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# Correlational Analysis of the Relationship Among Mastery Experience, Self-Efficacy, and Project Success

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Abstract

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MBA, Blekinge Institute of Technology, 2010

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Dissertation Submitted in Partial Fulfillment

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## Abstract

Project managers are important to organizational performance and survival because of their role in managing, controlling, and steering organizational projects to success. Research has shown that project failures are globally pervasive due to the shortage of experienced and well-skilled project managers. The purpose of this descriptive correlational study was to improve the current understanding of the relationships among project managers' project management experience, self-efficacy, and project success, for which the research questions were focused on in addition to the role of project management experience on self-efficacy and project success. The theoretical framework was based on social cognitive theory. This study involved a nonexperimental research design with a survey to collect data. Purposive sampling was used to recruit 51 Canadian-based Project Management Institute certified project managers with experiences in information technology projects. Multiple linear regression was used to assess the role of project management experience on self-efficacy and project success. Results indicated significant relationships among project management experience, self-efficacy, and project success and that project management experience did not mediate the relationship between self-efficacy and project success. The results may assist organizational leaders to better understand the holistic implications of project managers' project management experiences with project success as well as the role of self-efficacy on project success. The positive social change implications of this study include greater project success and decrease project risks due to ineffective project management. Improved project success may enhance the economic prosperity of organizations, employees, and the community.

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# Dedication

This study is dedicated to God Almighty who made it possible for me to survive the rigors of the last four years. To my wife and kids, thank you for your support, encouragement, and endless prayers. You guys are my rock upon without which I would not have been able to finish this doctoral study.

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Table of Contents

List of Tables

List of Figures

# Chapter 1: Introduction to the Study

Current business environments have resulted in organizational leaders implementing projects to improve businesses and implement changes more easily (Berssaneti & Carvalho, 2015; Bronte-Stewart, 2015). However, the high rate of project failure is an impediment to competitive growth and performance (Berssaneti & Carvalho, 2015; Bronte-Stewart, 2015). Many researchers (Huff & Prybutok, 2008; Hwang & Lim, 2013; Silva de Araújo & Pedron, 2015) have highlighted project managers' competence and experience as one of the factors that enhance project performance and success. According to Kamohi and Autram (2014), repeated cases of successful experiences in a task can enhance project managers' efficacy, whereas repeated cases of negative experiences are likely to result in low self-efficacy. Consequently, the type of experiences to which project managers are exposed could indicate how project managers will perform in their role.

In Chapter 1, I introduce the research topic and background information on the interrelationship between the key research variables: project managers' experience, self-efficacy, and project success. The problem statement, the purpose of the study, and the theoretical framework follow the background of the study. Chapter 1 also includes the research questions, research hypotheses, nature of the study, and definitions of key terms. The chapter concludes with the assumptions, scope and delimitations, limitations, significance of the study, and summary.

## Background

Organizational leaders are increasingly transforming the way they operate by focusing on strategic projects instead of traditional management that involves set procedures (Itegi, 2015; Project Management Institute [PMI], 2015). Organizational projects enable fast and consistent delivery of business results to cope with the challenges of a dynamic business landscape. For example, Lenovo experienced a 10% increase in turnover in 2006 due to the establishment of a project management office that enabled the transition from traditional management approaches to a project management approach (Itegi, 2015). Many authors have also emphasized project management as a core organizational competence to remain competitive and achieve organizational success through overall project success (Benoy & Gracias, 2015; Hadad, Keren, & Laslo, 2013; Itegi, 2015; Sadeghi, Mousakhani, Yazdani, & Delavari, 2014). A project is successful when its completion is "within the specified constraints of scope, time, cost, quality, resources, and risk" (PMI, 2013, p. 35).

The selection of project managers with the right skills and competencies is crucial to project success in modern organizations (Benoy & Gracias, 2015; Hadad et al., 2013; Sadeghi et al., 2014; Sprouse, 2010). For this reason, there is an increase in project managerial job openings, and the industry is experiencing a surge in professionals seeking to transition to project managerial roles. However, the high demands for project managers sometimes force organizational leaders to resort to new and inexperienced project managers to fill these roles (Benoy & Gracias, 2015). In the absence of experienced project managers, organizational leaders may take on managers who have

little or no project management experience to be successful in these roles (Benoy & Gracias, 2015; Florentine, 2014). Inexperienced project managers such as new or junior project managers are more susceptible to project failures, causing high monetary losses (Benoy & Gracias, 2015; PMI, 2015). Additionally, new managers are sometimes not prepared to face work-related challenges when compared to seasoned managers, making them more susceptible to failure (Plakhotnik, Rocco, & Roberts, 2011). Almost half of first-time managers fail in the first 3 months of occupying the role due to inexperience, causing significant organizational losses and affecting the performance of the organization (Plakhotnik et al., 2011). For example, a trend among software engineers occupying their first project managerial role indicated that they either quit the role after a short period or avoided the role due to complexities and fear of failure (Pressman, 1998).

Many project managers acquire the necessary project management skills through traditional ways of learning such as academic and specialist training programs but may lack the experience in meeting the challenges of real life projects (Geithner & Menzel, 2016; Ramazani & Jergeas, 2015). The growing complexities in business environments require project managers to possess a combination of relevant skills, expertise, and experience to lead projects (Barnwell, Nedrick, Rudolph, Sesay, & Wellen, 2014). There is a link between project managers' experience and competency development (Geithner & Menzel, 2016; Ofori, 2014). However, there is a lack of studies on the project management environment to support this relationship. Other authors such as Plakhotnik et al. (2011) have linked everyday experiences to the performance and success of new managers, whereas others have emphasized practical experiences as a source of

professional competence such as practicum experience improving preservice teacher performance (Martins, Costa, & Onofre, 2015).

Many authors have also underscored the positive influence of experience on self-efficacy, which affects achievement and performance in areas like academic environments and general success (Ineson, Jung, Hains, & Kim, 2013; Martins et al., 2015). Experience with success has also influenced self-efficacy in programs like a technology-supported behavior intervention program (Achterkamp, Hermens, & Vollenbroek-Hutten, 2015). Many studies (Ineson et al., 2013; Kamohi & Autram, 2014; Martins et al., 2015; Wood & Bandura; 1989) have found that successful experiences lead to high self-beliefs (self-efficacy), whereas failures or poor performances lead to low self-efficacy beliefs. These findings suggest that inexperienced project managers have lower self-efficacy than experienced project managers because they are more susceptible to the negative experiences of project failures.

Research has suggested that there is a relationship among professional experience, self-efficacy, and successful outcomes (Ineson et al., 2013; Kamohi & Autram, 2014; Martins et al., 2015). However, much work has not been done on the effect of experience on self-efficacy and how self-efficacy affects performance in a project environment. There is a gap in the literature of project management regarding the relationships of repeated performance of project management tasks, project managers' self-efficacy, and project success in real life project management environment. Researchers have not captured how project managers' positive successful and negative failure experiences in a project management environment affect the outcome of projects. This gap formed the

context of this study on the relationships between these three variables in a project environment.

## Problem Statement

Project failures are still pervasive across the globe, causing substantial financial losses to project owners such as organizations and governments (Damoah & Akwei, 2017; Liebowitz, 2015). For example, Liebowitz (2015) highlighted that only 41 out of 199 projects in the United Kingdom government's 500 billion-pound portfolio were successfully delivered in 2014. Liebowitz also noted that the U.S. government loses $20 billion of its $80 billion annual spending on information technology (IT) projects to failed projects. Further, Aranyossy, Blaskovics, and Horvath (2018) reported that 18% of IT projects failed in 2012, and Damoah and Akwei (2017) reported a financial loss in 2010 of about 15 million New Zealand dollars to organizations as a result of the nondelivery of one-third of organizational projects on budget. Allen, Alleyne, Farmer, McRae, and Turner (2014) also reported that the projected rate of project failure for Gartner from 2013 to 2016 was between 20% to 28%. Moreover, Davis (2011) found that only 41% of projects met their objectives within specified standards for time, budget, and quality. Finally, Denic, Moracanin, Milic, and Nesic (2014) found that over 90% of enterprise resource planning implementation projects experience resource overrun.

The general problem was that there is a shortage of experienced and well-skilled project managers due to the increasing demand for successful project managers to ensure faster and successful delivery of projects (Benoy & Gracias, 2015; Gewanial & Bekker, 2015). Many organizational leaders are turning to less experienced project managers,

such as new and junior project managers, to occupy available project managerial roles (Benoy & Gracias, 2015; Florentine, 2014; Gewanial & Bekker, 2015). However, new or junior managers are not as competent as experienced managers and are more prone to project failures, putting customer expectations and organizational success at risk (Florentine, 2014; Benoy & Gracias, 2015). Project managers' lack of experience is one of the reasons that projects fail (Benoy & Gracias, 2015; Florentine, 2014; Patanakul, 2014). The PMI, a professional membership organization for individuals who want to advance a career in project management, reported in its 2014 survey of project management leaders and practitioners that inexperienced project managers accounted for 20% of project failures (PMI, 2015).

Although many studies have focused on the effect of the duration of project managers' experience on project efficiency and success (Aranyossy, Blaskovics, & Horvath, 2018; Rubin & Seeling, 1967; Rugenyi, 2016), the effect of successful and failure experiences has not been sufficiently explored. The specific problem addressed in this study was the deficiency in knowledge regarding how the exposure of project managers to success and failure experiences affects their efficiency and project success. A review of past literature revealed no research on the correlational relationship among successful and failure experiences of project managers, self-efficacy of project managers, and project success. Thus, the focus of this study was on the four indicators of project success and performance: cost, schedule, technical performance, and customer satisfaction (Berssaneti & Carvalho, 2015; Thi & Swierczek, 2010). Additionally, no scholar has evaluated whether the self-efficacy theory of the social cognitive theory is

valid in IT project environment, so I attempted to reduce this gap by investigating the relationships among project managers' exposure to successful experiences, self-efficacy, and project success.

## Purpose

The purpose of this quantitative, descriptive correlational study was to improve the current understanding of the relationships among project management experience, project managers' self-efficacy, and project success. Researchers have not fully explored the validity of the self-efficacy theory of Bandura's social cognitive theory in a project environment, especially the effect of self-efficacy, through mastery experience, on project success. This study involved examining the relationships between project managers' exposure to successful experiences and their self-efficacy. This study also involved examining the relationship between perceived self-efficacy of project managers and project success as well as how successful experiences mediate this relationship.

## Theoretical Framework

Part of the framework for this study includes perspectives of project success. There are three perspectives for measuring project success: sponsor's perspective, project manager's perspective, and client or customer's perspective (Thi & Swierczek, 2010). Project success criteria also includes cost, schedule, technical performance, and customer satisfaction, meaning that a project is successful if it is completed within budget, on time, and with the proper performance that leads to customer acceptance (Thi & Swierczek, 2010). Adherence to cost, schedule (time), and quality are important indicators that are traditionally used to measure project success, though quality can be further divided into

technical specifications and customer satisfaction (Berssaneti & Carvalho, 2015). In this study, the focus was on the three dimensions of project success that constitute the Iron Triangle (i.e., cost, schedule, and quality). The Iron Triangle has been used in many studies to represent the connection among these three dimensions (Bronte-Stewart, 2015).

The theoretical framework for this study was also guided by Bandura's social cognitive theory, as the focus of the study was on self-efficacy. Many authors of self-efficacy studies have relied on Bandura's (1989) social cognitive theory (Bolaños-Medina, 2014; Ineson et al., 2013; Martins et al., 2015). The social cognitive theory explains the role of mastery modeling in the development of cognitive, social, and behavioral competencies of people, how people cultivate beliefs in their capabilities, and motivation enhancement through goal systems (Bandura, 1989, 1994; Wood & Bandura, 1989). Bandura attributed the development of self-efficacy and changes to individual self-efficacy to four different sources that include mastery experience, modeling/vicarious experience, social/verbal persuasion, and physiological and affective states (Bandura, 1989, 1994; Martins et al., 2015; Wood & Bandura, 1989). Figure 1 depicts the different sources through which people develop self-efficacy.

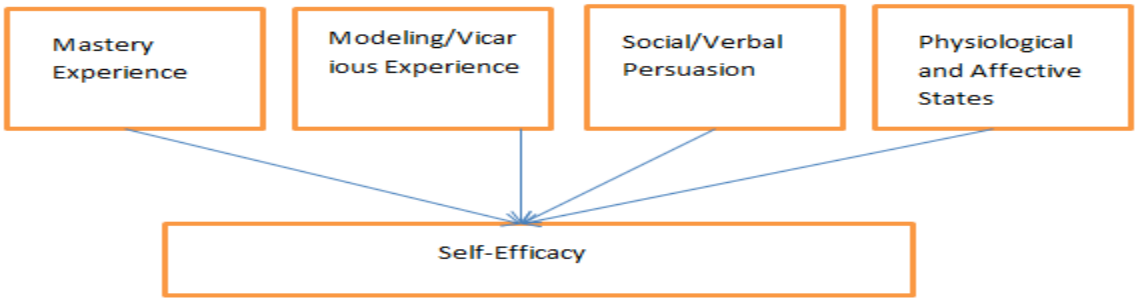


*Figure 1*. Sources of self-efficacy.

Self-efficacy is central to the self-regulation of motivation and performance attainments in social cognitive theory because the capability to mobilize motivation through self-reactive influences is one of the human mechanisms that facilitate this regulatory process, which works through personal efficacy beliefs (Bandura, 1991, 1994; Wood & Bandura, 1989). Repeated successes enable people to develop high assurance in their capabilities, affirming that external experiences influence self-efficacy (Bandura, 1991, 1994; Wood & Bandura, 1989). Bandura (1994) asserted that there is a positive relationship between self-efficacy and the boldness to take on mentally taxing and threatening activities. Further, mastery experience is the most effective way of developing a strong sense of efficacy because it provides convincing evidence of success (Bandura, 1994; Martins et al., 2015; Wood & Bandura, 1989). Therefore, self-efficacy theory from a social and cognitive perspective was the underlying premise for examining the relationships among the following variables: mastery experience, self-efficacy, and project success.

## Research Questions and Hypotheses

I examined the relationships among project managers' exposure to successful experiences, self-efficacy, and project success, especially how successful project management experiences mediate the relationship between self-efficacy and project success. The following four research questions and hypotheses guided the study:

Research Question 1: What is the relationship between project managers' exposure to successful experiences and project managers' self-efficacy?

$H_0$1: There is no significant statistical relationship between project managers' exposure to successful experiences and self-efficacy.

$H_a$1: There is a significant statistical relationship between project managers' exposure to successful experiences and self-efficacy.

Research Question 2: What is the relationship between project managers' self-efficacy and project success?

$H_0$2: There is no significant statistical relationship between project managers' self-efficacy and project success.

$H_a$2: There is a significant statistical relationship between project managers' self-efficacy and project success.

Research Question 3: What is the relationship between project managers' exposure to successful experiences and project success?

$H_0$3: There is no significant statistical relationship between project managers' exposure to successful experiences and project success.

$H_a$3: There is a significant statistical relationship between project managers' exposure to successful experiences and project success.

Research Question 4: Does project managers' exposure to successful experiences mediate the relationship between self-efficacy and project success?

$H_0$4: Project managers' exposure to successful experiences does not mediate the relationship between self-efficacy and project success.

$H_a$4: Project managers' exposure to successful experiences mediates the relationship between self-efficacy and project success.

## Nature of the Study

I adopted a quantitative descriptive correlational design to guide data collection, analysis, and evaluation of results. Quantitative research is consistent with understanding the relationships between random research variables (Frankfort-Nachmias, Nachmias, & DeWaard, 2015). The descriptive correlational design is relevant when describing research variables and investigating the natural relationships or associations between and among these variables (Sousa, Driessnack, & Mendes, 2007). Researchers embark on descriptive correlational design when investigating if and how changes in one or more variables predict changes in one or more variables (Sousa, Driessnack, & Mendes, 2007). Data collection was achieved through a survey, and the sample population was from members of the PMI. Surveys enable researchers to study a representative sample of institutions and communities and generate standardized quantifiable data that can be statistically analyzed to reveal relevant characteristics in an unbiased and scientific manner (Rea & Parker, 2014).

In this study, I used the project success scale (PSS) to measure variables that include cost, schedule/time, and quality that are traditionally used to measure project success (Berssaneti & Carvalho, 2015). I adopted the PSS scale from the project efficiency scale that Serrador and Turner (2015) used in their study on the relationships between project success and project efficiency measures of cost, time, and scope and requirements. To measure the indicators of self-efficacy, I used the new 8-item general self-efficacy (NGSE) scale developed by Chen, Gully, and Dov (2001). The NGSE scale has been used to examine the influence of prior subject knowledge, prior ability, and

work experience on the self-efficacy of students (Ineson et al., 2013). I also used a task-specific self-efficacy scale that Blomquist, Farashah, and Thomas (2016) used to measure the competencies of project managers in performing the different project management tasks.

The selection of participants in this study was achieved through purposive sampling. This strategy is appropriate when researchers seek specific participants who meet certain qualification criteria (Suen, Huang, & Lee, 2014). In this study, I used quantitative analysis to demonstrate the relationships among the research variables. I used IBM SPSS statistical software for quantitative and descriptive data analysis of the sample population. The estimation of the relationships between the research variables in this study was achieved through correlation and regression analysis. The evaluation of the mediating effect of project management experience on the relationship between project managers' self-efficacy and project success was achieved through linear multiple regression.

## Definition of Key Terms

*Mastery experience*: The most effective source of information about self-efficacy and it represents how a highly successful experience positively affects human perception of self-efficacy (Martins et al., 2015). It enables people to judge whether they have the capability to accomplish a particular task (Ineson et al., 2013).

*Project*: "A temporary endeavor that has a definite beginning and end, undertaken to create a unique product, service, or result" (PMI, 2013, p. 3). Bronte-Stewart (2015) considered four different definitions of project success from four project management

standards organizations and surmised that projects are temporary in nature, unique, and are focused toward achieving certain objectives or creation of end-products.

*Project management*: "The application of knowledge, skills, tools, and techniques to project activities to meet project requirements" (PMI, 2013, p. 5).

*Project manager*: A "person assigned by the performing organization to lead the team that is responsible for achieving the project objectives" (PMI, 2013, p. 16).

*Project success*: Completion of a project "within the constraints of scope, time, cost, quality, resources, and risk as approved between the project managers and senior management" (PMI, 2013, p. 35).

*Self-efficacy*: How well a person believes in his or her ability to perform a particular task (Moriarty, 2014). Martins et al. (2015) described self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 264).

## Assumptions

The following assumptions underlie this study:

1. The selected project managers have diverse experiences, and the participants will report their project management experiences accurately.
2. Due to the anonymous nature of this study, I assumed that the selected project managers provided honest reflections of the project success indicators. Anonymous study participants are more likely to provide honest reporting to questions than when participation is not anonymous (Warner et al., 2011).

