

**PROJECT MANAGEMENT AND GOVERNANCE IN THE PROJECT  
MANAGEMENT OFFICE (PMO): ANALYSIS OF THE VARIABLES  
ASSOCIATED WITH PROJECT SUCCESS**

by

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A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

Capella University

March 2015

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## **Abstract**

Greater understanding of the problem of unsuccessful projects in organization has practical and theoretical applications in the field of project management. The findings in this study derived from the empirical evidence bridge gaps in the academic literature and add to the body of knowledge within the field of project management. Findings of this study build on academic research of Dai (2001), Dai and Wells (2004), and Stewart (2010). The practical applications are for the use of the results of this study in organizations currently operating or seeking establishment of a Project Management Office (PMO). This study analyzed governance of projects associated with the presence of a PMO in relation to project success. The variables for this analysis were selected from constructs consisting of project success and governance of projects associated with a PMO within the theoretical constructs of contingency theory. The research methodology in this study was a non-experimental correlation analysis with a statistical test of multiple regression, bivariate correlation, and regression with moderation. These tests used a significance  $p < .05$  from a random sample of individual project team ( $n = 114$ ) from a population of project team members in organizations that execute projects. The results of this research indicated there was a significant relationship between the variables indicating the governance of projects by a PMO and project success with  $p < .05$  [ $F(6,101) = 22.38, p = .000$ ]. Project management methods and standards were determined to have a significant statistical relationship with project success,  $r(113) = .561, p = .000$ . The moderating effect of a PMO as a function of project management methods and standards was not significant on project success with  $p > .05$  [ $F(1,109) = 2.21, p = .14$ ].

## **Dedication**

To God, and my immediate and extended family. I am grateful and humbled for having the time and opportunity to complete this journey with enormous support from caring and loving individuals. As a grateful husband and father, I fully recognize the sacrifice and understanding from those who care.

To my loving wife, Mrs. Sue Neaverth, and wonderful kids, Mike Neaverth Jr., David Neaverth, John Neaverth, Yeoni Neaverth, and supportive parents Dr. and Mrs. Elmer J. Neaverth Jr.

## **Acknowledgments**

Special thanks are given to Dr. Werner (Don) Gottwald, Committee Chair, and other Committee Members, Dr. Gary Robinson and Dr. John Manchic. In addition, credit is due for Mr. Claus Poehler, educational advisor, who coaxed me to enter into a PhD program. Additional acknowledgement is provided for all those that have made it possible to allow US Service members and Veterans opportunities to participate in educational programs and benefits. With gratitude, I thank those that have sacrificed for their country to allow others the freedom to pursue their dreams.

## **Table of Contents**

Acknowledgments	iv
List of Tables	vii
List of Figures	viii
CHAPTER 1. INTRODUCTION	1
Background of the Study	3
Statement of the Problem	7
Purpose of the Study	7
Rationale	8
Research Questions	9
Significance of the Study	9
Definition of Terms	12
Assumptions	14
Limitations	15
Theoretical/Conceptual Framework	17
Organization of the Remainder of the Study	19
CHAPTER 2. LITERATURE REVIEW	20
Overview of Projects and Project Management	20
Contingency Theory a Theoretical Construct	29
Project Success, Measures, and Project Success Research	33
Project Management Office and PMO Research	41
Summary	59
CHAPTER 3. METHODOLOGY	63
Research Design	63

Sample	68
Instrumentation/Measures	70
Data Collection	72
Data Analysis	73
Validity and Reliability	76
Ethical Considerations	77
Summary	78
CHAPTER 4. RESULTS	80
Description of the Population and Sample	80
Summary of the Results	83
Detailed Analysis and Results	89
Summary	108
CHAPTER 5. DISCUSSION, IMPLICATIONS, RECOMMENDATIONS	111
Summary and Discussion and Results	111
Implications of the Study Results	119
Limitations	120
Recommendations for Future Research	123
Conclusion	127
REFERENCES	129
APPENDIX A. STATEMENT OF ORIGINAL WORK	142



