communication (Bloch et al., 2012; Chun & Mooney, 2009).

Poor communication has not been previously identified by scholarly literature as one of the most significant contributors to inadequate project scopes (Blaskovics, 2016; Dwiveldi et al.,

2015). This lack of recognition coupled with the significance stated by the interview participants constitutes a new contribution to the knowledge base of IT project scoping. The use of a communication plan fills a gap in knowledge about how to address the issue of poor communication and how poor communication negatively affects IT project scoping (Bloch et al., 2012; Lehtinen et al., 2014).

Theme 3: Lack of Technical Knowledge Hinders Creation of Adequate Project Scopes

The third theme that emerged was that of a deficit in technical knowledge. This issue is significant as it was mentioned by 19 of 20 participants, seven scholarly articles, and three public policies. There are many actors that contribute to an IT project scope (Hassan et al., 2017; Standish Group, 2014). When one of these contributors lacks the technical knowledge to understand the problem, the project, or how the project's outcome will fulfill the business need, this can cause a gap in the project scope (Hughes et al., 2017; Shirazi et al., 2017; Standish Group, 2014). Utilizing experts can help reduce the impact of actors lacking in technical knowledge (Chun & Mooney, 2009; Hassan et al., 2017).

The problem of a lack of technical knowledge has not previously been identified by scholarly literature as a contributing factor to IT project scope inadequacy. The significance of the identification of, and a potential solution for, this issue represents a new contribution to the existing knowledge base in IT project management. No previous studies identified this as a cause of inadequate project scoping (Chun & Mooney, 2009; Hassan et al., 2017; Standish Group, 2014).

Theme 4: Stakeholder Involvement Often Negatively Affects the Project Scoping Process

The final theme that emerged from this study was that of stakeholder involvement. Eight participants, four articles, and six public policies stated that stakeholder involvement could negatively impact project scope creation. Stakeholders collectively determine the requirements, needs, problems addressed, and other project details (Cooper & Schindler, 2014). When stakeholders are overbearing or absent from critical decision-making, this can lead to scope inadequacies (Cooper & Schindler, 2014; May et al., 2019). The problem can be exacerbated later during a project as issues can be found after significant work and resources have already been allocated and spent (Coplan & Masuda, 2011; Keyes, 2009).

It is recognized that stakeholders have an impact on IT project scopes and IT projects (Cooper & Schindler, 2014; Coplan & Masuda, 2011; Keyes, 2009). However, it is a new piece of information that the level of stakeholder involvement can directly and negatively impact the scoping process. This knowledge fills a gap that can help project managers increase scope adequacy by utilizing the approaches defined within this study, namely those of deliberate stakeholder involvement and actively managing stakeholder involvement.

Outlier 1: Not Having Meetings Can Sometimes Cause Scope Inadequacies

The first outlier that was identified was that a lack of meetings could negatively impact IT project scope development. While not applicable to all IT projects, regular and repeated meetings are normal for many types of projects, especially those that are software development in nature (de Moraes, 2016; Odeh, 2018). Five participants identified regular meetings as necessary for creating and maintaining an adequate scope. Similarly, four articles and two public policies noted the necessity of meetings.

Many project managers that are accustomed to working on software projects may already understand the significance of regular meetings (Brewer & Dittman, 2018; Odeh, 2018). However, other IT project managers may not understand that need and when it is applicable (de Moraes, 2016). This identification of the problem represents a datum that is less well known. This contribution to the knowledge base could assist IT project managers in understanding the need for and appropriateness of having meetings.

Outlier 2: Not Learning From Mistakes Can Lead to Future Scope Inadequacies

While only mentioned by two participants, the issue of repeating one's own mistakes was identified as an outlier that can negatively impact IT project scopes. An indirect mention of not repeating mistakes was made in the literature and public policies. Though learning from mistakes is an elementary concept, it can often be overlooked if a deliberate approach is not taken (Leoncini, 2015; Välikangas, Hoegl, & Gibbert, 2009). Having a plan, protocol, or process that involves reviewing mistakes made can reduce the chance of repeating the same mistakes (Alami, 2016; Leoncini, 2015).

The practice of having post project completion meetings that address and document mistakes made could be an effective method of avoiding those mistakes in a later project. The issue of learning from mistakes has been addressed in existing literature, but not within the context of IT project scopes development (Blaskovics, 2016; Dwiveldi et al., 2015). This gap can be filled with the last outlier defined in this study.