3. The selected project managers possess relevant industry knowledge to work effectively, given that all projects are different and require knowledge of the specific industry.

## Scope and Delimitations

Although there are many dimensions for measuring project success, compliance with cost, schedule, and quality has been traditionally used in many studies (Berssaneti & Carvalho, 2015; Thi & Swierczek, 2010). The scope of this study was restricted to mastery experience, one of the sources of self-efficacy, because it provides evidence as the most effective way to develop a strong sense of efficacy (Bandura, 1994; Martins et al., 2015). Due to convenience and accessibility, the scope of this study was limited to PMI certified project managers in Canada but not limited to Canadian projects.

## Limitations

Three limitations apply to this study. First, the lack of random selection in purposive sampling poses external validity issues due to possible selection bias that often affects the representativeness of the research sample and generalization of research results beyond the sample. However, efforts were made to eliminate selection bias by seeking the expertise of a research methodologist to determine the qualification criteria that ensured the selection of research participants that were representative of the study population. Second, the research relied on participants accurately reporting their level of project management experience; otherwise, the validity of research results may be affected. Third, the NGSE self-efficacy measurement scale is a general scale that is not specific to any domain. Therefore, the domain items might not capture project

management tasks specific activities, thus posing threats to the validity of the research results. To enhance the validity of the results, a task-specific self-efficacy scale was used to capture participants' competencies in the different project management tasks.

## Significance of the Study

The goal of this study was to understand the holistic implications of project management experience on project managers' self-efficacy and project success. The results could provide new insights into ways that could enhance the competency, integration, adaptation, and success of inexperienced, new, and junior project managers in project managerial roles, which can enhance the success of organizational projects. Because organizations implement projects on a regular basis as solutions to the challenges of the competitive business environment, results from this study could also help organizational leaders better understand ways to maximize project success rates and overall success of the organization. Results could help organizations determine the tools and framework needed to enhance the success of project managers and organizational sustainability. The results may reveal ways to lessen the effect of the type of project managers' experiences on the different dimensions of project success and can help prevent the high turnover rate of new project managers, organizational failure, downsizing, job loss, and shutdown of organizations. Preventing or lessening such detriments can be significant for positive social change.

## Summary

Projects play a significant role in organizational success and are critical to the performance, growth, and survival of organizations (Kamohi & Autram, 2014; PMI,

2013). Project managers are important to the success rate of organizational projects, as a project management approach to managing, monitoring, and controlling project tasks account for 20% of project success, whereas the performance of project managers account for the remaining 80% (Kamohi & Autram, 2014). Project managers require requisite skills, knowledge, and experience to apply project management methodology, best practices, and standards to monitor, manage, and control project activities as well as enhance project success (PMI, 2013). Inexperienced and underdeveloped project managers are one of the major causes of project failure (PMI, 2015). Given the scarcity of experienced project managers and the limited knowledge of the relationship among mastery experience, self-efficacy, and successful performances, this quantitative study was focused on project management environment and the relationships among project management experience, self-efficacy, and project success.

Chapter 2 contains a thorough review of project management and self-efficacy literature relating to project managers' effectiveness and success. I also present a summary of the themes that emerged from the literature review. Chapter 3 contains a detailed discussion of the research methodology used to answer the research questions. Chapter 3 also includes the rationale for selecting a quantitative nonexperimental research design and discussions about recruitment, sampling, and the target population. A description of the survey instruments, data collection and analysis methods, methodological assumptions and limitations, ethical and validity issues related to this study, and a brief chapter summary formed the basis for the remainder of Chapter 3.

Chapter 4 contains details of data collection, sample characteristics, and screening of research participants. The chapter also contains the results of correlation and regression analysis as well as the results of the linear multiple regression analysis. I include a discussion of all findings associated with each research question and hypothesis as well as an overview of additional findings that might influence future studies. Chapter 5 contains the summary of the study that details the limitations, interpretations of findings, recommendations for future research, and the implications for positive social change.

# Chapter 2: Literature Review

## Introduction

Many projects fail despite project managers having recognized industry certifications in project management for the skills and expertise to manage projects (Varajao, Colomo-Palacios, & Silva, 2016). The lack of skilled project managers and technical project management techniques and poor project management are significant factors that cause project failure (Ramos & Mota, 2014). The PMI (2015) linked 20% of project failure within a 12 months period to inexperienced project managers, and the lack of effective project management is a common feature of failed projects (Varajo et al., 2016). My analysis of relevant studies revealed a relationship among experience, self-efficacy, and performance (Ineson et al., 2013; Kamohi & Autram, 2014; Martins et al., 2015), aligning with Bandura's self-efficacy theory that suggests successful experiences increase self-efficacy, and in turn performance, achievement, and success.

The purpose of this quantitative, descriptive correlational study was to improve the current understanding of the relationships among project management experience, project managers' self-efficacy, and project success. I start the literature review with a discussion of the literature search strategy followed by articles that provided insight into Bandura's self-efficacy theory regarding the sources of self-efficacy, development of self-efficacy, mastery experience, and the effect of mastery experience on self-efficacy. Next, I include a literature review of researches focused on project management frameworks, project management knowledge, and its relevance to project success, and indicators of project success. I also include articles focused on relevant project

management skills, main competency areas, and the route through which project managers acquire project management experience. Additional discussion involves the relevance of project managers' experience on self-efficacy in a project management environment. I conclude the chapter with an overview of articles that highlight the relationship among experience, self-efficacy, and project performance.

## Literature Review Search Strategy

In this literature review, I focused on the relationship among project managers' experience, self-efficacy, and project success in a project environment. The articles were selected from peer-reviewed journals and academic journals hosted by databases that include ABI/INFORM Complete, Academic Search Complete, and Business Source Complete. Other academic databases include Computers and Applied Sciences Complete, Google Scholar, International Journal of Project Management, and Project Management Journal. The search of the databases was based on the keywords *project success, project failure, project manager, project management experience, mastery experience, first-time manager, new project manager, self-efficacy, social cognitive theory, known-groups technique, purposive sampling, linear multiple regression,* and *regression analysis*. I used limiters such as published date to limit the articles to only peer-reviewed journals published in the last 5 years. I also used citation chaining to identify relevant articles, journals, and studies from those already discovered. The literature review also contains relevant information from white papers and the yearly pulse of the profession reports from the PMI website. I also obtained relevant information from the 2013 project manager salary and development survey conducted by ESI International, a project-

focused training company. I also obtained news report with relevant information from the website of CIO magazine, a respected trade journal.

## Theoretical Foundation

The theoretical foundation for this study was the social cognitive theory by Bandura, which grew out of the social learning theory. The social learning theory introduced the role of cognitive capacity in influencing behavior. According to Bandura (1971), the social learning theory represents a shift from the traditional learning theorists who promoted the concept of behavior from internal forces such as needs, drives, and impulses, and motivators. The social cognitive theory introduced the concept of human functioning as a triadic model of reciprocal determinism arising from the interaction between behavior, cognitive capability and other personal factors, and environmental influences (Bandura, 1989). The social cognitive theory was based on the proposition that people learn through direct experience, modeling, and observing the behavior of others and that behavior is motivated and regulated by the ongoing exercise of self-influence (Bandura, 1971, 1991, 1994). The social cognitive theory was also based on the assumption that people change by creating new patterns of behavior through direct experience or observation and by acquiring symbolic representations of modeled activities (Bandura, 1971).

In social cognitive theory, cognition plays a central role in the motivation and regulation of human behavior (Bandura, 1989, 1991). Perceived self-efficacy is an important cognitive factor that influences personal control over people's motivation, and improvement in self-efficacy tends to have a corresponding effect on motivation and

performance (Bandura, 1994; Wood & Bandura, 1989). Bandura posited that self-efficacy is central to the exercise of personal agency and plays a key role in the self-regulation of motivation and performance attainments (Bandura, 1991, 1994; Wood & Bandura, 1989).

Self-efficacy influences individual performance, motivation, coping abilities, and persistence in difficult situations in addition to facilitating goal-setting and decision-making (Bolaños-Medina, 2014). The literature revealed the use of the self-efficacy concept in ways similar to this study and in multiple contexts (Beas & Salanova, 2006). For example, Daglar, Bilgic, Evcili, and Bolat (2018) and Martins et al. (2015) showed the positive effect of self-efficacy on achievement and performance in academic environments for both students and teachers. In a clinical context, Peters, Potter, Kelly, and Fitzpatrick (2019) reported that self-efficacy positively influenced health-related quality of life in people with multimorbidity. Sukhee and Jiwon (2018) also reported that older women with higher self-efficacy recorded successful osteoporosis and fall's preventive behavior than those with lower self-efficacy. Sivrikaya (2018) applied the self-efficacy concept to sports and concluded that self-efficacy influenced the acquisition of football skills and that it is a key characteristic of a successful athlete. Finally, Blomquist et al. (2016) and Kamohi and Autram (2014) applied self-efficacy to project management to predict the performance and effectiveness of project managers.

One of the propositions of self-efficacy is that people consciously create and strengthen their self-efficacy through information integrated from the different sources of self-efficacy (Bandura, 1994; Wood & Bandura, 1989). This proposition provided the

rationale for the application of self-efficacy in this study that contributes to the ongoing discussion in academia about success and performance enhancement strategies for project managers. Repeated experiences of success strengthen self-efficacy and thus performance, whereas failure experiences undermine self-efficacy by creating self-doubt (Bandura, 1988, 1994; Bolaños-Medina, 2014; Inison et al., 2013; Wood & Bandura, 1989). Mastery experience, the direct experience from successful completion of tasks, is the most effective way of gaining a strong sense of self-efficacy. In this study, the self-efficacy concept provided the guidelines for developing and formulating the research questions and hypothesizing the relationships among the research variables. The research questions in this study related to whether self-efficacy is a motivation variable for predicting project success and whether success experiences affect project managers' self-efficacy and project success, thus addressing the deficiency in knowledge regarding these relationships in IT project environments.

## Literature Review

### Project Management

Project management is a formalized approach that enhances the handling of complex business undertaken in organizations through well-organized processes for the planning, controlling, and managing projects and clearly defined roles (Gemünden, 2014). Many international standard organizations are promoting project management as an approach to assist organizations, especially project managers, to manage, increase the success rate of projects and ultimately organizational performance and productivity (Md Nasir, Sahibuddin, Ahmad, & Mohd Fauzi, 2015). Project management helps

organizations realize the benefits of projects as well as satisfy the needs for which they undertake projects.

**Role of Project Management in Organizations**

Organizations are increasingly relying on project management to help enhance business performance, productivity, and organizational success (Gemünden, 2014; Mir & Pinnington, 2014; Pollack & Adler, 2014). The value of project management lies in its effect on project success indicators, including but not limited to customer satisfaction, business success, and long-term organizational success (Mir & Pinnington, 2014). Project management also has a significant effect on business productivity when used to undertake core business activities (Pollack & Adler, 2014), and project management has a strong effect on the productivity of practitioners and the organization as a whole (Gemünden, 2014). Project managers rely on project management methods and frameworks for efficient planning, managing, execution, and controlling of organizational projects, which leads to a better balance of quality, time, cost, and risk (Md Nasir et al., 2015). Thus, individual project managers and organizations benefit from the use of project management practices, tools, and methodologies.

**Project Management Frameworks**

Many have promoted different variants of project management frameworks, tools, and techniques to enhance project success and improve organizational performance. Project management frameworks provide project managers with knowledge, skills, tools, and techniques to ensure effective management of project activities through efficient use of project resources to meet user and stakeholder needs, while also striving to fulfill the

various critical success factors (Besteiro, de Souza Pinto, & Novaski, 2015; Md Nasir et al., 2015). Some of the examples of the existing variants of project management guidelines, standards, and methodologies include project management body of knowledge (PMBOK), PRINCE2, International Standards Organization 21500:2012 standard (Drob & Zichil, 2013; Ika & Hodgson, 2014). Other variants include the Guide for Project and Program Management for Enterprise Innovation (P2M) and agile methodologies such as SCRUM and rapid application development. According to Md Nasir et al. (2015), PMBOK is the most prominent and widely used project management framework for non-IT and IT projects.

**Project Management Body of Knowledge**

The PMI publishes the PMBOK that defines project management processes (Nahod & Radujković, 2013). The PMBOK contains globally recognized guidelines and best practices for managing projects across diverse industries with a view to achieving a more successful outcome (Nasir et al., 2015; PMI, 2013; Varajao et al., 2016). In the fifth edition of PMBOK, the PMI grouped the core project management activities and tasks for managing projects into five project management process groups. These process groups interact with one another and are independent of the application areas or industry focus (PMI, 2013). The PMI presented the process groups in the order of which project activities happen, and they include initiating process group, planning process group, executing process group, monitoring and controlling process group, and closing process group (PMI, 2013; Varajao et al., 2016).

The PMI recognizes 47 project management processes that underlie the five process groups, with the outcome of one process becoming the input of at least one other process (Pinheiro, 2010; PMI, 2013). The 47 processes form the basis of the 10 separate knowledge areas that integrate the five process groups. The knowledge areas include project integration management, project scope management, project time management, project quality management, project human resource management, project communications management, project risk management, project procurement management, and project stakeholder management (PMI, 2013). Each knowledge area represents a focused area of specialization with related set of concepts, terms, and activities (PMI, 2013). Implementation of the project management processes and best practices result in better productivity and improved project performance indicators as well as project success (Nasir et al., 2015; Varajao et al., 2016).

**Project Management Body of Knowledge and Project Success**

Project managers who use PMBOK as a reference for executing projects need to be competent and knowledgeable in the project management knowledge areas to complete projects that meet customer expectations and stakeholders' requirements (Chou, Irwan, & Pham, 2013; Gomes, 2013). The application of PMBOK as a project management framework has a positive effect on critical success factors for software projects (Nasir et al., 2015), and understanding PMBOK's concept is one of the success factors in enterprise resource planning project implementation (Gomes, 2013). Higher project success index values have been observed when project managers apply PMBOK techniques, tools, and skills, while those who have not used PMBOK recorded lower

project success index values (Chou et al., 2013). There is also a relationship among project managers' age and experience, project management methodology, implementation of project management risk processes, and project success, as experienced project managers are more aware of the importance of project management risk processes (Varajao et al., 2016). Overall, there is a relationship between project managers' effective application of the tools, techniques, and skills contained in the PMBOK and successful implementation and delivery of projects (Chou et al., 2013; Nasir et al., 2015; Varajao et al., 2016).

**Project Success Indicators**

Many authors use the Iron Triangle to represent the connection between the three traditional indicators, also known as triple constraints, of project success: cost, schedule, and quality (Bronte-Stewart, 2015). However, authors like Serrador and Turner (2015) have noted that the triple constraints may not be adequate to measure project success because project measurements may not meet customer/stakeholder satisfaction while fulfilling the triple constraint requirements. To expand the view of project management, Berssaneti and Carvalho (2015) and Thi and Swierczek (2010) added that the quality indicator encompasses the technical specifications and customer satisfaction. Scope and quality have been used interchangeably in many studies as part of the triple constraint (Pollack, Helm, & Adler, 2018).

**Self-Efficacy**

Bandura introduced self-efficacy as part of the social cognitive theory to account for someone's belief in his or her capabilities to perform the actions required to manage

potential situations (Bolaños-Medina, 2014). Self-efficacy plays an important role in the self-regulation of motivation, goal-setting, anticipation of likely outcomes of tasks, and coping in the face of difficulty (Bandura, 1994; Bolaños-Medina, 2014; Kamohi & Autram, 2014). The stronger the perceived self-efficacy of individuals, the higher the motivation and commitment toward a task as well as the goals they set for themselves (Bandura, 1994; Bolaños-Medina, 2014; Kamohi & Autram, 2014). People with a high sense of self-efficacy activate motivation and necessary cognitive resources with the courses of actions they need to achieve target tasks (Kamohi, 2014). Self-efficacious people tend to have a higher tendency to embrace the right strategies to achieve target tasks as well as a higher recovery rate from setbacks (Bolaños-Medina, 2014). Therefore, there is a link among self-efficacy and individuals' motivation and performance in a wide range of tasks (Bandura, 1994; Bolaños-Medina, 2014; Kamohi & Autram, 2014).

**Sources and Development of Self-Efficacy**

There are four ways to create and strengthen people's capabilities to produce certain levels of performance to thrive in an environment or on a task: mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states (Bandura, 1994; Bolaños-Medina, 2014; Inison et al., 2013; Kamohi & Autram, 2014). For mastery experiences, researchers on self-efficacy have found that experiences of repeated successes enhance self-efficacy and failure experiences undermine it. Mastery experiences are associated with actual successes that reinforce a sense of capacity to be successful and are the most powerful contributors to self-efficacy (Bolaños-Medina, 2014; Inison et al., 2013). In contrast, failure experiences create self-doubt and affect

performance (Wood & Bandura, 1989). Additionally, people can develop a strong sense of self-efficacy through the persuasive influence of social role models, or vicarious experiences (Bandura, 1994; Bolaños-Medina, 2014). The more people assume they are similar to their social models, the more the persuasive influence of the successes and failures of the social models on their capacity to succeed in comparable activities. Further, people work to succeed and in turn develop a strong sense of self-efficacy through verbal encouragement from others, which is known as social persuasion (Bandura, 1994; Bolaños-Medina, 2014; Kamohi & Autram, 2014). A boost in self-efficacy through credible verbal encouragement tends to encourage extra efforts from people as well as the development of the right skills to succeed (Bandura, 1994; Bolaños-Medina, 2014; Kamohi & Autram, 2014).

In addition to people's experiences, physiological and emotional states can affect self-efficacy. The inherent physiological and emotional states of people influence how they judge their capacity to succeed in given activities (Bandura, 1994; Bolaños-Medina, 2014). People perceive and interpret their stress reactions and tensions as signs of incapacity to perform and succeed in given activities (Bandura, 1994; Bolaños-Medina, 2014). Mood also affects how people interpret and judge their self-efficacy in that positive mood tends to enhance self-efficacy, whereas negative mood has a contrasting effect on self-efficacy (Bandura, 1994). Hence, developing the skills and ability to reduce the stress reactions as well as alter the emotional states and misinterpretations can help enhance self-efficacy (Bandura, 1994).

The four sources of self-efficacy provide information that is processed through the self-appraisal process to produce results that influence the judgment of perceived self-efficacy (Bandura, 1989). Acting on the results of the self-appraisal process can lead to successes or failures, and these experiences are recycled back into the self-appraisal operative competencies (Bandura, 1989). Overall, there is a link between the acquisition of self-efficacy belief, through these different sources, and individual success in related tasks or activities (Bandura, 1994; Blomquist et al., 2016; Bolaños-Medina, 2014; Inison et al., 2013; Kamohi & Autram, 2014). There is also a link among project managers' self-efficacy, competency, individual success, and overall project success (Blomquist et al., 2016; Kamohi & Autram, 2014).