## **List of Tables**

Table 1. Project Management Office (PMO) entities	44
Table 2. Statistical Test	76
Table 3. Highest level of education completed	82
Table 4. Years of full-time work experience	82
Table 5. Project Success	86
Table 6. Likert Scale “Triple Constraint” versus “Multidimensional” project success	88
Table 7. PMO Functions	89
Table 8. Correlations Matrix (project success and six independent variables)	92
Table 9. ANOVA (Project success and six independent variables)	95
Table 10. Model Summary <sup>b</sup> (Project success and six independent variables)	95
Table 11. Coefficients (Project success and six independent variables)	96
Table 12. Correlation (Project success and methods and standards)	100
Table 13. Correlation (Project success and historical archives)	101
Table 14. Correlation (Project success and administrative support)	101
Table 15. Correlation (Project success and human resource support)	102
Table 16. Correlation (Project success and training)	102
Table 17. Correlation (Project success and human consulting and mentoring)	103
Table 18. Coefficients	106
Table 19. Model Summary (Centering)	108
Table 20. Industry of respondents	125

## **List of Figures**

Figure 1. Relationship of research variables and theoretical construct.	19
Figure 2. The project governance framework.	49
Figure 3. Relationship between predictor variables and outcome variable.	74
Figure 4. Relationship between predictor variables and outcome variable.	75
Figure 5. Relationship between predictor and outcome variable with moderator.	75
Figure 6. Bar Chart graph describing the respondent's role for the project.	81
Figure 7. Average size of project in US dollars.	83
Figure 8. Unstandardized predicted value and the studentized residual.	91
Figure 9. Histogram regression standardized residual.	93
Figure 10. Normal P-P Plot of regression standardized residual.	94
Figure 11. Composite project management methods and standards versus composite project success.	98
Figure 12. Histogram SUM PM – Composite Likert for PM methods and standards.	99
Figure 13. Scatter Plot to test assumptions of linearity.	105
Figure 14. Histogram of studentized residual.	107

## **CHAPTER 1. INTRODUCTION**

Project management as a profession has seen growth in membership since 1974 from about 1,000 members registered with the Project Management Institute (PMI) to 2010 of approximately “half a million members in 185 countries including over 381,000 certified project managers” (Fortune, White, Jugdev, & Walker, 2011, p.555). Additionally, Mir and Pinnington (2014) state that from 2002 to 2011 there has been an increase in the use of project management methodologies based on results of a “partial longitudinal comparison” study (Fortune et al., 2011, p. 571). However, during that same time period more than a third of projects were documented as failing to meet their goals with the success rates of projects from 2008 to 2012 falling from 72 percent to 62 percent (Elena, Arnone, Boccadelli, & Napolitano, 2014). Fortune et al. (2011) document additional evidence of project failure and project success in their research. From a 2009 survey of 50 responses from three different countries, only “16 percent of projects were judged to be a complete success” (Fortune et al., 2011, p. 557). A larger survey in 2009 of 400 organizations by the Standish Group documented results of research on IT projects with 24 percent considered failures, 44 percent considered challenged, and the remaining 32 percent considered successful (Fortune et al., 2011). The evidence found in the body of knowledge highlights unsuccessful projects and project failure is significant (Ika, 2009; Nixon, Harrington, & Parker, 2012; Sauser, Reilly, & Shenhar, 2009; Too & Weaver, 2013).

The problem identified in this research study is the continuing issue of unsuccessful projects in organizations that have a Project Management Office (PMO; Too & Weaver, 2013). The definition of a PMO as it relates to this study is discussed in detail later in this study and is distinct to earlier historical reference of a PMO as a program management office by organizations like NASA (Anderson, Henriksen, & Aarseth, 2007).

High project failure rates in organizations result from lack of successful project management as an organizational methodology (Young & Poon, 2013). Inadequate PMO related functions like management of information and knowledge have also been identified as a primary reason for project failure (Milin, Moraca, Radakovic, Jasarevic, & Hadzistevic, 2012). Establishment of a formal PMO is one strategy to address some of these concerns and reduce problems leading to unsuccessful projects (Milin et al., 2012).