Fulfillment of Research Purpose

This study intended to determine the most common cause of IT project scope inadequacy. This study intended to discover some policies, procedures, and methods that can be used to

mitigate or negate the negative effects of the most common problems. There has been a lack in the knowledge base regarding these issues and potential solutions (Blaskovics, 2016; Chun & Mooney, 2009; Dwiveldi et al., 2015). This study identified four common problems and some potential counters. In this way this study has successfully expanded the scholarly understanding of IT project scope inadequacy.

However, the intention of this researcher was to utilize the Normalization Process Theory in this evaluation as a means of identifying the actors involved and how each actor affects the project scope. During the data analysis, the researcher determined that this identification of involved actors did not need extra definition as each participant clearly understood and presented the actors they have interacted with and how those actors affect others involved and the project scope both (Chun & Mooney, 2009; Hassan et al., 2017; May et al., 2019). As coding and analysis was performed the researcher realized that the coding using the Coherence (May et al., 2019) of NPT was not particularly applicable or needed to fulfill the study's aims (May et al., 2019). In this way this study did fulfill the research purpose while shifting away from the intended framework (Cooper & Schindler, 2014; Corbin & Strauss, 2008; Leedy & Ormrod, 2016).

RoCKS-ML Model

Instead of relying on an existing framework, this study has led to the development of a model that can be used by IT project managers to address common issues leading to scope inadequacy. The RoCKS-ML model addresses each of the most common problems negatively affecting IT project managers when creating IT project scopes, as well as the discovered outliers. The RoCKS-ML model represents Requirements, Communication, Knowledge, Stakeholders, Meetings, and Learning constructs. Each construct consists of both a question and a suggestion.

The questions help IT project managers determine if they have the potential for issues with that construct, while the suggestions are for mitigating the respective issue. RoCKS-ML can be used as an effective model to help IT project managers to address the most common pitfalls associated with developing an IT project scope. The definition of each construct within the model is visualized in Figure 5 and detailed in the next few sections.

Figure 5. RoCKS-ML model.

R - Requirements

The first construct of the RoCKS-ML model is requirements. Requirements definition is a fundamental building block for any project and is a crucial aspect to get right the first time. Re-evaluating requirements during a project can delay and derail the project. This study found that there is a much smaller likelihood for a project scope to be adequate if the project is not entirely, sufficiently, and accurately defined.

The question IT project managers can ask themselves to see if they might have trouble with requirements definition is "Are the requirements sufficient?" While this question is simple in nature, it can help the project manager to step back from the project and think about the problem of requirements definition. The suggestion this model makes for project managers is that they ensure the requirements are sufficient before starting the project. The interview participants expressed that if requirements are not defined correctly at the start of the project that there is a higher likelihood of issues related to requirements and inadequate scopes.

C – Communication

The second construct is communication. Every company and project is likely to have usual avenues of communication established. The problem occurs when these avenues are insufficient for the project at hand. It is important to assess what the most appropriate methods of communication will be for each project and implement that at the beginning. Establishing communication early on can help maintain proper communication throughout the life of the project.

The thought-provoking question for IT project managers regarding the communication construct is, "Are there active avenues of communication?" Establishing adequate routes of

communication before a scope is finalized can help ensure that proper communication persists throughout the life of the project. If communication is not sufficient, the participants of this study stated that purposefully developing avenues will aid in creating an adequate IT project scope.

K – Knowledge

The third construct of RoCKS-ML is knowledge. Sometimes there are actors involved in project scope creation that lack some of the necessary technical knowledge to contribute appropriately. IT professionals and IT project managers should not expect all involved parties to be familiar with and understand all the technical aspects of a project as this would be unrealistic. However, if the project manager recognizes the lack of depth of knowledge, it would be beneficial to involve one or more subject matter experts so that the expert can help inform all parties so that an effective scope is created despite individual's lack of technical knowledge.

The main question revealed from this study that an IT project manager could ask themselves is "Are SMEs needed?" A project manager should be able to determine if any actors lack in technical expertise, including the project manager themselves. If an actor that is pivotal to the creation of the project is lacking, the project manager should enlist the aid of an SME. The cost of a subject matter expert will be less than the cost of a failed project.

S – Stakeholders

The S in the RoCKS-ML model stands for stakeholders. Stakeholders often play a large part in the development of an IT project scope. However, the level of involvement needed will vary by stakeholder, project, project manager, teams, companies, and many other factors (Cooper & Schindler, 2014). Input from stakeholders is necessary for some projects, while others require little or no stakeholder involvement (Cooper & Schindler, 2014). Determining the appropriate

level of involvement and managing the stakeholders so that their involvement matches the need can help develop an adequate IT project scope.