**Mechanism of Self-Efficacy**

There are four psychological processes that self-efficacy activates to regulate human behavior and functioning on a task: cognitive, motivational, affective, and selective processes (Bandura, 1994; Bolaños-Medina, 2014). These processes influence how people feel, think, behave, and motivate themselves in an environment or in executing a particular task, and thus individual performance (Bandura, 1994; Bolaños-Medina, 2014). Cognitive processing relates to the self-appraisal of capability and how it influences individual goal-setting. People with a high sense of perceived self-efficacy tend to set higher goals and possess effective cognitive abilities to anticipate, construct, and visualize successful scenarios, thus firming up their commitment towards the tasks at hand (Bandura, 1994; Bolaños-Medina, 2014). Motivational processing relates to how personal self-belief in a given task influences motivation by enhancing the capacity to

forethought and anticipate the likely outcome of the task (Bandura, 1994; Bolaños-Medina, 2014). Affective processing relates to how self-efficacy influences people's thought patterns about the environment or task-based challenges (Bandura, 1994; Bolaños-Medina, 2014). People with a low sense of self-efficacy develop disturbing thought patterns about their inability to cope in an environment or with a task and exhibit avoidance behavior, whereas those with a higher sense of self-efficacy exercise control over the challenging thoughts (Bandura, 1994; Bolaños-Medina, 2014). In addition to cognitive, motivational, and affective processing, selective processing relates to how people's self-efficacy beliefs influence the environment and tasks they embrace (Bandura, 1994; Bolaños-Medina, 2014). People tend to avoid environments and tasks they judge exceed their coping abilities, while they embrace environments and tasks they are capable of handling successfully (Bandura, 1994; Bolaños-Medina, 2014).

**Self-Efficacy and Performance Enhancement**

The interaction of the four psychological processes helps people develop either a positive or negative evaluative reaction towards a task as well as influence how they perceive and interpret their level of performance, capacity to handle the task and possible outcome (Bandura, 1994). The self-efficacy mechanism is central to the development of personal agency because of its strong effect on human thought, affect, motivation, and action (Bandura, 1991). The belief in own efficacy to produce the desired actions necessary to achieve certain outcomes is a major driver of personal agency (Bandura, 2006). Personal agency refers to the internal locus of control that allows people to attribute their behaviors and outcomes to their efforts, and it helps boost confidence, high

self-esteem, independence, and performance (Hamilton, Matthews, & Crawford, 2015). Further, a person's positive judgment of own performance enhances self-efficacy because it sets the occasion for self-reactive influences (Bandura, 1991). People are likely to trigger actions to address any discrepancy that may arise between their actual performance and the internal standard or goals they set for themselves (Bandura, 1991).

**Project Management Experience**

People learn and acquire the skills and competency they need to handle the tasks assigned to them through experience on the job, formal education, and training, amongst others (Benoy & Gracias, 2015; Ofori, 2014). Hands-on experience is the best way to learn; and the selection of project managers to meet organizational needs often rely on candidate's past performance and experience in a similar role (Benoy & Gracias, 2015; Ofori, 2014). Overall, project managers need a certain level of skills and competencies to thrive and be successful.

**Project Management Skills, Competence, and Experience**

Many organizations rely on project managers with project management skills and competencies up to a prescribed standard to enhance the success of organizational projects (Ofori, 2014). Project management skills and competencies standard framework is set by professional project management accreditation organizations such as PMI, International Project Management Association, Australian Institute of Project Management, and Association of Project Management (Ofori, 2014). The PMI project manager competency development framework is one of the blueprints for the acquisition of functional project management knowledge and expertise that many project managers

rely on in modern competitive and dynamic project management environment. Project managers acquire the necessary skills and competencies to handle the challenges of the project environment through a combination of knowledge enriching mediums like formal training, experience, and hands-on opportunity in a project management role (Ofori, 2014). For example, student participants of a business simulation game designed to provide real work practice in a multidisciplinary project team experienced an increase in project management knowledge (Geithner & Menzel, 2016). The experience helped the students acquire and improve both technical project management knowledge and soft skills (Geithner & Menzel, 2016). Overall, hands-on experience in project management improves the competencies and skills of project managers.

The 10 knowledge areas and five process groups of project management form the basis of project manager competency development framework, which enriches three main competency areas of project management that include knowledge, performance, and personal (Briere et al., 2015; Geithner & Menzel, 2016; Ofori, 2014). Project management knowledge is the personal contributions of project managers towards project related activities through their knowledge and understanding (Briere et al., 2015; Geithner & Menzel, 2016; Ofori, 2014). Project management performance is the ability of project managers to successfully perform project related activities, whereas personal competency relates to soft skills such as project managers' behavior, attitude, and core personality traits when performing project-related activities (Briere et al., 2015; Geithner & Menzel, 2016; Ofori, 2014). Overall, the project manager competency development

framework is a valuable tool for evaluating the knowledge, competence, and experience of project managers.

**Relevance of Experience in a Project Management Environment**

Geithner and Menzel (2016) reported an increase in project management knowledge amongst student participants of a business simulation game designed to provide real work practice in a multidisciplinary project team. The authors found that practical experiences acquired through the business simulation game positively affect students' project management knowledge, competence, and skills. Although the authors focused on the academic environment, they underscored the importance of practical project management experiences in promoting skill acquisition and knowledge development in a project environment. Huff and Prybutok (2008) linked prior project management experience to project managers' knowledge base, which in turn influences project performance. In contrast, Rubin and Seeling (1967) found that the effect of project management experiences on project performance is minimal. Thi and Swierczek (2010) identified project managers' competence as having the strongest relationship to project performance. Huff and Prybutok (2008) aligned with Thi and Swierczek (2010) in that they reported that project management experience progressively increases the project manager's competence by increasing their knowledge. Overall, there is a relationship among practical project management experience, project managers' knowledge, competence, and performance (Geithner & Menzel, 2016; Huff & Prybutok, 2008; Thi & Swierczek, 2010).

Further, many studies have also found similarities in how project managers' competencies and knowledge affect project success (Carlton, 2017; Ekrot, Kock, & Gemünden, 2016; Nahod & Radujković, 2013). Nahod and Radujković (2013) reported that technical project management competencies are critical to achieving project objectives. Ekrot et al. (2016) reported a positive relationship between average project success and project management competence retention through retention initiatives such as lessons learned systems. Carlton (2017) found that IT project leaders with technical IT competencies and knowledge are better equipped to manage complex IT projects compared to technically incompetent project managers. The author noted that technically incompetent project managers adversely affect project outcomes. These findings suggest that project managers with high technical competence are more likely to achieve successful project outcomes. Overall, there is a relationship among practical project management experience, project managers' competence, and project success (Carlton, 2017; Ekrot et al., 2016; Geithner & Menzel, 2016; Huff & Prybutok, 2008; Nahod & Radujković, 2013; Thi & Swierczek, 2010).

**Relevance of Experience on Self-Efficacy in a Project Management Environment**

Martins et al. (2015) highlighted that "mastery experience is the most powerful source of information for people to develop a strong sense of their level of self-efficacy" (p. 264). The authors asserted that experience reinforces competence self-perception. Negative failure experiences result in low self-efficacy and affect performance, whereas positive successful experiences enhance self-efficacy and improve performance (Kamohi & Autram, 2014; Martins et al., 2015; Wood & Bandura; 1989). People involved in

project-based roles require high levels of self-efficacy to deal effectively with project uncertainties, and the challenging and complex work experiences (Lloyd-Walker, French, & Crawford, 2016). Kamohi and Autram (2014) found a positive influence of project managers' self-efficacy improvement on effectiveness in five specific personal critical competencies: adaptability, ability to handle ambiguity, persistence, perseverance, emotional intelligence, and resilience.

Additionally, Blomquist et al. (2016) found that project management self-efficacy of project managers is a predictor of performance. Project managers' self-efficacy positively influences six project performance indicators that include budgeting allowance, meeting deadlines, delivering specifications, contributing to the organizational strategy, meeting stakeholder expectations, and delivering business benefits (Blomquist et al., 2016). Research has suggested that past success and failure experiences of project managers affect their self-efficacy and that high levels of self-efficacy have a positive relationship with project performance as well as the ability to handle uncertainties and challenging work experiences (Blomquist et al., 2016; Kamohi & Autram, 2014). Research has also suggested that exposing project managers to successful project management experiences through association with experienced project managers or mentorship opportunities enhance the chances of successful completion of future project tasks and deliverables (Blomquist et al., 2016; Kamohi & Autram, 2014).

## Summary

The literature review revealed the relevance of positive experiences on people's competence, self-efficacy, and successful handling of tasks. Concerning project

management, the literature review revealed three emergent themes about the relationships among project management experience of project managers, self-efficacy, and project performance and success. One of the themes indicates that project management experiences enhance project managers' knowledge, competency levels, and project performance. The second theme indicates that successful project management experiences will likely enhance the self-efficacy of project managers. The last theme indicates that high levels of project managers' self-efficacy enhance project performance.

The three themes encapsulate the objectives of this study and collectively suggest that project managers with overwhelming successful project management experiences stand a better chance of becoming successful. However, there is a lack of empirical studies that examine how success and failure experiences of project managers relate to self-efficacy and project performance. No empirical evidence supports the first two themes that suggested that project management experiences enhance the project managers' knowledge, competency levels, performance, and self-efficacy. In this study, I addressed such gaps in the literature by examining the effect of successful experiences of project managers on their self-efficacy and project success.

The findings of Blomquist et al. (2016) provided empirical evidence to support the last theme. However, because the study involved projects from different industries, the levels, and nuances of project challenges and risks could differ, thus affecting project performance. Hence, there is a need for examining the consistency of the findings of Blomquist et al. in IT project domain. Chapter 3 contains details of the methodology used to gather and analyze the research data.

# Chapter 3: Research Method

## Introduction

The purpose of this quantitative study was to improve the current understanding of the relationships among project management experience, project managers' self-efficacy, and project success. Because the literature review showed insufficient empirical research to support the relationships, in this study, I describe and analyze these relationships to increase the understanding of how project management experience affects self-efficacy and project success. The results of this study foster an understanding of how the self-efficacy of project managers affects the ability to deliver project tasks and deliverables within time, cost, and scope constraints. In this chapter, I include sections on research design, rationale for selecting the research design, methodology, threats to validity, and ethical procedure. The Methodology section contains details about the population, sampling and sampling procedures, participants' recruitment, data collection, processing, and analysis, and instrumentation.

## Research Design and Rationale

The main research questions in this study were focused on how project managers' experiences of project success affect their self-efficacy and project success as well as how self-efficacy affects the success of IT projects. The research questions were as follows:

Research Question 1: What is the relationship between project managers' exposure to successful experiences and project managers' self-efficacy?

Research Question 2: What is the relationship between project managers' self-efficacy and project success?

Research Question 3: What is the relationship between project managers' exposure to successful experiences and project success?

Research Question 4: Does project managers' exposure to successful experiences mediate the relationship between self-efficacy and project success?

The nature of the research questions necessitated a quantitative descriptive correlational study, a nonexperimental research design, to answer them. Correlational research is useful when the goal is to examine the relationships between two or more random variables within the same population or between the same variables in two different populations (Curtis, Comiskey, & Dempsey, 2016). This study involved the measurement of three study variables using validated survey instruments and examining the relationships among these variables. The literature revealed that positive experiences of success lead to high self-efficacy, whereas negative experiences of failure lead to low self-efficacy, and high self-efficacy is associated with success, whereas low self-efficacy often leads to failure. The interdependencies between these research variables suggest that the more the exposure of project managers to successful project management experiences, the higher their self-efficacy and the chances of project success. There is no research to support these relationships, indicating a gap in the literature.

## Methodology

Figure 2 depicts the research steps and methods selection in this quantitative study.

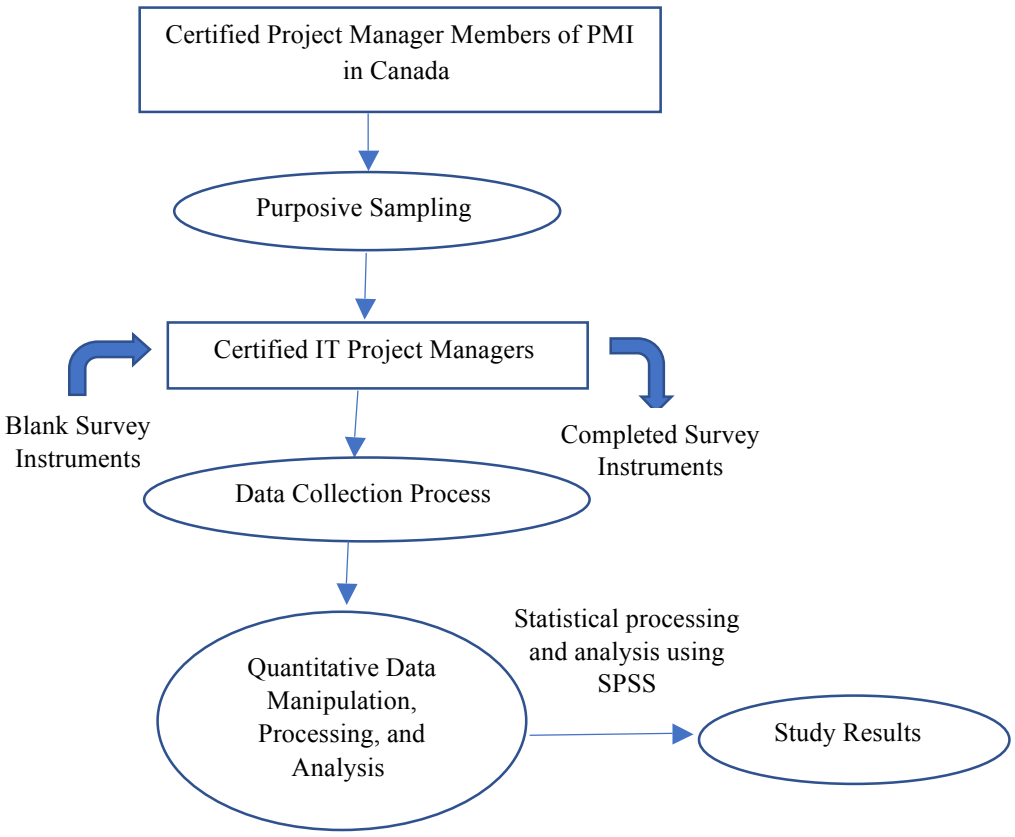


*Figure 2*. Research steps.

### Participants

This study involved purposive sampling to obtain participants. Purposive sampling is appropriate when researchers are seeking participants who meet certain criteria (Suen, Huang, & Lee, 2014). Purposive sampling is a nonprobability sampling method that involves the subjectivity of the researcher in identifying the selection criteria to obtain a sample that is representative of the study population (Frankfort-Nachmias &

Nachmias, 1996). The drawbacks of using nonrandom sampling strategies like purposive sampling include nonrepresentativeness of the research sample and external validity issues from possible selection bias (Frankfort-Nachmias, Nachmias, & DeWaard, 2015). To alleviate the effect of the lack of random sampling, Suen et al. (2014) suggested increasing the statistical power of the study by increasing the sample size.

This study involved a population of Canadian-based PMI certified project management professionals with current or past experiences in IT projects. I intended to survey certified project management professional members of a Canadian PMI chapter and obtained the approval of the chapter to carry out the survey. The decision was made to broaden the target population to include PMI certified project management professionals in Canada due to low participation of members of the PMI chapter. In the absence of any official information on the population of these project managers, I relied on the information available on the websites of all the PMI chapters in Canada that showed that there were over 24,935 members. About 8,000 members were identified as holders of project management professional certification.

It is important to use power analysis to determine the sample size, which takes into account the probability of Type I or Type II error occurring during hypotheses testing. The probability of a Type I error is denoted as alpha or $\alpha$, and the probability of Type II error is denoted as beta or $\beta$ (Bagiella et al., 2019; Tellez et al., 2015). Type I error occurs when the null hypothesis is rejected when it is true, and Type II errors occur when the null hypothesis is not rejected when it is false results (Bagiella et al., 2019; Hae-Young, 2015; Tellez et al., 2015). Power analysis uses the alpha level, effect size,

and statistical power in calculating the sample size of a study (Bagiella et al., 2019; Tellez et al., 2015). By convention, the alpha level of .05 minimizes the probability of Type I error occurring, and it represents a 5% chance of making a wrong conclusion (Hae-Young, 2015; Tellez et al., 2015). The power level of .80 is acceptable, and it indicates an 80% chance of arriving at the correct conclusion (Tellez et al., 2015). A conventional way of interpreting effect size is to classify the correlation coefficient value of 0.2 as a small effect, 0.3 as a medium effect, and 0.5 as a large effect (Cohen, 1969; Tellez et al., 2015). Effect size is often estimated from past studies that probe similar constructs, and it represents the strength of the relationship between the variables under investigation (Blomquist et al., 2016; Tellez et al., 2015).

Past studies on the relationship between self-efficacy and performance have indicated that effect sizes that ranged between 0.23 to 0.38 make self-efficacy a good predictor of performance (Blonquist et al., 2016). For example, consistent with past studies, Blomquist et al. (2016) reported an effect size of 0.32 in their study. Additionally, Geithner and Menzel (2016) reported correlation coefficients of .478 to .812 in their study on the relationship between learning through experience and project management students' skills and performance levels, whereas Achterkamp et al. (2015), Bandura (1989, 1994), Martins et al. (2015), and Wood and Bandura (1989) reported a high correlation between successful experiences and performances.

For this study, I used an alpha level of .05, effect size of .3, and statistical power of .80. G*Power offers accurate and advanced sample size calculation and can provide the estimate of sample size based on the alpha level, effect size, power, and other

parameters depending on the statistical test (see Meysamie et al., 2014). I conducted a priori power analysis using G*Power software version 3.1.9.2 with an effect size of .3, alpha error probability of 05, and power of .80, and the software returned a sample size of 82 for correlation analysis, and 68 for multiple linear regression involving medium effect size and two predictors. Should the ideal sample size be inaccessible, a contingency plan was to use a reduced power of .70 and 90% confidence level resulting in a sample size of 49 for correlation analysis, and 43 for multiple linear regression.

Based on the G*Power calculator, the target sample size for this study was 82. The criteria that each study participant must meet to be representative of the study population are relatively simple. The criteria include the following:

1. Worked/Working on IT projects as a project manager in Canada.
2. Possess project management professional certification from the PMI.

There seem to be no other characteristics of the study population that would make some individuals more representative of the population than others. The study population consists of certified project management professional members of the PMI, Canada. The participants include a targeted sample of project managers that possess the PMI certification and have worked on many IT projects in Canada or currently working on IT projects in Canada.