Although having a PMO is a strategy to resolve issues with project failure, there is limited empirical research on managing PMOs (Singh, Keil, & Kasi, 2009) and PMO project governance (Müller, Pemsel, & Shao, 2014) in relationship to project success. Spalek (2013) mentions PMOs influence performance in organizations, however he further states there is a “knowledge gap” (p. 88) of what contributes significantly to a successfully operating PMOs for improved performance. In addition, the concepts of what constitute PMO performance have “limited quantitative validation” (Müller Glückler & Aubry, 2013, p. 59) and there is limited documented quantifiable evidence to substantiate the influence PMOs have on project performance (Dai & Wells, 2004; Mir &

Pinnington, 2014). Even without the benefits of empirical results to justify implementation, organizations are still establishing PMOs (Dai & Wells, 2004).

Based on the limited empirical studies related to PMO performance and project success (Dai & Wells, 2004; Müller et al., 2013), this research study seeks to bridge the gaps in knowledge of PMO governance's contribution to project success (Spalek, 2013).

### **Background of the Study**

Project management is a professional academic field (Söderlund, 2004) involved in coordinating resources to execute projects with predictability to achieve preferred outcomes (Gopalasamy, Mansor, Selagor, & Tambahan, 2013). These preferred outcomes using project management are generally referred to in terms of benefits (Ika, 2009), performance, value, or success (Mir & Pinnington, 2014). Benefits are associated with increased prosperity, while performance is associated with achievement in relation to cost, time, and scope (McLeod, Doolin, & MacDonell, 2012), value is associated with generating business opportunities (Turner & Zolin, 2012), and success is associated with achieving requirements or objectives for stakeholders (Davis, 2014).

Studying project success can be challenging, as there is various positions on the formal definition of what constitutes project success (Mishra, Dangayach & Mittal, 2011). Mir and Pinnington (2014) reiterate this point in their research identifying lack of specificity and clarity for the evolving construct of project success (Cserhádi & Szabó, 2014; Davis, 2014).

Understanding project success as it is related to this research study considers the foundational seminal works by Pinto and Slevin (1987) and Pinto and Prescott (1988)

relating critical success factors to project success (Davis, 2014; Müller & Jugdev, 2012). This prior research, although dated, is relevant for analysis and integration into this research design as it is still valid today (Söderlund & Geraldi, 2012). The supposition of this earlier research was that success is measured as a “multidimensional concept” (Müller & Jugdev, 2012, p. 760) of multiple measures rather than a single measure. This research study, consistent with the findings of Müller and Jugdev (2012), will analyze the multidimensionality of several independent variables and their influence on project success. The study seeks to assess and add to the body of knowledge regarding the multidimensional construct of project success.

This research study acknowledges the varying perspectives and general definitions of project success (Müller & Jugdev, 2012) and will use contingency theory (Hanisch & Wald, 2012) as a theoretical framework for the study. Contingency theory fits his research because of the contingent nature of project management methodologies for given situations (Sauser et al., 2009). A PMO structure for project management in organizations is contingent upon the environment with the appropriate “fit” in relationship to the environment (Mullaly & Thomas, 2009). This research design will use the concept of “fit” within contingency theory as a theoretical foundation to support study of projects in organizations that have Project Management Office (PMO) structures are unsuccessful. Venkatraman (1989) found that the concept of “fit” corresponded to terms such as, “contingent upon, consistent with, fit, congruence, and coalignment” (p.423). Venkatraman (1989) also provides several perspectives for measuring “fit” that include the perspective of moderation of an independent variable upon a dependent variable. An

objective evaluation of fit requires a determination of what “delivers value in a particular context” (Mullaly & Thomas, 2009, p. 128).

The continuing rate of unsuccessful projects has broader significance because project management success can affect business value (Too & Weaver, 2013). Flyvbjerg, Holm, and Buhl (2003) studied cost issues in 258 projects related to infrastructure development efforts in 20 different nations with overruns and found an overrun rate of 45% in rail, 20% in roads, and 34% in bridges and tunnels. Overruns in individual projects can adversely influence the business as a whole with “losses of an average of US\$135 million dollars for every US\$1 billion invested in a project” (Elena et al., 2014, p.1). The business and operation perspective of managing projects is referred to as the project governance (Müller et al., 2014). Project governance from a PMO provides the structure to execute projects (Pinto, 2014). Approaches to project governance vary (Aubry, Müller, Ralf, & Glückler, 2013) and include examples as the presence of PMOs and steering committees in organizations that manage projects (Müller et al., 2014).