The question to ask yourself as an IT project manager is, "Are stakeholders involved appropriately?" If the answer is no, the project manager should manage the stakeholders and their involvement as best as they can. Developing a plan for managing stakeholders can help a project manager both determine the appropriate level of involvement, but also provide a structure for how to manage that involvement appropriately.

M – Meetings

The first outlier construct is meetings. While meetings are not as necessary for all teams and companies, a lack of meetings can inhibit the creation of an adequate IT project scope. The nature of the project can affect the meeting requirements strongly. For instance, development projects often require regular meetings as part of their structure (de Moraes, 2016; Tanner & Mackinnon, 2015). Knowing an estimate of the type and number of meetings needed for a project scope creation can help an IT project manager ensure that all necessary parties are involved and abreast of any and all developments of the scope.

IT project managers can ask themselves, "Does this project require extra meetings?" Ensure meetings are planned as often as needed based on the type of project and teams involved. Creating a suggested meeting chart could be useful in helping an IT project manager answer this question at the onset of each project they manage. While no set of meetings on a chart is likely to fulfill the needs of every IT project, the chart can be used as a guide, especially if the project manager updates and maintains the chart based on their experiences.

L – Learning

The final construct is learning from mistakes. While learning from mistakes may seem like common sense, there were several participants, articles, and public policies that mentioned how vital learning from mistakes can be. While not heavily emphasized and seeming like common sense, purposefully including it as a construct can aid IT project managers in keeping this ideology at the forefront of their minds and help them analyze mistakes when beginning any new projects.

Specifically, project managers should ask, "Am I at risk of repeating mistakes?" The answer to this can be found by evaluating previous mistakes to determine if there are any applications to the current or upcoming project. Analyzing prior mistakes as a common practice can help build a team and help them develop an adequate IT project scopes that are less likely to fall victim to the same mistakes made in the past.

Contribution to Business Technical Problem

The business problem this study addressed was that of the high rate of failure of IT projects that cause millions of dollars and countless resources to be wasted every year (PMI, 2016; Clarizen, 2016). The most common cause of IT project failure has been traced to the project scope (Dwiveldi et al. 2015; Hughes et al., 2017; Lavanya & Malarvizhi, 2008; Standish Group, 2014). However, there exists a gap in the knowledge base regarding the root causes of these project scope inadequacies. These common causes of scope inadequacy and strategies for avoiding them were the specific target of this study. The results of this study provided common causes of scope inadequacy. This study also resulted in the development of a model that can be used by IT project managers to avoid these pitfalls or minimize their negative effects.

This study is important to the IT project management industry, and all other affected industries, by providing a list of common problems for project managers to monitor for. Not only did this study provide this list of common problems, but it also led to the development of RoCKS-ML model that can be used as a reminder for project managers and offers some insight as to how project managers might avoid some of these problems or minimize their negative impacts on IT project scopes. The themes that comprise the RoCKS-ML model came from analysis of IT project managers, CIOs, CTOs, scholarly articles, and active IT policies of public institutions.

Recommendations for Further Research

While this study fills a gap in the current knowledge base, there remain gaps that could be filled by additional research. Research on IT project failures has focused on the causes of those failures and has led to the understanding that many problems come from inadequate project scopes. While this study fills some of that gap, there is more knowledge to be gained from this aspect. Conduction of a similar study that is based on this study, such as limiting to specific industries or expanding to other countries, could benefit IT project management professionals. Quantitative research that focuses on the prevalence of the themes found in this study and the effectiveness of the solutions presented in the RoCKS-ML model would add more to the existing knowledgebase. There remain ways that both qualitative and quantitative studies could add to the knowledge base around IT project scopes and their impact on IT project failure.

Conclusions

The goal of this qualitative inquiry was to determine the most common problems that negatively affect IT project scopes. This study resulted in a model that can be used by

companies, IT project managers, CTOs, CIOs, and others to avoid common problems that contribute to inadequate IT project scopes. In situations where common problems cannot be avoided entirely, the RoCKS-ML model can be used as a means of identifying potential problems and help mitigate the negative impact those problems might have upon an IT project scope. The more adequate an IT project scope is, the higher the chance of success the project has (Dwiveldi et al. 2015; Hughes et al., 2017; Giles, 2015; Lavanya & Malarvizhi, 2008; Standish Group, 2014). The RoCKS-ML model was developed using interviews of practicing IT professionals, scholarly articles, and currently active IT policies at publicly run organizations. Using the RoCKS-ML model can help IT project managers create adequate project scopes, thereby increasing the success rate of IT projects that companies, businesses, organizations, and C-level executives rely on.

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