**Materials and Instruments**

Data collection was through an online survey published on the SurveyMonkey website. This method of data collection involved the distribution of the survey link to certified members of the PMI. The survey has four parts, namely, bio-data section, PSS,

project management self-efficacy scale (PMSE), and project management experience scale (PMES). Participants were asked to record their details in the bio-data section and score four items on the PSS. These items include: (a) “What percentage of the projects you manage to meet budget allowance”; (b) “What percentage of the projects you manage meet deadlines”; (c) “What percentage of the projects you manage meet technical specifications”; and d) “What percentage of the projects you manage meet the expectations of the customer.” The participants scored these items using a 5-point Likert-type scale as follows: (1) “less than 20%”, “21–40%”, “41–60%”, “61–80%”, and “80-100%”. Adopting the task-specific self-efficacy scale used in Blomquist et al. (2016), the PMSE has 22 items covering five competency areas that represent distinct tasks from these competency areas. Participants were asked to score their level of confidence in completing each task using a 5-point Likert-type scale ranging from “Cannot do the task (0% confident)” to “Totally confident to manage the task effectively (100%).” Adopting the new one-dimensional 8-item general self-efficacy scale used in Ineson et al. (2013), participants also scored the indicators of self-efficacy on a 5-point Likert-type scale that ranges from (1) strongly disagree to (5) strongly agree. Participants used the PMES to record their years of experience and the aggregate percentage of successful experiences on relevant projects using a 10-point Likert-type scale ranging from “10%” to “100%.” A copy of the survey can be found in Appendix A.

**Pilot Study**

A pilot test typically begins data collection, and it is an important step in the development of research instruments because it provides feedback on the validity and

reliability of the instrument (Cooper & Schindler, 2008). Researchers can skip the pilot study phase due to time constraints and when the study involves instruments that have been validated in a past study (Cooper & Schindler, 2008). The pilot study was skipped in this study because the research involved three established and well-validated survey instruments that have been used in past studies to obtain measures relating to the research variables. The PMSE, NGSE, and PSS have been used in many studies (Blomquist et al., 2016; Chen et al., 2001; Ineson et al., 2013; Serrador & Turner, 2015) to measure the constructs of self-efficacy and project success (see Appendix L for permissions to use research instruments).

**Data Collection, Processing, and Analysis**

This study involved IT projects only and one country, Canada. Data administration and collection were achieved through an online survey tool, SurveyMonkey. The survey link was sent directly to my LinkedIn contacts in Canada that possessed PMI certification and Canadian experience in IT projects. I also published the survey link on the Facebook page of a PMI chapter in Canada and invited certified members to participate in the survey. Upon clicking the survey link, the project managers were directed to read the informed consent that appeared on the screen before proceeding with the survey. The consent form contained the responsibilities of the participants if they volunteer to participate in the study. Project managers who decided to participate in the study were requested to proceed with the survey by clicking the “Next Page” button, while those who did not want to participate in the study were instructed to close the survey window to exit the survey. In this study, I used quantitative data analysis to

analyze the research data in order to discern the relationships among the research variables. I used IBM SPSS Statistical Software for data analysis as well as descriptive analysis of the sample. The main sources of data for this study were the research participants, and the secondary data sources include project management reports, documents, and information system. The estimation of the relationships between the research variables was achieved through correlation and regression analysis. The evaluation of the mediating effect of project managers' exposure to successful experiences on the relationship between project manager's self-efficacy and project success was through linear multiple regression.

**Methodological Assumptions, Limitations, and Delimitations**

Some critical assumptions govern the use of linear regression analysis to ensure the validity of the outcome of the statistical analyses (Anja & Casper, 2017). The assumptions include linearity, normality of residuals, independence of errors, absence of multicollinearity between the predictor variables, and homoscedasticity, and Chapter 4 includes the evaluation of these statistical assumptions. To ensure the empirical validity of a measuring scale, researchers evaluate the correlation between scores obtained from the scale and outcomes from a criterion measure (Baugher, Weisbord, & Ramos, 2014). However, the absence of participants' project success and self-efficacy ratings made it impossible to examine the empirical validity of the scales, thus posing a methodological limitation to this study. The analysis of the work of Anja and Casper (2017) showed that developers of IBM SPSS statistical software offer simple ways to verify multivariate

normality, linearity, homoscedasticity, and some of the other assumptions through SPSS statistics and graphical interpretation of SPSS plots and graphs.

**Threats to Validity**

The validity and reliability of measurements were paramount in this study. In quantitative research, it is important to address concerns about the validity of measurements such as content, construct, and empirical validity. Having subject-matter expertise to assess the effectiveness of the test items on the measurement instruments enhanced content validity. I used the *convergent validity technique* to assess the construct validity of the task-specific PMSE scale and the 8-item general self-efficacy scale. Construct validity is high when the different measures of the same construct yields related results (Bolaños-Medina, 2014).

Serrador and Turner (2015) used the PSS as a subscale of the main survey instrument to measure project success based on performance against the triple constraints: cost, time, and scope. The authors reported a relationship between the respondents' project success ratings and the scores recorded for the triple constraints, denoted as project efficiency scores; hence an indication of satisfactory construct and empirical validity. Despite methodological limitation that hindered the examination of the empirical validity of the measuring scales, I was confident to adopt the PMSE because it exhibited satisfactory convergent and discriminant validity by producing similar results in different contexts (Blomquist et al., 2016). Furthermore, there was enough justification for adopting the PSS because the triple constraint is traditionally a measure of project success in many studies.

Reliability relates to the extent to which the study measurements are repeatable under identical conditions (Drost, 2011). The use of scales can enhance the reliability of measurements because an aggregate score from several variables is a more reliable indicator of an attribute (Gliem & Gliem, 2003). Because the NGSE, PMSE, and PSS are multi-item scales, summing up the individual item scores can average out measurements errors, thus enhancing the reliability of measurements (Gliem & Gliem, 2003). Also, these scales are less complex and easy to read and complete, reducing the chances of random measurement errors. To further reduce measurement errors, some of the scales have provision for alternative responses where necessary.

Blomquist et al. (2016) highlighted that the PMSE exhibited satisfactory reliability measurements with the loading factors of the 27 project management self-efficacy indicators above the required 0.70. Despite these assurances, I used the parallel-forms reliability strategy using the NGSE scores and PMSE scores to ensure the reliability of the self-efficacy measurements. Because these two scales probe similar constructs, I evaluated the consistency of measurements across the two scales. Serrador and Turner (2015) found that the triple constraint is a reliable measure of project success. The authors reported satisfactory reliability of the PSS with a Cronbach's alpha of 0.769.

**Ethical Assurances**

I maintained the current standards for the ethical well-being of participants by following the recommendations of the Walden University Institutional Review Board (IRB) throughout the different phases of this study. I requested that the participants complete the informed consent before commencing the survey. Consent is necessary to

protect participants' rights and safety. The consent form contained information relating to the purpose of the study, known risks, benefits of the study, and duration of the study. I also used the consent form to inform the participants that participation is voluntary and confidential. Further, I highlighted in the consent form the procedures of the study, my contact information, and the contact information of the representative of Walden University. The consent form also included the Walden University Institutional Review Board (IRB) approval number 05-04-18-0281744. Furthermore, I used the consent form to inform the participants that they may quit the research at any time. In line with the approval requirements of the Walden University IRB, I will ensure the safekeeping of research data and relevant resources for 5 years.

## Summary

A detailed description of the research methodology for examining the relationships among the research variables was presented in Chapter 3. Based on the gap in the literature, I identified three main research variables, namely, project managers' mastery experience, self-efficacy, and project success and hypothesized four relationships in line with the social cognitive theory. Due to the theorized relationships, I used correlation and regression analysis for the evaluation of the relationships among these variables. I used linear multiple regression to evaluate the mediating effect of project managers' successful project management experiences on the relationship between project managers' self-efficacy and project success.

In this study, I used the purposive sampling method due to the peculiarity of the population of interest and the need for the sample participants to meet certain selection

criteria, while relying on the researcher's judgment. I used PMES to obtain details of the project management experiences of project managers and adopted the PSS, PMSE, and the 8-item NGSE from other studies that showed acceptable validity of measurements from these scales. I used an online survey to collect data from participants through SurveyMonkey online tool. This method offers a cheaper way of data collection. To alleviate some of the disadvantages of an online survey, such as low response rate and lack of control over who fills out the survey, the LinkedIn email was resent to my LinkedIn contacts as a reminder. I present the descriptive statistics of the demographic variables and the findings from the statistical analysis of the research data and test of research hypotheses in Chapter 4.

# Chapter 4: Results

## Introduction

The purpose of this quantitative, descriptive correlational study was to evaluate the relationships among project management experience, project managers' self-efficacy, and project success as determined by the survey responses from a sample of PMI certified project managers in Canada. The project success aspect was measured using the PSS, which measured adherence to four dimensions of project success that includes budget, deadline, technical specifications, and customer expectations. The self-efficacy of the project manager participants was measured using PMSE and the NGSE scales. The PMSE scale produced 22 measures representing the efficacy beliefs of project managers for fixed skills that fall within the five main competency areas of project management: manage project team, manage stakeholder relationships, development of project plan, manage project execution, and evaluation of project performance. The NGSE scale produced eight measures representing the general self-efficacy beliefs of project managers in a broad context.

I represented the scale scores for each respondent by a single composite score obtained by calculating the unweighted average of related scale items. Project management experience was limited to the experiences garnered from repeated cases of success in a particular task, otherwise known as mastery experience. The mastery experience aspect of this study was measured using the PMES to produce two measures: years of experience as a project manager on IT projects and the aggregate percentage of successful experiences of project managers. The relationships among the research

variables as highlighted in the research hypotheses were evaluated using Pearson correlation analysis.

**Data Collection and Analysis**

The target population comprised Canadian-based PMI certified project management professionals with current or past experience on IT projects. Data were collected through a web-based survey posted on SurveyMonkey. The participants were invited to participate in the survey through an invitational e-mail that contained the survey link and instructions on how to complete the survey. I informed the participants that the survey would take about 20 minutes to complete. I sent the invitation to the participants after 1 week of receiving the first e-mail.

A total of 63 project managers attempted to complete the online survey, with 60 of the 63 who were PMI certified project managers. However, only 54 participants answered all the questions relevant to test the relationships between the research variables. Of the 54, I classified the data from three respondents as outliers due to two extreme cases of PSS scores and one extreme case of PMES successful experience scores; hence, the final sample size after data cleaning was 51 Canadian-based PMI certified project managers. Based on the G*Power analysis, the sample size of 51 was enough to achieve the contingency plan of using a reduced power of .70 and a 90% confidence level if the ideal sample size of 82 was inaccessible.

**Demographics**

The demographic requirements for this study were minimal. There were no collection of personal identifiers that would negate the anonymity of the study. This study

did not include the collection of names and organizations of participants, and demographic information was limited to age, gender, professional certification, and geographic location. The survey targeted project manager participants who met the demographic requirements of being a PMI certified project manager who resides in Canada with current or past experience on IT projects.

The result showed that all the 51 (100%) participants were project management professional certified, and they all reside in Canada. Of the 51 participants who participated in the study, 32 (62.7%) were men, 18 (35.3%) were women, and the remaining (2%) participant did not specify any value for the gender variable. The result also showed that 48 (94.1%) participants recorded ages between 24 and 63, whereas three (5.9%) participants did not specify their ages. Appendix B shows detailed frequency tables for all of the demographic variables (see Tables B1-4). Appendix C shows the frequency tables of the survey questions for project success, project management self-efficacy, and project management experience. I transformed the measures of project management self-efficacy and project success into composite variables PMSE and Project_Success to create the descriptive statistics for these variables. Appendix D shows the descriptive statistics of the three study variables.

**Findings**

The PSS and PMSE showed satisfactory reliability with Cronbach's alpha scores of 0.86 and 0.93, respectively (see Appendix E). These results indicated that 86% of the variance in PSS scores was reliable variance, whereas 93% of the variance in PMSE scores was reliable variance. As such, PSS and PMSE showed acceptable internal

consistency reliability. A further test of the reliability of the PMSE using the parallel-forms reliability strategy revealed a consistency of measurements across the PMSE and NGSE (see Appendix F). Test results indicated similarities in the mean, variance, and standard deviation of the measurements from the PMSE and NGSE.

There was also a significant correlation between the PMSE and NGSE, $r(52) = 0.51$; $p < .001$, thus establishing the reliability of the PMSE. As such, construct validity was also established because the two different measures of self-efficacy yielded related results. The correlation between the scores from the two scales provided evidence of satisfactory convergence validity. I answered Research Questions 1, 2, and 3 by testing Hypotheses 1, 2, and 3 using Pearson correlation analysis to evaluate the relationships between research variables. I answered Research Question 4 by testing Hypothesis 4 using linear multiple regression to evaluate the mediating effect of successful experiences of project managers on the relationship between self-efficacy and project success. Linear multiple regression was used to model the relationship between project managers' self-efficacy and project success in Model 1 and how the introduction of project managers' successful experiences affects the relationship between self-efficacy and project success in Model 2 (see Appendix J & K).

Before commencing the analysis, I conducted data cleaning and verified the assumptions of Pearson correlation and linear multiple regression. I accomplished data cleaning through descriptive statistics, review of histograms of variables, and review of boxplots as well as the stem and leaf plots for outliers. I ensured that no score exceeded the possible response levels and excluded responses with missing data. Appendix G

shows the stem and leaf plot tables for the research variables, showing two extreme cases of PSS scores, one extreme case of PMES successful experience scores, and no extreme case recorded for the PMSE scores. Data cleaning involved removing these three responses with outliers: two composite scores from the PSS and one from the PMES successful experience score as shown in Figures 3 and 4.

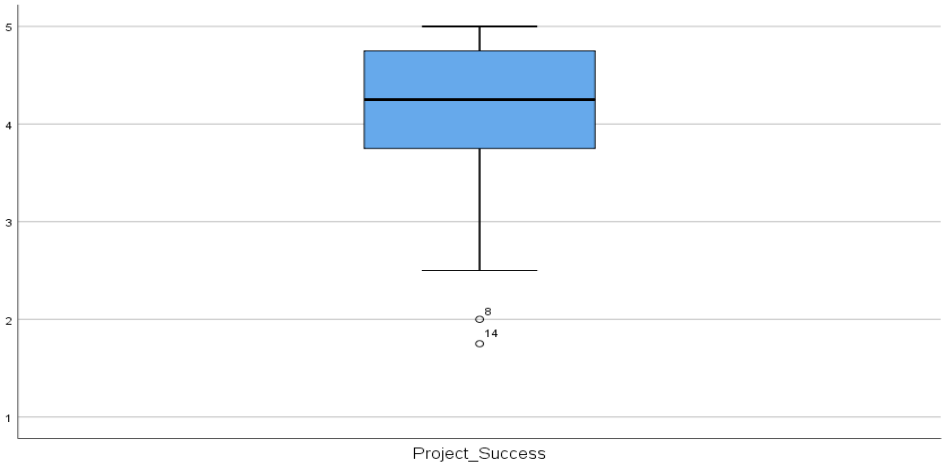


*Figure 3*. PSS successful experience outlier graph.

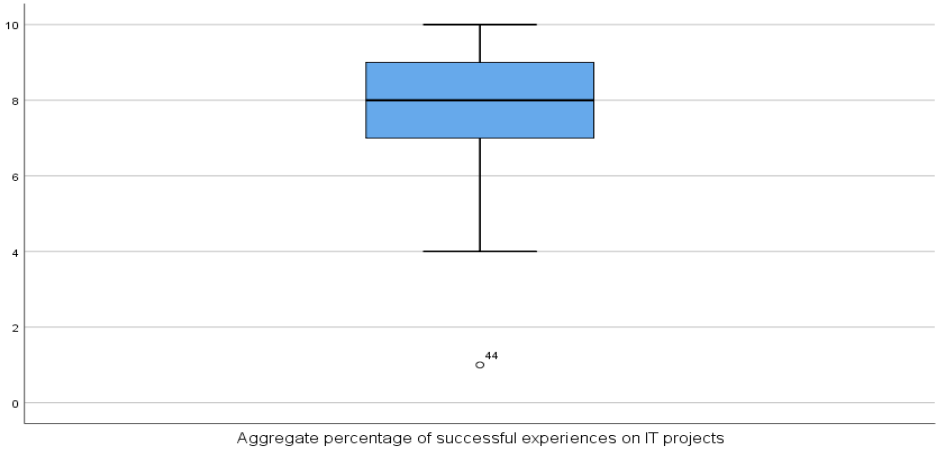


*Figure 4*. PMES successful experience outlier graph.

**Pearson Correlation Assumptions**

It is important to verify the assumptions of Pearson correlation before commencing correlation analysis (Aczel, 1996). The validity of these assumptions

ensures the accuracy of statistical inferences and the validity of research results beyond the participants. In this study, I verified the assumptions of normality, absence of outliers, presence of continuous variables, linearity, and homoscedasticity.

A combination of tests can be used to ensure accurate evaluation of normality (Hae-Young, 2013). One of these tests is the Shapiro-Wilk test that indicates normality when the *p* value is more than 0.05. In this study, the *p* value of the Shapiro-Wilk test for PMSE, PSS, and PMES scores are less than 0.05, indicating the data are not from a normally distributed population (see Table H1). Skewness and kurtosis and visual examination can also be used to determine the extent of departure from normality (Hae-Young, 2013). Research data should only be rejected if it shows a substantial departure from normality (Hae-Young, 2013). The *z* scores for skewness and kurtosis between +1.96 and -1.96 for sample size below 50 indicate normality, whereas *z* scores outside the range +3.29 and -3.29 indicates a substantial departure from normality for sample size between 51 and 300 (Hae-Young, 2013). The *z* scores were obtained by dividing the skewness and kurtosis by the corresponding standard error (see Table H2). The *z* scores for the distribution curves in this study were between +143 and -2.29 and are within the acceptable range, so the *z* scores did not indicate a substantial deviation from a normal distribution. Figures 5, 6 and 7 illustrate that the deviation from normality is not substantial. PSS scores showed a slight deviation from normality, whereas the PMSE and PMES successful experience scores showed partial normality.