Organizations can attempt to mitigate issues related to unsuccessful projects through **methods and standards** present in a Project Management Office (Dai & Wells, 2004). Desouza and Evaristo (2006) note that a PMO is a strategy to mitigate project failure through emphasizing project success. A PMO can enhance project management governance through **methods and standards** that positively affect performance in the organization (Spalek, 2013). Multiple authors (Hurt & Thomas, 2009; Mathur, Jugdev, & Fung, 2013; Mir & Pinnington, 2014) define a project management organizational

structural methodology that positively influences project and organizational success (Jugdev & Müller, 2005).

Hurt and Thomas (2009) cite Hobbs and Aubry's (2007) comprehensive study of 500 respondents identifying 27 functional areas associated with PMOs. These 27 functional areas were further refined down to groups through factor analysis. The identified groups included factors like project management methodologies and organizational learning. Dai and Wells (2004) addressed similar PMO associated activities and referred to these as PMO categories. These categories help define the presence of a PMO and are identified as: project management methods and standards, project historical archives, project administrative support, project human resource / staff assistance, project related training, and project related consulting and mentoring (Dai, 2001; Dai & Wells, 2004; Stewart, 2010).

This study will build on previous PMO research by Dai (2001) and Stewart (2010). Specifically, this research uses the variables indicating the presence of a PMO (Dai, 2001) and the governance of projects in a PMO to determine the significance of these variables in relation to project success. The research by Dai (2001) used the variables indicating the presence of a PMO to build upon research of Pinto and Slevin (1987) and Pinto and Prescott (1988). Dai (2001) used her research design to analyze the linear relationship between critical success factors and project success. Stewart's (2010) research is similar to Dai (2001) and assessed the extent that a PMO contributes to project success analyzing the variables indicating the presence of a PMO.



Through this research, greater understanding of the identified variables is sought by conducting statistical tests of multiple linear regression, bivariate correlational analysis, and regression with moderation. This research is viewed as important because project failure still occurs in those organizations having a PMO structure. The reasons for this are unclear. Ambiguity and gaps in the literature cite a lack of ample empirical evidence to support the value of a PMO to project success (Aubry & Hobbs, 2011). The problem can be compounded as organizations continue to establish PMO structures in spite of insufficient empirical evidence (Singh et al., 2009) to substantiate a PMO's role in achieving positive project success.

### **Statement of the Problem**

The problem addressed in this research study is unsuccessful project management through a Project Management Office (PMO). The occurrence of unsuccessful projects and quest for project success are documented as an issue in several research articles in academic literature (Ika, 2009; Nixon et al., 2012; Sauser et al., 2009). Davis (2014) identifies the need for additional investigation related to project success and project failure.

### **Purpose of the Study**

The purpose of this non-experimental correlational research study is to analyze the degree to which the variables that indicate the presence of PMO governance of projects support project success (Dai & Wells, 2004; Müller et al., 2014). PMO governance variables to be measured include: project management methods and standards, project historical archives, project administrative support, project human

resource and staff assistance, project related training, and project related consulting mentoring. With these identified variables, this study seeks to build on Singh et al.'s (2009) recommendations to “gather ‘hard’ statistics on the impact of PMOs on project and organizational performance” (p. 421). The study will further assess the problem with supplementary analysis isolating a variable of PMO governance, project management methods and standards, in relationship to project success. This study will specifically analyze the project management methods and standards in relationship to project success when moderated by a formal PMO structure. This research is accomplished by providing non-experimental correlational analysis related to the research problem of determining factors influencing project success in organizations that have a PMO.

### **Rationale**

Researchers have called for further studies on PMOs and understanding better, ways in which their findings can be implemented (Milin et al., 2012). This research study seeks to contribute to the field of project management by providing additional contributions to the theory of project management and practical applications of these contributions to the field of project management.