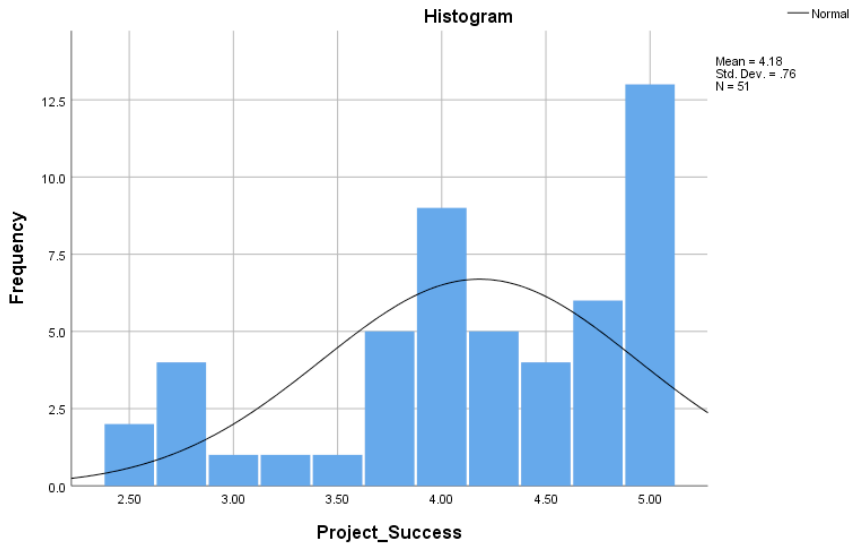


*Figure 5*. Frequency distribution of project success scores.

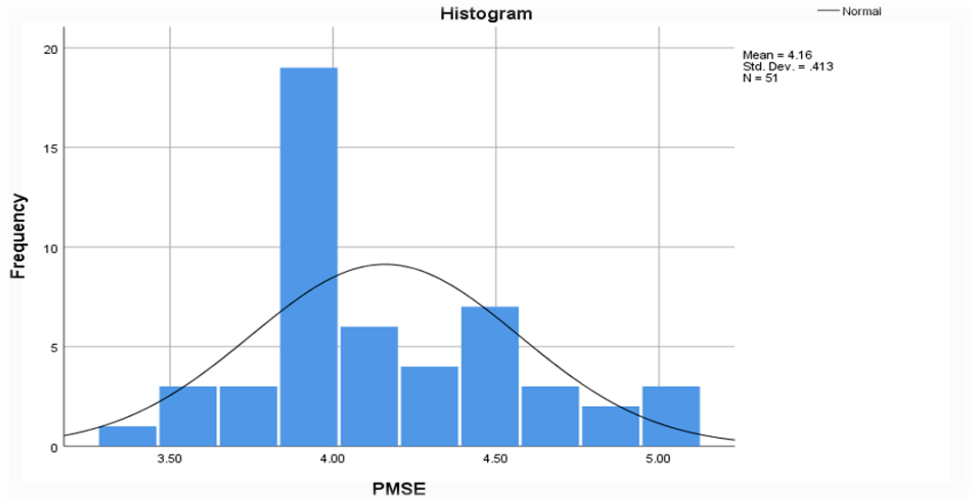


*Figure 6*. Frequency distribution of project management self-efficacy scores.

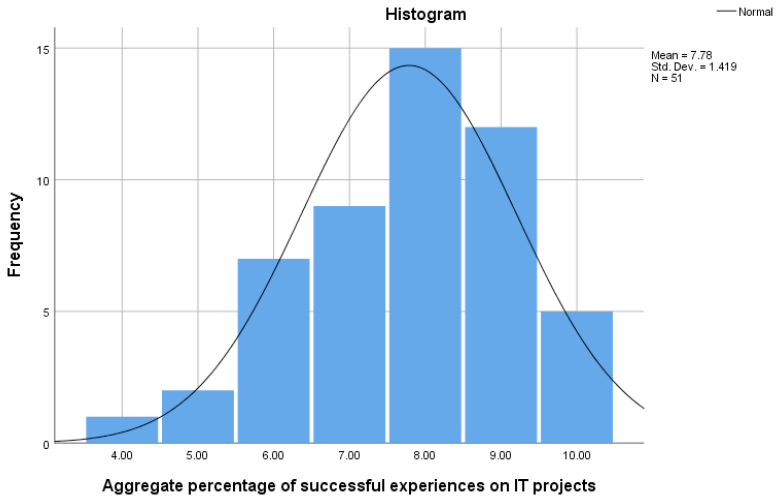


*Figure 7*. Frequency distribution of PMES successful experience scores.

In addition to normality, outliers were tested for and are noted in boxplots. Figures 8, 9, and 10 showed boxplots that indicated the absence of outliers for PSS, PMSE, and PMES successful experience scores after data cleaning.

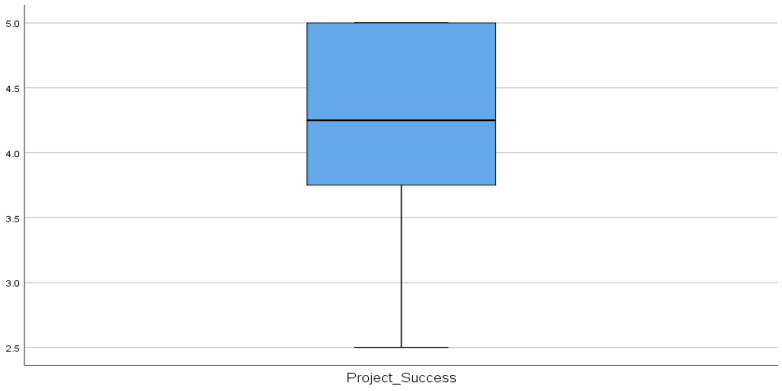


*Figure 8*. Project success scores outlier graph.

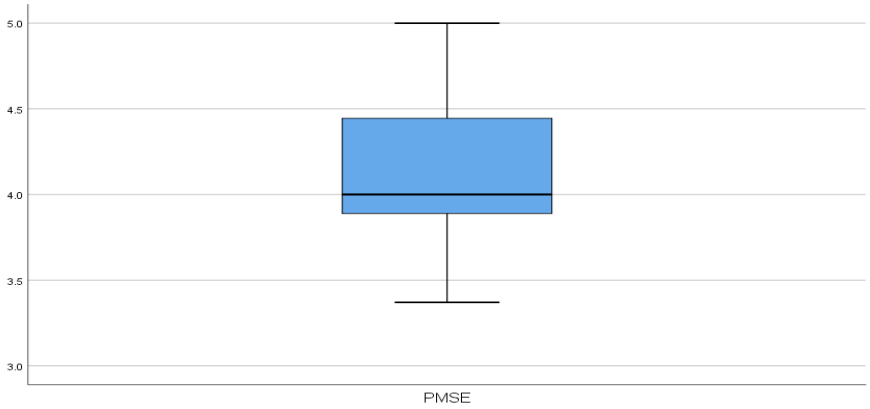


*Figure 9*. Project management self-efficacy scores outlier graph.

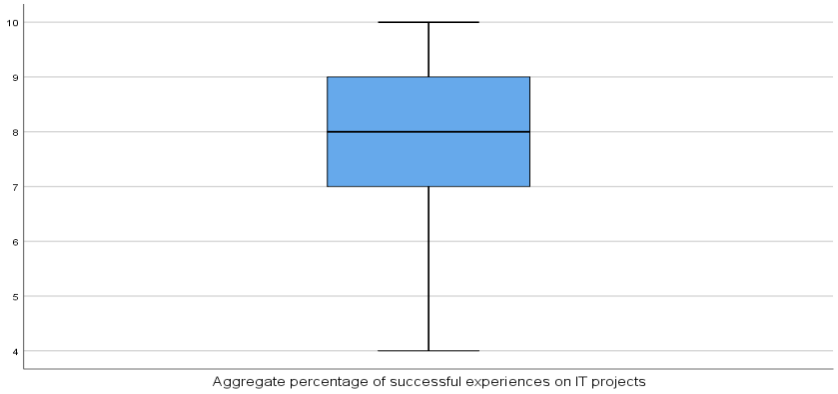


*Figure 10*. PMES successful experience scores outlier graph.

For the third assumption, presence of continuous variables, continuous variables can take any possible value within a given interval (Mayya, Monteiro, & Ganapathy, 2017). The three study variables are interval level variables coded as scales and were recorded at the scale level of measurements. Hence, the study variables are continuous variables.

I also tested for linearity to address assumptions. Figure 11 depicts the scatter plot of the linear relationship between PMSE and PSS scores, and it shows a positive linear relationship between the two variables with $R^2$ linear score of 0.353. This $R^2$ score shows

that 35% of the variability in project success was accounted for by the self-efficacy of project managers (Kraha, Turner, Nimon, Zientek, & Henson, 2012). Figure 12 shows a weak positive relationship between the PMES successful experience and PMSE scores with $R^2$ linear score of 0.241(Akoglu, 2018). This $R^2$ score shows that 24% of the variability in the self-efficacy of project managers was accounted for by the aggregate percentage of successful experiences (Kraha et al., 2012). Figure 13 also shows a weak positive relationship between the PMES successful experience and PSS scores with $R^2$ linear score of 0.219. This $R^2$ score shows that 22% of the variability in project success was accounted for by the aggregate percentage of successful experiences (Kraha et al., 2012). Based on the visual inspection of the scatter plots, I concluded that some form of linear relationships exists between the research variables involved in Hypotheses 1, 2, and 3.

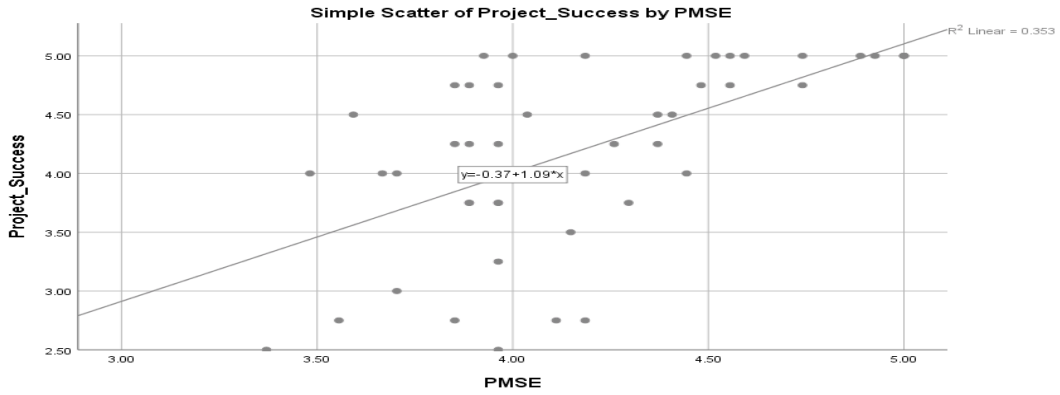


*Figure 11*. PMSE and project success linearity test.

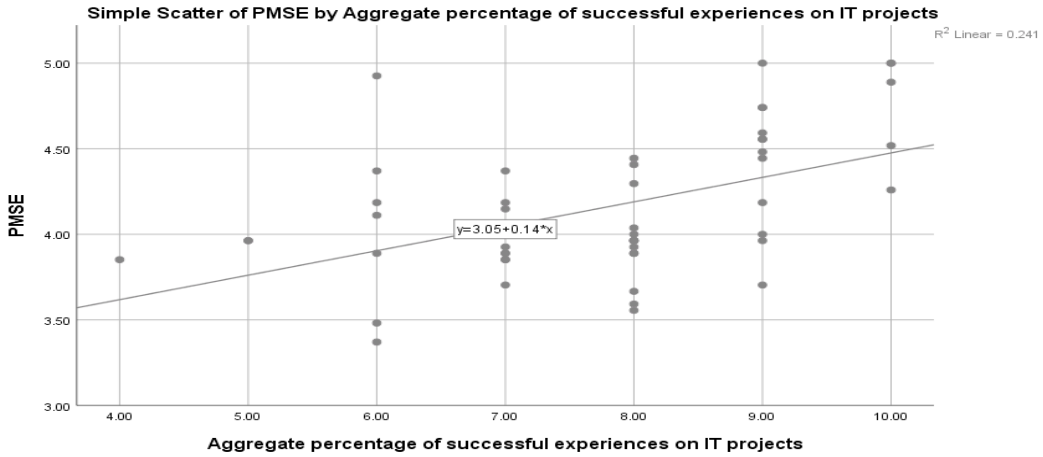


*Figure 12*. PMES successful experience and self-efficacy test.

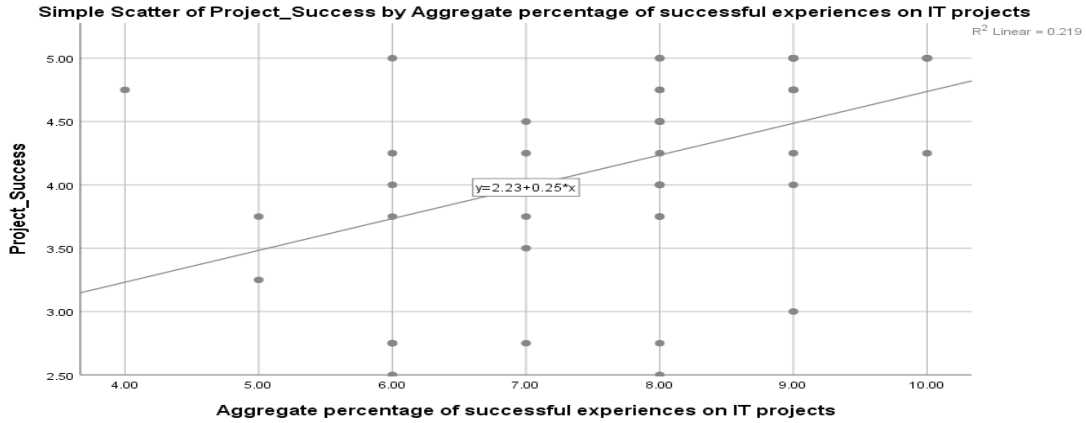


*Figure 13*. PMES successful experience and project success linearity test.

Finally, the scatterplots represented in Figures 14, 15, and 16 show the results of the homoscedasticity test between the research variables. Homoscedasticity is present if the variance around the regression line is similar across the values of the random variables (Anja & Casper, 2017). In other words, homoscedasticity is present when the distance between the points and the regression line is similar as we move up the regression line. Figure 14 shows satisfactory homoscedasticity for the relationship between PMSE and PSS scores. Figure 15 also shows satisfactory homoscedasticity for

the relationship between PMES successful experience and PMSE scores. Figure 16 shows the presence of homoscedasticity between PMES successful experience and PSS scores.

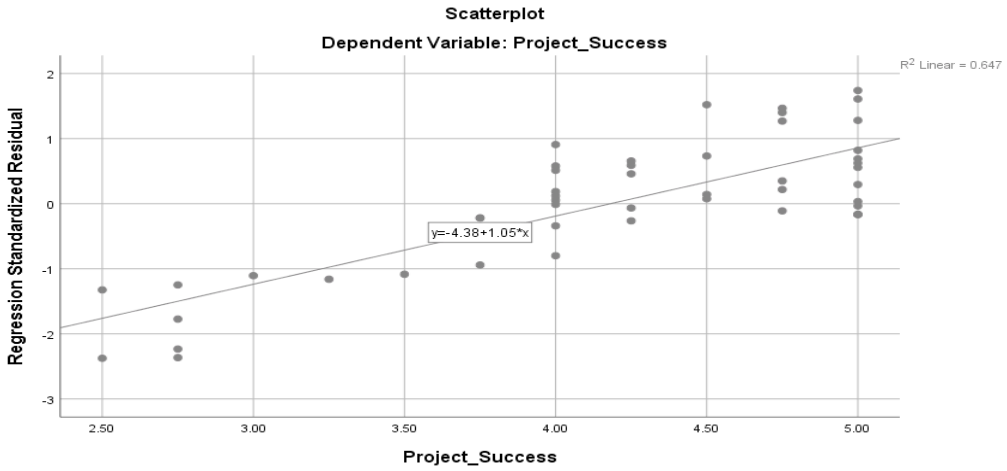


*Figure14*. PMSE and PSS scores homoscedasticity test.

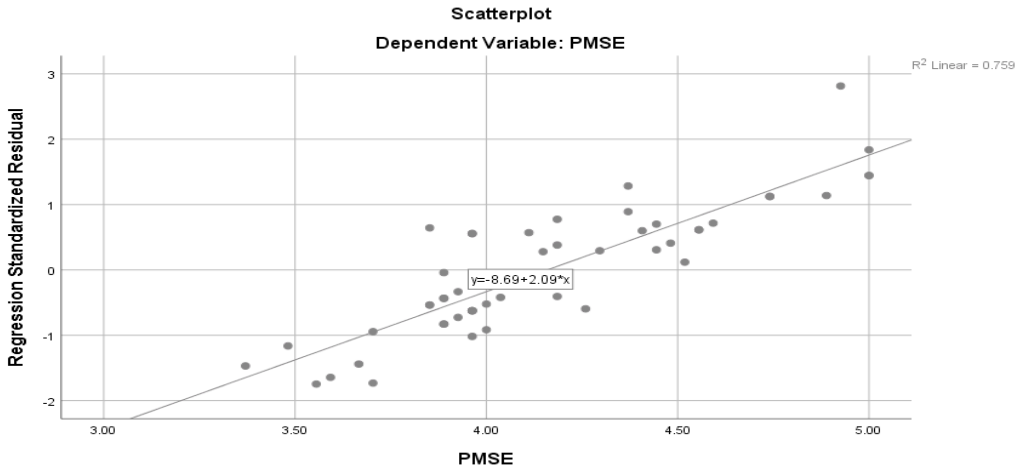


*Figure 15*. PMES successful experience and PMSE scores homoscedasticity test.

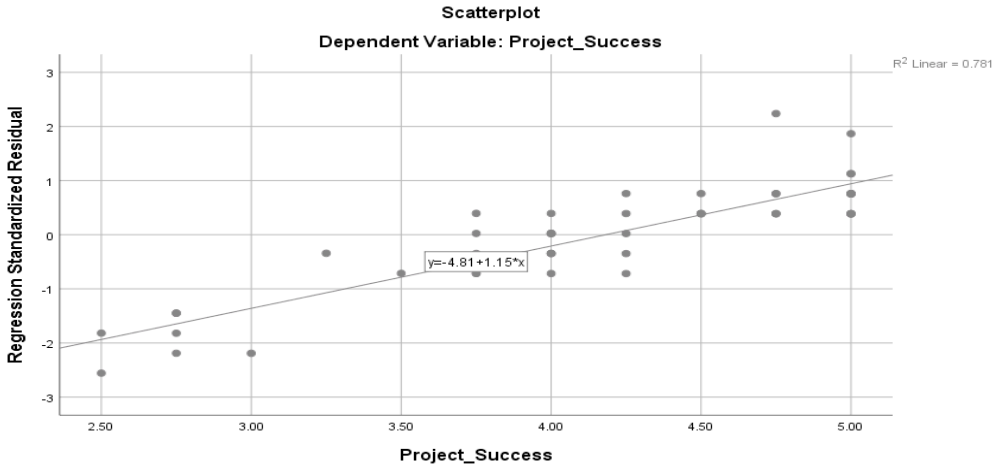


*Figure 16*. PMES successful experience and PSS scores homoscedasticity test.

In summary, the test of the assumptions of Pearson correlation analysis revealed the presence of three outliers that were subsequently removed before the analysis. Therefore, the assumptions of normality, continuous variable, linearity, homoscedasticity, and absence of outliers were met.

**Linear Multiple Regression Assumptions**

Before embarking on a multiple regression analysis, it is important to verify assumptions to ensure the accuracy of statistical estimates (Anja & Casper, 2017). The validity of these assumptions ensures the applicability of research results beyond the participants (Anja & Casper, 2017). In this study, I verified the assumptions of linearity, normality of residuals, independence of errors, absence of multicollinearity between the predictor variables, and homoscedasticity.

Linearity assumption can be verified by examining the plots of standardized residuals against the outcome variable or one of the predictor variables (Anja & Casper, 2017). Figures 14 and 16 show evidence of linearity between residuals and project

success, the outcome variable. Figure 15 also shows evidence of linearity between the residuals and PMSE, the predictor variable. I also tested for normality of residuals to address assumptions. Normality assumption is met if the residuals are randomly distributed around zero (Anja & Casper, 2017). A visual examination of Figure 17, the histogram of standardized residual, shows a fairly normal distribution of residuals. Further, the P-P plot of the residuals in Figure 18 did not show a drastic deviation of the observed residuals from the diagonal line; hence we can assume the normality of residuals.

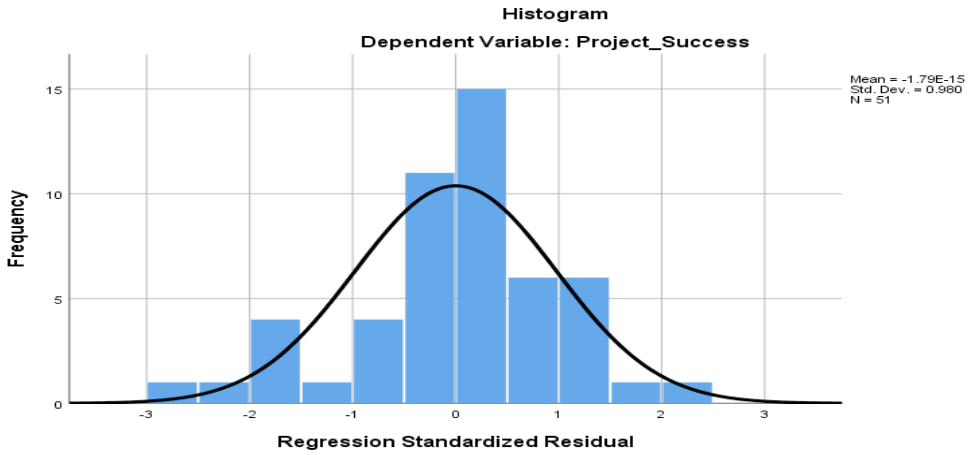


*Figure 17*. Standardized residual histogram.

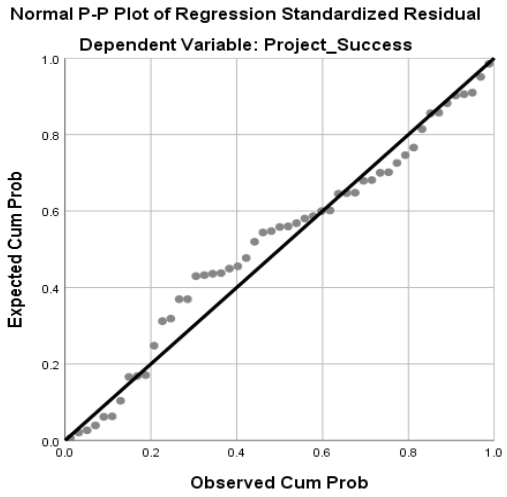


*Figure 18*. Normal P-P plot of standardized residuals.

For the third assumption, independence of errors, I examined the Dubrin-Watson value from the model summary table in Appendix J to determine the correlation between residuals. The value usually varies between 0 and 4 with value 2 representing the absence of correlation between residuals (Chen, 2016). A Durbin-Watson value above 2 represents a negative correlation, and a value below 2 represents a positive correlation (Chen, 2016). Table J3 shows a value of 1.890 which is closer to 2, thus suggesting that the assumption was almost met. I also tested for the absence of multicollinearity between the predictor variables to address assumptions. A correlation between predictor variables above 0.7 is an indication of multicollinearity. Table I1 shows that correlation between project managers' successful experiences and project managers' self-efficacy, the predictor variables, is $r(49) = .49$, thus indicating the absence of multicollinearity. Also, a VIF value that is substantially above 1 indicates multicollinearity (Daoud, 2017). Table J5 shows that the VIF values for model 1 and 2 are 1 and 1.32 respectively. A VIF value of 1.32 indicates some correlation but not enough to fail the multicollinearity test (Daoud,

2017). Lastly, I tested for the assumption of homoscedasticity by checking whether the error variances differ across the values of the predictor variable (Zhou, Song, & Thompson, 2015). The visual examination of Figure 19 shows that the residuals are not evenly scattered around zero resulting in a reversed funnel shape; hence, homoscedasticity assumption was violated.

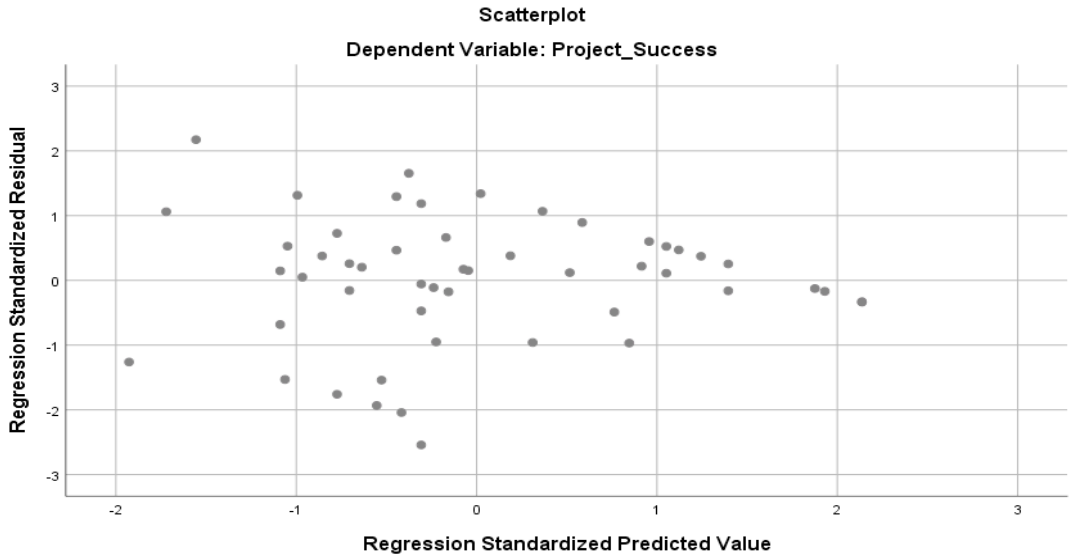


*Figure 19*. Normal P-P plot of standardized residuals.

Violation of any of these assumptions can lead to a biased and inconsistent estimation of the regression parameters (Kantar, 2016; Ernst & Albers, 2017). Kantar (2016) and Zhou et al. (2015) highlighted that the violation of homoscedasticity in a regression model causes the default least square estimation of the regression parameters to be inconsistent and inefficient. The authors presented the weighted least square estimation method as an alternative to the least square estimation. The weighted least square estimation provides an unbiased, efficient, and consistent way of estimating

regression parameters when the error variance around the regression line is inconsistent across the values of the outcome variable (Kantar; 2016; Zhou et al., 2015). In addition, Kantar (2016) noted that the weighted least square estimation method is efficient when analyzing small samples. In the weighted least square estimation method, each case of the outcome variable is adjusted by an estimate of the prediction error associated with it.

**Analysis of Test Results**

Appendix I shows the results of the correlation analysis of the relationships between the research variables in Hypotheses 1, 2, and 3. I only needed to use the weighted least square estimation method to test hypothesis 4. I obtained and analyzed the regression parameters from both least square estimation and weighted least square estimation methods to enhance the validity of the results by checking for consistency across the two methods. Appendix J shows the results of the regression model analysis using the default least square estimation method.

**Research Question 1**

In Research Question 1, I evaluated the relationship between project managers' exposure to successful experiences and project managers' self-efficacy by testing these hypotheses below:

$H_0$1: There is no significant statistical relationship between project managers' exposure to successful experiences and self-efficacy.

$H_a$1: There is a significant statistical relationship between project managers' exposure to successful experiences and self-efficacy.

The statistical result of Hypothesis 1 that evaluated the relationship between project managers' successful experiences and project managers' self-efficacy is r(49) = .49, $p$ = .00025, two-tailed. At the 5% level of significance, the null hypothesis was rejected because the $p$ value is less than 5% ($p < .05$). The alternate hypothesis that stated that there is a relationship between project managers' successful experiences and self-efficacy was accepted.

**Research Question 2**

In Research Question 2, I evaluated the relationship between project managers' self-efficacy and project success by testing these hypotheses below:

$H_0$2: There is no significant statistical relationship between project managers' self-efficacy and project success.

$H_a$2: There is a significant statistical relationship between project managers' self-efficacy and project success.

The statistical result of Hypothesis 2 that evaluated the relationship between project managers' self-efficacy and project success is $r(49) = .60$, $p = .00004$, two-tailed. At the 5% level of significance, the null hypothesis was rejected because the $p$ value is less than 5% ($p < .05$). The alternate hypothesis that stated that there is a relationship between project managers' self-efficacy and project success was accepted.

**Research Question 3**

In Research Question 3, I evaluated the relationship between project managers' exposure to successful experiences and project success by testing these hypotheses:

$H_0$3: There is no significant statistical relationship between project managers' exposure to successful experiences and project success.

$H_a$3: There is a significant statistical relationship between project managers' exposure to successful experiences and project success.

The statistical result of Hypothesis 3 that evaluated the relationship between project managers' success experiences and project success is $r(49) = .47$, $p = .001$, two-tailed. At the 5% *level of significance*, the null hypothesis was rejected because the $p$ value is less than 5% ($p < .05$). The alternate hypothesis that stated that there is a relationship between project managers' success experiences and project success was accepted.

**Research Question 4**

In Research Question 4, I evaluated whether project managers' successful experiences mediate the relationship between self-efficacy and project success by testing these hypotheses below:

$H_0$4: Project managers' exposure to successful experiences does not mediate the relationship between self-efficacy and project success.

$H_a$4: Project managers' exposure to successful experiences mediates the relationship between self-efficacy and project success.

Table J1 depicts the descriptive statistics of the research variables involved in the regression model. Table J2 depicts the stages of the regression model and the variables involved at each stage of the regression model. Table J3 depicts the regression analysis model summary, and it shows the relationships between the regression model variables.

In Model 1, project management self-efficacy accounted for 35.3% variance in project success, while Model 2 shows that the combination of project management self-efficacy and project managers' successful experience accounted for 39.4% variance in project success. This result is reflected in the R Square Change column that shows an additional 4.1% variance in project success as a result of adding project managers' successful experiences to the regression. The F-ratio for Model 1, $F(1,49) = 26.80$, $p = .000004$, shows that the change in project success as a result of Model 1 is significant at 5% level of significance. The F-ratio for Model 2, $F(2,48) = 3.24$, $p = .078$, shows that the change in project success as a result of the addition of project managers' successful experience is not significant at 5% level of significance because the $p$ value is greater than 5% ($p > .05$).

Table J4 depicts the ANOVA table that also shows the effect of Model 1 and 2 on the outcome variable, project success. The $F$-statistics, $F(1,49) = 26.79$, $p = .000004$, shows that Model 1 significantly affects project success at 5% level of significance because $p < 0.05$. The $F$-statistics, $F(2,48) = 15.63$, $p = .000006$, also shows that Model 2 significantly affects project success at 5% level of significance because $p < 0.05$.

Table J5, the coefficients table, shows how the addition of project managers' successful experience to the regression model exactly affect the relationship between project managers' self-efficacy, the predictor variable, and project success, the outcome variable. The $t$ statistics, $t(49) = 3.73$, $p = .001$, indicates that project managers' self-efficacy still significantly predicts project success when project managers' successful experience is added to the model. Table J5 revealed that the introduction of project

managers' successful experience in Model 2 reduced the strength of the relationship between self-efficacy and project success from .595 in model 1 to .480 in Model 2. This result suggests that project managers' successful experience is not a mediator of the relationship between project managers' self-efficacy and project success because it does not control the significance of project success in Model 2. Therefore, I accepted the null hypothesis that states that project manager' exposure to successful experiences does not mediate the relationship between self-efficacy and project success.

Appendix K shows the results of the regression model analysis using the weighted least square estimation method. Table K1 shows the different stages of the regression model and the variables involved at each stage of the model. Table K2 depicts the regression analysis model summary. In Model 1, project management self-efficacy accounted for 55.8% variance in project success, while Model 2 shows that the combination of project management self-efficacy and project managers' successful experience accounted for 58.1% variance in project success. This result is reflected in the R Square Change column that shows an additional 2.3% variance in project success as a result of adding project managers' successful experiences to the regression model.

The F-ratio for model 1, $F(1,49) = 61.82$, $p = .000$, shows that the change in project success as a result of Model 1 is significant at 5% level of significance. The F-ratio for Model 2, $F(2,48) = 2.64$, $p = .111$, shows that the change in project success as a result of the addition of project managers' successful experience is not significant at 5% level of significance because the $p$ value is greater than 5% ($p > .05$). Table K3 depicts the ANOVA table that also shows the effect of Model 1 and 2 on the outcome variable,

project success. The *F*-statistics, $F(1,49) = 61.82$, $p = .000$, shows that Model 1 significantly affects project success at 5% level of significance because $p < 0.05$. The *F*-statistics, $F(2,48) = 33.26$, $p = .000$, shows that Model 2 significantly affects project success at 5% level of significance because $p < 0.05$.

The analysis indicates that Model 1 has a significant effect on project success. Although the model summary table, K2, indicates that the addition of project managers' successful experience to the regression model is not significant, Model 2 also has a significant statistical effect on project success. Table K4, the coefficients table, shows the exact effect of project managers' successful experience on the relationship between project managers' self-efficacy, the predictor variable, and project success, the outcome variable. The *t* statistics, $t(49) = 5.11$, $p = .000006$, indicates that project managers' self-efficacy still significantly predicts project success when project managers' successful experience is added to the model. Table K4 also revealed that the introduction of project managers' successful experience in Model 2 reduced the strength of the relationship between self-efficacy and project success from .747 in Model 1 to .621 in Model 2.

This result suggests that project managers' exposure to successful experiences is not a mediator of the relationship between project managers' self-efficacy and project success because it does not control the significance of project success in Model 2. Therefore, I accepted the null hypothesis that states that project manager' successful experiences do not mediate the relationship between self-efficacy and project success.

## Conclusion

The analysis revealed a slight difference in the results from the least square estimation and weighted least square estimation methods of multiple linear regression, but the difference is not enough to affect the outcome of the test of Hypothesis 4. This chapter contains the findings based upon the data captured from Canadian-based certified project management professional members of the PMI with experience in IT projects. The results showed a statistically significant positive correlation among project managers' self-efficacy, project managers' exposure to successful experiences, and project success. The results also showed that project managers' exposure to successful experiences does not mediate the relationship between project managers' self-efficacy and project success. Included in Chapter 5 is a detailed discussion of the findings and how it fits into the existing literature. I conclude Chapter 5 with the implications of this research for practice and recommendations for further studies.

# Chapter 5: Discussion, Conclusions, and Recommendations

## Introduction

This study was conducted to address the deficiency in knowledge regarding how project managers' success experiences affect their efficacy and project success. The interrelationship among project managers' competence, project success, and overall organizational performance is why the investigation of ways to improve the performance of project managers and their eventual success continues to be an area of research interest. The purpose of this study was to examine the relationships among project managers' exposure to successful experiences, self-efficacy, and project success. Data were collected from 63 PMI certified project managers who reside in Canada with current or past experiences on IT projects out of which 54 responses were valid. Three responses that contained outliers were removed before proceeding with data analysis, so the total sample was 51.

## Interpretation of Findings

I tested four hypotheses for the research questions that guided this research. The first research question pertained to whether a relationship exists between project managers' successful experiences and project managers' self-efficacy. The findings as reported in Chapter 4 indicated a moderate positive relationship between successful experiences of project managers and their self-efficacy, $r(49) = .49$, $p = .00025$, two-tailed. Although the result did not confirm a causal relationship between the two research variables, it indicated that participants with higher exposure to successful experiences tended to have higher self-efficacy. This study represents a first attempt at demystifying

how project managers' successful experiences affect their self-efficacy in a project management environment. The result is consistent with the self-efficacy theory that suggests repeated cases of successful experiences lead to high self-efficacy (Bandura, 1989, 1994; Wood & Bandura; 1989). The finding also supports past research that established that successful experience has a positive effect on the self-efficacy (Achterkamp et al., 2015; Martins et al., 2015). This finding also clarified the evidence from studies (Geithner & Menzel, 2016; Huff & Prybutok, 2008) in project management environment that a link exists between practical project management experience and the acquisition of project management skills and competence.

The second research question addressed whether a relationship exists between project managers' self-efficacy and project success. The statistical findings indicated a slightly strong positive relationship between the self-efficacy of project managers and project success, $r(49) = .60$, $p = .00004$, two-tailed. The result is consistent with the self-efficacy theory in that the stronger the self-efficacy, the more successful people become, and self-efficacy contributes to the attainment of competencies and success (Bandura, 1989, 1994). Although the self-efficacy theory has been found to hold in general management research, there have been few attempts to investigate the construct in project management, which is why I was not able to locate prior researches to support a robust discussion of this statistical finding.

Despite a lack of research, the finding for Research Question 2 is similar to the findings of Kamohi and Autram (2014) that established that self-efficacy positively affects the effectiveness of project managers in modern-day organizations. However, the

authors only examined the effect of self-efficacy on the intrinsic personal attributes of project managers and concluded that self-efficacy has a positive influence on the intrinsic attributes that contribute to project managers' effectiveness in a project environment (Kamohi & Autram, 2014). The finding from this study is also supported by Blomquist et al. (2016), who demonstrated that project managers with higher self-efficacy delivered higher job performance as well as a positive correlation between project managers' self-efficacy and each of the scale items of the PSS used in this study. However, this study was limited to IT projects and involved only project management professionals certified by the PMI, and Blomquist et al. assessed different types of project managers with diverse qualifications.