The contribution to theory of this research will build upon prior research on PMOs and project success (Dai, 2001; Stewart, 2010). This research study seeks to bridge gaps in PMO knowledge (Spalek, 2013) as a result of limited empirical studies in the PMO literature related to PMO performance and success (Dai, & Wells, 2004; Müller, Glückler, & Aubry, 2013). This study also seeks to augment the existing academic body of knowledge and provide generalizability of the PMO related research.

Results from this study may lead to improvements in the field of project management based on documented evidence that can make PMOs more effective as effective PMOs can add value in project-oriented organizations (Hurt & Thomas, 2009).

### **Research Questions**

A central research question and two sub-questions have been developed for this research study to determine the degree to which a PMO structure contributes to greater project success. The research questions are the following:

What is the relationship between the six independent variables associated with presence of PMO governance of projects: project management methods and standards, project historical archives, project administrative support, project human resource staff assistance, project related training, and project related consulting and mentoring, to the dependent variable of project success (Dai & Wells, 2004)?

Sub-Question 1: Is there a relationship between project management methods and standards to project success?

Sub-Question 2: What is the relationship of project management methods and standards to project success when moderated by a formal PMO?

### **Significance of the Study**

The introduction of a PMO structure has attempted to increase project success and has been cited as an enabler in governance of projects (Müller et al., 2014). However, studies conducted on project success and PMOs (Dai & Wells, 2004) have not provided sufficient empirical evidence on the factors that influence project success related to project management and PMOs (Aubry & Hobbs, 2011). The limited documented

contribution of PMO organizations to successful project management is contradictory to the rationale of establishing PMO organizations. A greater understanding of the relationships of factors that has led to the limited success of projects under PMO governance is important. This research seeks to provide empirical evidence (Singh et al., 2009) to provide greater clarity in this research area.

Additionally, this research expands on prior research (Aubry & Hobbs, 2011; Dai, 2001; Dai & Wells, 2004; Stewart, 2010) and strives to fill gaps in literature, more fully explored in Chapter 2. This research strives to provide greater evidence to support the concept of Project Management Office (PMO) from the perspective of contingency theory. Accordingly, contingency theory involves how the interaction of organizations is contingent upon internal and external influences on the organizational structure (Howell, Windahl, & Seidel, 2010).

This research also seeks to provide greater understanding of the PMO associated variables previously identified and their significance to the overall multidimensional aspect (Müller & Jugdev, 2012) of project success. The understanding of PMO related variables might influence how organizations achieve greater success (Kerzner, 2003). Establishing evidence for a greater probability for overall project success can have implications on management decisions and lead to increased value and effectiveness within the organizations using PMOs. Hurt and Thomas (2009) further identify the importance of PMOs value and “the sustainability of project management competencies” (p. 70). Greater understanding about the PMO associated variables and relationship to project success is reasoned as being significant to managing projects in organizations.

Organizations currently operating under a PMO construct or those considering initiating a PMO can use the results of this study for further research or conduct assessments within their own organization. Establishing evidence for a greater probability for project success can have implications on management decision striving for increased value and effectiveness within the organizations implementing PMOs.

### **Contribution to the Field of Project Management**

This research study seeks to build upon prior research and bridge gaps in the academic literature. This research will critically examine findings of seminal authors of project management and project success (Pinto & Prescott, 1988; Pinto & Slevin, 1987). This will be accomplished from a contingency theory perspective consistent with earlier research on project success as a function of a multidimensional project success concept (Müller & Jugdev, 2012). This research design uses a similar approach and uses multiple variables that influence project success to analyze the associated relationship of these variables with PMO governance of projects that result in project success. This research builds on Dai (2001) and Stewart (2011) and their findings of the relationship of a PMO and PMO related variables to project success. Kerzner (2003) found that, “the concept of the project office is expected to grow over the next several years” (p. 25) and his prediction of this growth in the PMO as an organizational concept is fulfilled based on the number of PMO related research articles since that time (Aubry et al., 2013; Pemsel & Wiewiora, 2013). Various articles highlight the limited empirical evidence on PMOs success (Singh et al., 2009). It is anticipated that the empirical analysis developed from this study can further support practical applications (Corley & Gioia, 2011) for

organizations to leverage project success based on more documented definitive empirical evidence.