The third research question addressed whether a relationship exists between project managers' successful experiences and project success. The findings indicated a moderate positive relationship between project managers' successful experiences and project success, $r(49) = .47$, $p = .001$, two-tailed. This result is consistent with the central idea of the self-efficacy theory that the more the exposure of people to successful experiences in each task, the more likely they are to accomplish the task because of the positive effect of the successful performances on their perceived self-efficacy (Bandura, 1994; Wood & Bandura, 1989).

I was unable to locate any prior research on the topic in Research Question 3—the relationship between successful experiences and project success in a project environment. The few studies I located focused on the duration of project management experience and its effect on knowledge acquisition, competence, and project performance in a project

management environment. Among these studies, Rubin and Seeling (1967) reported that project management experiences have a minimal effect on project performance, which is inconsistent with the result of this study. Although the authors initially thought that project performance was due to the project managers' experience, they eventually concluded that project performance improved because organizations highly prioritize larger projects and assign more experienced managers to these projects (Rubin & Seeling, 1967). Additionally, the results of this study partially support the work of Geithner and Menzel (2016) demonstrating that practical project management experience enhances project management knowledge and competence and Ekrot et al.'s (2016) argument that project managers' competence retention positively influences project success. Finally, other studies suggested that differences in the project management experience levels of project managers cause differences in decision-making and outcomes, as decision-making and the ability to understand trade-offs are competencies that affect project performance and success (Huff & Prybutok, 2008; Thi & Swierczek, 2010). This also relates to the finding for Research Question 3.

The fourth research question addressed whether project managers' successful experiences mediate the relationship between self-efficacy and project success. The findings indicated that the self-efficacy of project managers continued to significantly relate to project success when the aggregate percentage score of project managers' successful experiences was added to the regression model, $t(49) = 5.11$, $p = .000006$. Additionally, the effect of one standard deviation change in project managers' self-efficacy on project success only reduced in strength from .747 in Model 1 to .621 when

project manager' successful experience was added in Model 2. This result confirmed that project managers' successful experiences did not control the significance of the relationship between self-efficacy and project success, indicating the absence of a mediating effect of project managers' successful experiences.

I was unable to locate any prior research on the topic in Research Question 4—the mediating effect of general project management experience on the relationship between self-efficacy and project success. Hence, this study is the first attempt at demystifying whether project management experience of project managers mediates the relationship between self-efficacy and project success.

**Applications to Professional Practice**

Projects are critical to the sustainable growth and survival of businesses (Kamohi & Autram, 2014). Research has shown that project success is critical to the overall organizational success by enhancing the organizational ability to efficiently cope with dynamic business environments (Ekrot et al., 2016). Project managers with key competence in project management play a significant role in the success of projects (Ekrot et al., 2016; Sadeghi et al., 2014). Despite the availability of training programs and professional certifications to help project managers acquire relevant project management skills and competencies, researchers and practitioners continue to report a high project failure rate (Allen et al., 2014; Standish, 2014). Researchers and practitioners highlighted project managers' lack of experience as one of the reasons for project failure (Benoy & Gracias, 2015; Florentine, 2014; PMI, 2015).

The few attempts to examine the effect of project managers' experience in the project management environment have been limited to the duration of experiences. This study was anchored on the self-efficacy concept of Bandura's social cognitive theory, and I demonstrated the relationship between project managers' successful experiences, self-efficacy, and project success to obtain information that could help organizational leaders to make decisions on maximizing project success. Statistically proven findings from this study can provide new insights for researchers and practitioners on the holistic implications of the self-efficacy theory in the project management environments.

## Implications for Positive Social Change

The literature revealed that project failure causes financial losses to project owners (Benoy & Gracias, 2015; Damoah & Akwei, 2017), the influence of which can be detrimental to organizational performance and success as well as the success of the community. Project managers are important drivers of project success and eventual organizational performance (Ramos & Mota, 2014). From the perspectives of positive social change, information from this study could help formulate strategies to improve the success rate of project managers and overall project success. The positive social change implication is that project successes can help reduce the problems and losses associated with failure and eventually enhance organizational performance, sustainability, and survival, as well as the economic advancement of the employees and their community. Resultantly, the findings of this study could make significant contributions to positive social change by mitigating the implications of project failure and poor organizational

performance such as job losses, downsizing, organizational failure, and eventual organizational shutdown.

## Recommendations for Action

Project managers require skills and competencies beyond the ones garnered through formal education and training to be able to deal with the complexities of modern projects (Ramazani & Jergeas, 2015). In this study, I brought attention to the positive effect of successful experiences on project success and how successful experiences positively affect project managers' belief in their ability to successfully perform project management tasks. Organizational managers and professional certification bodies can draw on the insights from this study to improve existing project management training and development curriculum for project managers. As indicated in my participants' invitation email, I will disseminate the summary of my research findings to the participants and seek to publish it on the social media page of a PMI chapter in Canada. I will also give my consent to other project management organizations and PMI chapters to publish the results.

## Recommendations for Further Research

The small sample size (n = 51) and the lack of random selection of research participants pose external validity concerns from possible selection bias. Future research should focus on a random selection of research participants from a larger pool of project managers to minimize or eliminate possible selection bias as well as improve the statistical power and generalizability of research findings. Unidimensional variable measurements such as the aggregate percentage of successful experiences contained in

the PMES are susceptible to random measurements errors unlike multi-item variable measurements (Gliem & Gliem, 2003). Summing up the individual items could average out the measurement errors (Gliem & Gliem, 2003). To my knowledge, there is no evidence that a multi-item scale exists for capturing the different types of project management experiences; hence future researchers could focus on developing an evidenced-based multidimensional scale for capturing successful and failure experiences in project management.

Finally, future researchers should also consider examining how project failure experiences affect the performance and success of project managers in IT project environment. Furthermore, given that the factors that affect project outcomes are not universal and are different across industries, future researchers should consider expanding this research to other industries to confirm if the relationships between the research variables are similar across the industries.

## Reflections

My experiences and shortcomings as an uncertified IT project manager prompted my interest in the field of project management, especially how first-time IT managers cope with the challenges associated with the role. I initially focused on the pursuit of a doctoral designation to such an extent that I almost forgot the primary objective of advancing knowledge in my chosen field. A related gap in the literature led me to a different path; and as I continued researching my research topic and developing the content of my prospectus, the need for the novelty of a doctoral research became clearer.

Developing original research that required a high level of intellectual maturity and critical thinking became my primary motivation.

## Conclusion

The literature revealed the importance of competent project managers in steering projects to success especially in today's complex and dynamic business environment. This study contributed to the existing discussions on project success, especially the critical success factors of IT projects. The findings of this quantitative research supported the research hypotheses and demonstrated that (a) a positive relationship exists among project managers' successful experiences, self-efficacy, and project success, and (b) project managers' successful experiences do not mediate the relationship between their self-efficacy and project success. These results converge on several key points of the self-efficacy concept and results from a few related studies. The results provided new insights into the influence of successful experiences on the self-efficacy of IT project managers.

While this study did not confirm cause-and-effect relationships, the findings suggested that project success might be improved through the exposure of project managers to repeated cases of success. Therefore, organizational managers can improve the success rate of project managers, especially new and junior project managers, by exposing them to successful experiences through mentorship programs with highly successful project managers. Because the results of this study are consistent with many aspects of the self-efficacy concept, organizations can also improve the success rate of project managers by instituting a strategic development framework for IT projects that focus on self-efficacy enhancement.

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Appendix A: Instruments and Items Included in Study Survey

Date: _____

**Bio-Data**

1. Age: _____
2. Gender: _____
3. Professional Certification: _____
4. Country of Residence: _____

**Project Success Scale (PSS)**

Purpose. I am interested in your own personal views of your adherence to the project success indicators.

Directions. Please indicate the percentage of your adherence to each indicator by selecting the appropriate option.

5. What percentage of the projects you manage do meet budget allowance

   Less than 20%" 21–40% 41–60% 61–80% 80-100%

6. What percentage of the projects you manage meet deadlines

   Less than 20% 21–40% 41–60% 61–80% 80-100%

7. What percentage of the projects you manage meet technical specifications

   Less than 20% 21–40% 41–60% 61–80% 80-100%

8. What percentage of the projects you manage meet the expectations of the customer

Less than 20% 21–40% 41–60% 61–80% 80-100%

**Project Management Self-Efficacy Scale (PMSE)**

Purpose. I am interested in knowing how confident you are in managing the following project tasks effectively.

Directions. Please indicate how confident you are using Likert scale 1-5; 1 = cannot do the task (0% confident), 5 = totally confident to manage the task effectively (100% confident).

| | Questions | Not at all confident | Not so confident | Somewhat confident | Very confident | Extremely confident |
|---|---|---|---|---|---|---|
| 9. | Address poor individual performance by providing constructive criticism promptly and in private. | | | | | |
| 10. | Delegate work to meet project needs while taking into account team member's personal and professional needs. | | | | | |
| 11. | Monitor team behaviors and take corrective action when the team is not working well | | | | | |
| 12. | Negotiate acceptable project decisions when stakeholders disagree over priorities | | | | | |
| 13. | Communicate in a way that ensures all stakeholders have the same understanding, no matter their level of technical or operational understanding | | | | | |
| 14. | Engage external stakeholders so that they feel heard and their input is incorporated into project decisions. | | | | | |
| 15. | Develop shared stakeholder understanding of the project (including outcomes, assumptions, exclusions and constraints) even when there is pressure to begin the "real work". | | | | | |
| 16. | Implement project management processes and procedures in a way that gains acceptance | | | | | |

| | |
|---|---|
| | from all members of the team |
| 17. | Break the work down into tangible work items with measurable completion criteria that team members will commit to delivering. |
| 18. | Incorporate “lessons learned” from previous projects into planning the work. |
| 19. | Ensure the plan for the project reflects relevant legal requirements and addresses any potential conflicts |
| 20. | Use appropriate risk analysis tools to evaluate and prioritize identified risks and responses on the basis of impact and likelihood |
| 21. | Prioritize measurable project success criteria in cooperation with all relevant stakeholders |
| 22. | Achieve sign off on a realistic schedule for the project that takes into account resource availability, budget considerations and stakeholder requirements. |
| 23. | Hold regular status meetings comparing progress to plan, analyzing variances, and taking corrective actions (to get back on plan) where necessary. |
| 24. | Recognize when a risk or legal requirement becomes an issue and take action as necessary. |
| 25. | Take the time to seek feedback on my personal performance |
| 26. | Clearly define key characteristics and business benefits of the product of the project and |

| | |
|---|---|
| | acquire sign off from key stakeholders on these specifications. |
| 27. | Ensure that all requests for changes to the product of the project follow a defined change control process and only those signed off by the sponsor are acted on. |
| 28. | Secure sign off of the product of the project to close the project. |
| 29. | Write a project charter (or similar document) that describes the project in enough detail to obtain agreement from key stakeholders to begin work. |
| 30. | Implement kick-off activities to set the tone of the project, establish norms of behavior, reporting, and communication. |
| 31. | Obtain phase end sign off on the outputs of the last phase, and transition between phases. |
| 32. | Close the project by finalizing project records, obtaining sign off and redeploying the team. |
| 33. | Plan for project evaluation including specifying the purpose, focus, criteria, and relevant evaluation techniques to be used |
| 34. | Evaluate the project in accordance with the evaluation plan engaging all key stakeholders in the evaluation. |
| 35. | Evaluate project reviews and suggested improvements, discuss with key stakeholders and take appropriate action. |

**New General Self-Efficacy Scale (NGSE)**

Purpose. I am interested in knowing the extent to which you agree with the following statements. Directions. Please use Likert scale 1-5; 1 = Strongly disagree, 5 = Strongly agree.

| Questions | Strongly disagree | Disagree | Neutral/Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| 36. I will be able to achieve most of the goals that I have set for myself | | | | | |
| 37. When facing difficult tasks, I am certain that I will accomplish them | | | | | |
| 38. In general, I think that I can obtain outcomes that are important to me | | | | | |
| 39. I believe I can succeed at most any endeavor to which I set my mind | | | | | |
| 40. I will be able to successfully overcome many challenges | | | | | |
| 41. I am confident that I can perform effectively on many different tasks | | | | | |
| 42. Compared to other people, I can do most tasks very well | | | | | |
| 43. Even when things are tough, I can perform quite well | | | | | |

**Project Management Experience Scale (PMES)**

Purpose. I am interested in your personal views of the type of your project management experiences.

Directions. Please indicate your years of experience and select the percentage of successful experiences on IT projects from the available options.

44. Years of experience as a project manager. _____

45. Aggregate percentage of successful experiences on IT projects

    10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

# Appendix B: Frequency Tables for Demographic Variables

Table B1

*Frequency Table for Age*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | | 3 | 5.9 | 5.9 | 5.9 |
| | 24 | 1 | 2.0 | 2.0 | 7.8 |
| | 35 | 2 | 3.9 | 3.9 | 11.8 |
| | 36 | 2 | 3.9 | 3.9 | 15.7 |
| | 37 | 2 | 3.9 | 3.9 | 19.6 |
| | 38 | 1 | 2.0 | 2.0 | 21.6 |
| | 39 | 3 | 5.9 | 5.9 | 27.5 |
| | 40 | 2 | 3.9 | 3.9 | 31.4 |
| | 41 | 1 | 2.0 | 2.0 | 33.3 |
| | 42 | 4 | 7.8 | 7.8 | 41.2 |
| | 43 | 6 | 11.8 | 11.8 | 52.9 |
| | 44 | 1 | 2.0 | 2.0 | 54.9 |
| | 45 | 3 | 5.9 | 5.9 | 60.8 |
| | 47 | 4 | 7.8 | 7.8 | 68.6 |
| | 48 | 4 | 7.8 | 7.8 | 76.5 |
| | 50 | 1 | 2.0 | 2.0 | 78.4 |
| | 53 | 1 | 2.0 | 2.0 | 80.4 |
| | 54 | 3 | 5.9 | 5.9 | 86.3 |
| | 55 | 2 | 3.9 | 3.9 | 90.2 |
| | 57 | 1 | 2.0 | 2.0 | 92.2 |
| | 59 | 1 | 2.0 | 2.0 | 94.1 |
| | 60 | 1 | 2.0 | 2.0 | 96.1 |
| | 63 | 2 | 3.9 | 3.9 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table B2

*Frequency Table for Gender*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 32 | 62.7 | 64.0 | 64.0 |
| | Female | 18 | 35.3 | 36.0 | 100.0 |
| | Total | 50 | 98.0 | 100.0 | |

| | | | | |
|---|---|---|---|---|
| Missing | System | 1 | 2.0 | |
| Total | | 51 | 100.0 | |

Table B3

*Frequency Table for Professional Certification (PMP)*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | PMP | 51 | 100.0 | 100.0 | 100.0 |

Table B4

*Frequency Table for Professional Certification (PgMP)*

| | | Frequency | Percent |
|---|---|---|---|
| Missing | System | 51 | 100.0 |

Table B5

*Frequency Table for Professional Certification (PfMP)*

| | | Frequency | Percent |
|---|---|---|---|
| Missing | System | 51 | 100.0 |

Table B6

*Frequency Table for Professional Certification (Other)*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | | 44 | 86.3 | 86.3 | 86.3 |
| | CISA | 1 | 2.0 | 2.0 | 88.2 |
| | CSM, Certified Scrum Master | 1 | 2.0 | 2.0 | 90.2 |
| | PENG | 1 | 2.0 | 2.0 | 92.2 |
| | Prince2 | 1 | 2.0 | 2.0 | 94.1 |
| | PRINCE2, HCMP, PSM I | 1 | 2.0 | 2.0 | 96.1 |

| | | | | | |
|---|---|---|---|---|---|
| | Prosci, ITIL, SMC | 1 | 2.0 | 2.0 | 98.0 |
| | SCMP | 1 | 2.0 | 2.0 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table B7

*Frequency Table for Country of Residence*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Canada | 51 | 100.0 | 100.0 | 100.0 |

Table B8

*Frequency Table for Country of Residence (Other)*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | 51 | 100.0 | 100.0 | 100.0 |

# Appendix C: Frequency Tables for Project Success, Project Management Self-Efficacy, and Project Management Experience Survey Questions

Table C1

*Percentage of Projects that Meet Budget Allowance*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Less than 20% | 2 | 3.9 | 3.9 | 3.9 |
| | 21-40% | 5 | 9.8 | 9.8 | 13.7 |
| | 41-60% | 9 | 17.6 | 17.6 | 31.4 |
| | 61-80% | 14 | 27.5 | 27.5 | 58.8 |
| | 81-100% | 21 | 41.2 | 41.2 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C2

*Percentage of Projects that Meet Deadlines*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Less than 20% | 1 | 2.0 | 2.0 | 2.0 |
| | 21-40% | 4 | 7.8 | 7.8 | 9.8 |
| | 41-60% | 10 | 19.6 | 19.6 | 29.4 |
| | 61-80% | 21 | 41.2 | 41.2 | 70.6 |
| | 81-100% | 15 | 29.4 | 29.4 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C3

*Percentage of Projects that Meet Technical Specifications*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Less than 20% | 1 | 2.0 | 2.0 | 2.0 |
| | 21-40% | 2 | 3.9 | 3.9 | 5.9 |
| | 41-60% | 1 | 2.0 | 2.0 | 7.8 |

| | | | | | |
|---|---|---|---|---|---|
| | 61-80% | 16 | 31.4 | 31.4 | 39.2 |
| | 81-100% | 31 | 60.8 | 60.8 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C4

*Percentage of Projects that Meet the Expectations of the Customer*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 41-60% | 4 | 7.8 | 7.8 | 7.8 |
| | 61-80% | 19 | 37.3 | 37.3 | 45.1 |
| | 81-100% | 28 | 54.9 | 54.9 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C5

*Address Poor Individual Performance by Providing Constructive Criticism Promptly in Private*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 9 | 17.6 | 17.6 | 17.6 |
| | Very confident | 28 | 54.9 | 54.9 | 72.5 |
| | Extremely confident | 14 | 27.5 | 27.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C6

*Delegate Work to Meet Project Needs While Considering Team Members' Personal and Professional Needs*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 3 | 5.9 | 5.9 | 5.9 |
| | Very confident | 33 | 64.7 | 64.7 | 70.6 |
| | Extremely confident | 15 | 29.4 | 29.4 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C7

*Monitor Team Behaviors and Take Corrective Action When the Team is not Working Well*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 1 | 2.0 | 2.0 | 2.0 |
| | Somewhat confident | 7 | 13.7 | 13.7 | 15.7 |
| | Very confident | 25 | 49.0 | 49.0 | 64.7 |
| | Extremely confident | 18 | 35.3 | 35.3 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C8

*Negotiate Acceptable Project Decisions When Stakeholders Disagree Over Priorities*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 10 | 19.6 | 19.6 | 19.6 |
| | Very confident | 30 | 58.8 | 58.8 | 78.4 |
| | Extremely confident | 11 | 21.6 | 21.6 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C9

*Communicate to Ensure that All Stakeholders Have the Same Understanding*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 6 | 11.8 | 11.8 | 11.8 |
| | Very confident | 28 | 54.9 | 54.9 | 66.7 |
| | Extremely confident | 17 | 33.3 | 33.3 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C10

*Engage External Stakeholders*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 4 | 7.8 | 7.8 | 7.8 |
| | Very confident | 35 | 68.6 | 68.6 | 76.5 |
| | Extremely confident | 12 | 23.5 | 23.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C11

*Develop Shared Stakeholder Understanding of the Project*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 6 | 11.8 | 11.8 | 11.8 |
| | Very confident | 32 | 62.7 | 62.7 | 74.5 |
| | Extremely confident | 13 | 25.5 | 25.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C12

*Implement Project Management Processes and Procedures in a Way That Gains Acceptance From All Members of the Team*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 6 | 11.8 | 11.8 | 11.8 |
| | Very confident | 28 | 54.9 | 54.9 | 66.7 |
| | Extremely confident | 17 | 33.3 | 33.3 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C13

*Break the Work Down with Measurable Completion Criteria that Team Members will Commit to Delivering*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 3 | 5.9 | 5.9 | 5.9 |
| | Very confident | 29 | 56.9 | 56.9 | 62.7 |
| | Extremely confident | 19 | 37.3 | 37.3 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C14

*Incorporate "Lessons Learned" from Previous Projects into Planning the Work*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 3 | 5.9 | 5.9 | 5.9 |
| | Somewhat confident | 10 | 19.6 | 19.6 | 25.5 |
| | Very confident | 26 | 51.0 | 51.0 | 76.5 |
| | Extremely confident | 12 | 23.5 | 23.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C15

*Ensure the Plan for the Project Reflects Relevant Legal Requirements and Addresses Potential Conflicts*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 1 | 2.0 | 2.0 | 2.0 |
| | Somewhat confident | 8 | 15.7 | 15.7 | 17.6 |
| | Very confident | 29 | 56.9 | 56.9 | 74.5 |
| | Extremely confident | 13 | 25.5 | 25.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C16

*Use Appropriate Risk Analysis Tools*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 2 | 3.9 | 3.9 | 3.9 |
| | Somewhat confident | 10 | 19.6 | 19.6 | 23.5 |
| | Very confident | 27 | 52.9 | 52.9 | 76.5 |
| | Extremely confident | 12 | 23.5 | 23.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C17

*Prioritize Measurable Project Success Criteria in Cooperation With All Relevant Stakeholders*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 1 | 2.0 | 2.0 | 2.0 |
| | Somewhat confident | 9 | 17.6 | 17.6 | 19.6 |
| | Very confident | 27 | 52.9 | 52.9 | 72.5 |
| | Extremely confident | 14 | 27.5 | 27.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C18

*Achieve Sign Off on a Realistic Schedule for the Project*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 2 | 3.9 | 3.9 | 3.9 |
| | Somewhat confident | 10 | 19.6 | 19.6 | 23.5 |
| | Very confident | 23 | 45.1 | 45.1 | 68.6 |
| | Extremely confident | 16 | 31.4 | 31.4 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C19

*Hold Regular Status Meetings*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 1 | 2.0 | 2.0 | 2.0 |
| | Very confident | 21 | 41.2 | 41.2 | 43.1 |
| | Extremely confident | 29 | 56.9 | 56.9 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C20

*Recognize When a Risk or Legal Requirement Becomes an Issue and Take Action*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 1 | 2.0 | 2.0 | 2.0 |
| | Somewhat confident | 4 | 7.8 | 7.8 | 9.8 |
| | Very confident | 27 | 52.9 | 52.9 | 62.7 |
| | Extremely confident | 19 | 37.3 | 37.3 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C21

*Take the Time to Seek Feedback on My Personal Performance*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 4 | 7.8 | 7.8 | 7.8 |
| | Somewhat confident | 8 | 15.7 | 15.7 | 23.5 |
| | Very confident | 28 | 54.9 | 54.9 | 78.4 |
| | Extremely confident | 11 | 21.6 | 21.6 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C22

*Define Key Characteristics and Business Benefits of the Product of the Project and Acquire Sign Off*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 9 | 17.6 | 17.6 | 17.6 |
| | Very confident | 26 | 51.0 | 51.0 | 68.6 |
| | Extremely confident | 16 | 31.4 | 31.4 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C23

*Ensure That All Requests for Changes to the Product of the Project Follow a Defined Change Control Process and Only Those Signed Off by the Sponsor are Acted On*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 4 | 7.8 | 7.8 | 7.8 |
| | Very confident | 28 | 54.9 | 54.9 | 62.7 |
| | Extremely confident | 19 | 37.3 | 37.3 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C24

*Secure Sign Off of The Product of the Project to Close the Project*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 3 | 5.9 | 5.9 | 5.9 |
| | Very confident | 21 | 41.2 | 41.2 | 47.1 |
| | Extremely confident | 27 | 52.9 | 52.9 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C25

*Write a Project Charter that Describes the Project in Enough Detail to Obtain Agreement from Key Stakeholders to Begin Work*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 3 | 5.9 | 5.9 | 5.9 |
| | Very confident | 22 | 43.1 | 43.1 | 49.0 |
| | Extremely confident | 26 | 51.0 | 51.0 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C26

*Implement Kick-Off Activities*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 3 | 5.9 | 5.9 | 5.9 |
| | Very confident | 23 | 45.1 | 45.1 | 51.0 |
| | Extremely confident | 25 | 49.0 | 49.0 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C27

*Obtain Phase End Sign Off on the Outputs of the Last Phase and Transition Between Phases*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 1 | 2.0 | 2.0 | 2.0 |
| | Somewhat confident | 5 | 9.8 | 9.8 | 11.8 |
| | Very confident | 28 | 54.9 | 54.9 | 66.7 |
| | Extremely confident | 17 | 33.3 | 33.3 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C28

*Close the Project by Finalizing Project Records, Obtaining Sign Of,f and Redeploying the Team*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Somewhat confident | 6 | 11.8 | 11.8 | 11.8 |
| | Very confident | 29 | 56.9 | 56.9 | 68.6 |
| | Extremely confident | 16 | 31.4 | 31.4 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C29

*Plan for Project Evaluation Including Specifying the Purpose, Focus, Criteria, and Relevant Evaluation Techniques to be Used*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 2 | 3.9 | 3.9 | 3.9 |
| | Somewhat confident | 11 | 21.6 | 21.6 | 25.5 |
| | Very confident | 30 | 58.8 | 58.8 | 84.3 |
| | Extremely confident | 8 | 15.7 | 15.7 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C30

*Evaluate the Project in Accordance With the Evaluation Plan Engaging All Key Stakeholders in the Evaluation*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 3 | 5.9 | 5.9 | 5.9 |
| | Somewhat confident | 9 | 17.6 | 17.6 | 23.5 |
| | Very confident | 31 | 60.8 | 60.8 | 84.3 |
| | Extremely confident | 8 | 15.7 | 15.7 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C31

*Evaluate Project Reviews and Suggested Improvements, Discuss With Key Stakeholders and Take Appropriate Action*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Not so confident | 2 | 3.9 | 3.9 | 3.9 |
| | Somewhat confident | 6 | 11.8 | 11.8 | 15.7 |
| | Very confident | 29 | 56.9 | 56.9 | 72.5 |
| | Extremely confident | 14 | 27.5 | 27.5 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Table C32

*Aggregate Percentage of Successful Experiences on IT projects*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 40% | 1 | 2.0 | 2.0 | 2.0 |
| | 50% | 2 | 3.9 | 3.9 | 5.9 |
| | 60% | 7 | 13.7 | 13.7 | 19.6 |
| | 70% | 9 | 17.6 | 17.6 | 37.3 |
| | 80% | 15 | 29.4 | 29.4 | 66.7 |
| | 90% | 12 | 23.5 | 23.5 | 90.2 |
| | 100% | 5 | 9.8 | 9.8 | 100.0 |
| | Total | 51 | 100.0 | 100.0 | |

Appendix D: Descriptive Statistics of Study Variables

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Aggregate percentage of successful experiences on IT projects | 51 | 4.00 | 10.00 | 7.7843 | 1.41864 |
| Project_Success | 51 | 2.50 | 5.00 | 4.1814 | .76006 |
| PMSE | 51 | 3.37 | 5.00 | 4.1590 | .41271 |
| Valid N (listwise) | 51 | | | | |

# Appendix E: Cronbach's Alpha for PSS and PMSE Scales

| Cronbach's Alpha for Project Success Scale | | |
|---|---|---|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .860 | .866 | 4 |
| Cronbach's Alpha for Project Management Self-Efficacy Scale | | |
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .931 | .932 | 27 |

Appendix F: Descriptive Statistics and Bivariate Correlation Test Results for PMSE and NGSE

Descriptive Statistics for the PMSE and NGSE

| | Mean | Std. Deviation | N |
|---|---|---|---|
| PMSE | 4.1468 | .40604 | 54 |
| NGSE | 4.3102 | .40758 | 54 |
| Correlation between PMSE and NGSE | | | |
| | | PMSE | NGSE |
| Pearson Correlation | | 1 | .510** |
| Sig. (2-tailed) | | | .000081 |
| N | | 54 | 54 |
| Pearson Correlation | | .510** | 1 |
| Sig. (2-tailed) | | .000081 | |
| N | | 54 | 54 |

Appendix G: Stem and Leaf Plot Table Showing Outliers

| PSS Outlier Table | |
|---|---|
| Frequency | Stem & Leaf |
| 2.00 Extremes | (=<2.0) |
| .00 | 2 . |
| 6.00 | 2 . 557777 |
| 2.00 | 3 . 02 |
| 6.00 | 3 . 577777 |
| 14.00 | 4 . 00000000022222 |
| 11.00 | 4 . 55555777777 |
| 13.00 | 5 . 0000000000000 |
| PMES Outlier Table | |
| Frequency | Stem & Leaf |
| 1.00 Extremes | (=<1.0) |
| 1.00 | 4 . 0 |
| 2.00 | 5 . 00 |
| 7.00 | 6 . 0000000 |
| 10.00 | 7 . 0000000000 |
| 16.00 | 8 . 0000000000000000 |
| 12.00 | 9 . 000000000000 |
| 5.00 | 10 . 00000 |
| PMSE Outlier Table | |
| Frequency | Stem & Leaf |
| 2.00 | 3 . 34 |
| 23.00 | 3 . 55677788888888999999999 |
| 18.00 | 4 . 000001111122334444 |
| 8.00 | 4 . 55557789 |
| 3.00 | 5 . 000 |

*Note.* Stem width: 1.00
Each leaf: 1 case(s)

# Appendix H: Test of Pearson Correlation Analysis Assumptions

Table H1

*Test of Normality: PMES, PMSE, and PSS Scores*

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Project_Success | .145 | 51 | .009 | .883 | 51 | .000 |
| PMSE | .160 | 51 | .002 | .951 | 51 | .033 |
| Aggregate percentage of successful experiences on IT projects | .188 | 51 | .000 | .936 | 51 | .009 |

Table H2

*Descriptive Statistics: PMES, PMSE, and PSS Scores*

| | | | Statistic | Std. Error |
|---|---|---|---|---|
| Project_Success | Mean | | 4.1814 | .10643 |
| | 95% Confidence Interval for Mean | Lower Bound | 3.9676 | |
| | | Upper Bound | 4.3951 | |
| | 5% Trimmed Mean | | 4.2263 | |
| | Median | | 4.2500 | |
| | Variance | | .578 | |
| | Std. Deviation | | .76006 | |
| | Minimum | | 2.50 | |
| | Maximum | | 5.00 | |
| | Range | | 2.50 | |
| | Interquartile Range | | 1.25 | |
| | Skewness | | -.763 | .333 |
| | Kurtosis | | -.325 | .656 |
| PMSE | Mean | | 4.1590 | .05779 |
| | 95% Confidence Interval for Mean | Lower Bound | 4.0430 | |
| | | Upper Bound | 4.2751 | |
| | 5% Trimmed Mean | | 4.1515 | |
| | Median | | 4.0000 | |
| | Variance | | .170 | |
| | Std. Deviation | | .41271 | |
| | Minimum | | 3.37 | |
| | Maximum | | 5.00 | |
| | Range | | 1.63 | |
| | Interquartile Range | | .56 | |
| | Skewness | | .475 | .333 |
| | Kurtosis | | -.436 | .656 |
| Aggregate percentage of successful experiences on IT projects | Mean | | 7.7843 | .19865 |
| | 95% Confidence Interval for Mean | Lower Bound | 7.3853 | |
| | | Upper Bound | 8.1833 | |
| | 5% Trimmed Mean | | 7.8377 | |
| | Median | | 8.0000 | |
| | Variance | | 2.013 | |
| | Std. Deviation | | 1.41864 | |
| | Minimum | | 4.00 | |
| | Maximum | | 10.00 | |
| | Range | | 6.00 | |
| | Interquartile Range | | 2.00 | |
| | Skewness | | -.477 | .333 |
| | Kurtosis | | -.147 | .656 |

Appendix I: Correlation Analysis of the Relationships between PMSE, PSS, and PMES Successful Experience Scores

| | | Aggregate percentage of successful experiences on IT projects | Project_Success | PMSE |
|---|---|---|---|---|
| Aggregate percentage of successful experiences on IT projects | Pearson Correlation | 1 | .468** | .491** |
| | Sig. (2-tailed) | | .001 | .000252 |
| | N | 51 | 51 | 51 |
| Project_Success | Pearson Correlation | .468** | 1 | .595** |
| | Sig. (2-tailed) | .001 | | .000004 |
| | N | 51 | 51 | 51 |
| PMSE | Pearson Correlation | .491** | .595** | 1 |
| | Sig. (2-tailed) | .000252 | .000004 | |
| | N | 51 | 51 | 51 |

# Appendix J: Mediating Effect of PMES Successful Experience on Self-Efficacy and Project Success Using Least Square Estimation

Table J1

*Descriptive Statistics of the Regression Model*

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Project_Success | 4.1814 | .76006 | 51 |
| PMSE | 4.1590 | .41271 | 51 |
| Aggregate percentage of successful experiences on IT projects | 7.7843 | 1.41864 | 51 |

Table J2

*Stages of the Regression Model*

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | PMSE[b] | . | Enter |
| 2 | Aggregate percentage of successful experiences on IT projects[b] | . | Enter |

a. Variable: Project_Success

b. All requested variables entered.

Table J3

*Regression Model Summary*

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .595[a] | .353 | .340 | .61734 | .353 | 26.792 | 1 | 49 | .000004 | |
| 2 | .628[b] | .394 | .369 | .60367 | .041 | 3.244 | 1 | 48 | .078 | 1.890 |

*Note.* a. Predictors: (Constant), PMSE; b. Predictors: (Constant), PMSE, Aggregate percentage of successful experiences on IT projects; c. Variable: Project_Success

Table J4

*Regression Model ANOVA Table*

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 10.211 | 1 | 10.211 | 26.792 | .000[b] |
| | Residual | 18.674 | 49 | .381 | | |
| | Total | 28.885 | 50 | | | |
| 2 | Regression | 11.393 | 2 | 5.696 | 15.631 | .000[c] |
| | Residual | 17.492 | 48 | .364 | | |
| | Total | 28.885 | 50 | | | |

a. Variable: Project_Success

b. Predictors: (Constant), PMSE

c. Predictors: (Constant), PMSE, Aggregate percentage of successful experiences on IT projects

Table J5

*Regression Model Coefficients Table*

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Tolerance | VIF |
| 1 | (Constant) | -.373 | .884 | | -.421 | .675 | | |
| | PMSE | 1.095 | .212 | .595 | 5.176 | .000 | 1.000 | 1.000 |
| 2 | (Constant) | -.467 | .866 | | -.540 | .592 | | |
| | PMSE | .885 | .237 | .480 | 3.726 | .001 | .759 | 1.318 |
| | Aggregate percentage of successful experiences on IT projects | .124 | .069 | .232 | 1.801 | .078 | .759 | 1.318 |

a. Dependent Variable: Project_Success

Appendix K: Mediating Effect of PMES Successful Experience on Self-Efficacy and Project Success Using Weighted Least Square Estimation

Table K1

*Stages of WSLE Regression Model*

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | PMSE[c] | . | Enter |
| 2 | Aggregate percentage of successful experiences on IT projects[c] | . | Enter |

a. Variable: Project_Success

b. Weighted Least Squares Regression - Weighted by Weight

c. All requested variables entered.

Table K2

*WSLE Regression Model Summary*

| | | | | | Change Statistics | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change | Durbin-Watson |
| 1 | .747[a] | .558 | .549 | 1.26732 | .558 | 61.817 | 1 | 49 | .000 | |
| 2 | .762[b] | .581 | .563 | 1.24664 | .023 | 2.639 | 1 | 48 | .111 | 1.868 |

a. Predictors: (Constant), PMSE

b. Predictors: (Constant), PMSE, Aggregate percentage of successful experiences on IT projects

c. Variable: Project_Success

d. Weighted Least Squares Regression - Weighted by Weight

Table K3

*WSLE Regression Model ANOVA Table*

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 99.284 | 1 | 99.284 | 61.817 | .000[c] |
| | Residual | 78.699 | 49 | 1.606 | | |
| | Total | 177.984 | 50 | | | |
| 2 | Regression | 103.386 | 2 | 51.693 | 33.262 | .000[d] |
| | Residual | 74.598 | 48 | 1.554 | | |
| | Total | 177.984 | 50 | | | |

a. Variable: Project_Success

b. Weighted Least Squares Regression - Weighted by Weight

c. Predictors: (Constant), PMSE

d. Predictors: (Constant), PMSE, Aggregate percentage of successful experiences on IT projects

Table K4

*WSLE Regression Model Coefficients Table*

| | | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| Model | | B | Std. Error | Beta | t | Sig. | Tolerance | VIF |
| 1 | (Constant) | .048 | .595 | | .081 | .935 | | |
| | PMSE | 1.002 | .127 | .747 | 7.862 | .000 | 1.000 | 1.000 |
| 2 | (Constant) | .074 | .585 | | .126 | .900 | | |
| | PMSE | .833 | .163 | .621 | 5.112 | .000006 | .592 | 1.689 |
| | Aggregate percentage of successful experiences on IT projects | .085 | .052 | .197 | 1.625 | .111 | .592 | 1.689 |

a. Variable: Project_Success

b. Weighted Least Squares Regression - Weighted by Weight

Appendix L: Permissions to use Research Instruments

**Blomquist et al. (2016) – PMSE**

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## Serrador and Turner (2015) – PSS



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