### **Definition of Terms**

*Contingency Theory:* Contingency theory is defined by a situation that considers multiple factors (Hanisch & Wald, 2012) as internal and external organizational constraints or relationship of the organization to the environment (Mullaly & Thomas, 2009). As related to this research design, project management methodologies are contingent upon the situation (Sauser et al., 2009). This term is further defined with terms as project contingency theory and structural contingency theory. Project contingency theory is the fit or misfit of a selected project management methodology and the project type (Sauser et al., 2009). Structural contingency theory considers the effect of a variable on organizational effectiveness when moderated by a contingency (Hanisch & Wald, 2012). Interrelated with the contingency theory are terms like “fit” of requirements within the organization (Mir & Pinnington, 2014).

*Governance of Projects:* The governance of projects involves management and governance functions for individual projects and their deliverables (Too & Weaver (2013). The governance of projects with a PMO has broader organizational implications associated with business objectives and organizational strategic objectives (Müller et al., 2014). Governance of projects can be more explicitly addressed as governance of projects (Müller et al., 2014) by a PMO. For this research design, the variables indicating presence of a PMO and governance of projects are identified as: project management methods and standards, project historical archives, project administrative support, project

resource assistance, project related training, and project related consulting and mentoring (Dai, 2001; Stewart, 2010).

*Methods and Standards:* PMI (2013) defines a standard as a “document, established by consensus and approved by a recognized body, which provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context” (p. 563). Methods are derived from a project management methodology of a “system of practices, techniques, procedures, and rules used by those who work in a discipline” (PMI, 2013, p. 546).

*Project:* A project is defined as “a temporary endeavor undertaken to create a unique result, product or service” (PMI, 2013, p. 552).

*Project Management:* Project Management is defined as “the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements” (PMI, 2013, p. 554).

*Project Management Office:* Project Management Office (PMO) is defined as “an organizational structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques” (PMI, 2013, p. 554). A PMO can be referred to as Project Office, Project Support Office, Program Office, or Project Management Center of Excellence (Hobbs & Aubry, 2007).

*Project-oriented organizations:* A project-oriented organization is defined as “organizations that perform their activities by implementing projects whose results are

determined by requirements of the project customer” (Todorović, Mitrović, & Bjelica, 2013).

*Project Success:* Project success is defined by this research study is the degree with which the project team member from the organization has assessed an individual project based on a number of factors. The factors include the assessment of the overall project performance and “if there is a high level of satisfaction concerning the project outcome among key people in the parent organization, key people in the project team and key users or clientele of the project effort” (de Wit, 1988, p. 165). The definition of Project Success is in contrast to Project Failure of not meeting stated objectives (Mir & Pinnington, 2014).

### **Assumptions**

This research assumes a positivist philosophical approach to project management associated with a theoretical framework rooted in engineering and science as well as social sciences (Söderlund, 2004). The theoretical traditions of project management derive from either qualitative or a quantitative research design (Bredillet, 2010). This design assumes the more appropriate approach follows a positivist, quantitative approach (Unger, Gemünden, & Aubry, 2012) with non-experimental correlational analysis to include regression analysis. Additionally, the approach assumes project success is multidimensional (Shenhar et al., 2001) and is contingent on various independent predictor variables.

Another assumption of this study is the assumption of the measures. Although the constructs of governance of projects and project success are complex, it is assumed that



that they can be accurately measured. The instrument selected for this is the “Project Management Institute Members Questionnaire” (Stewart, 2010, p.116-122). This instrument has been used and validated in previous research (Dai, 2001; Stewart, 2010) and is assumed valid and reliable for this study.

The selected survey instrument uses a seven point Likert scale questionnaire. This research design relies on the validity of the Central Limit Theorem (Norman, 2010). It follows that the data generated from questionnaires using Likert scales is assumed to produce normally distributed data for interval level of measure (Field, 2009). With assumed normally distributed data the statistical test selected are parametric test (Murray, 2013; Norman, 2010) and require testing for normality, homoscedasticity, and linear relationships (Garson, 2012).

### **Limitations**

A limitation identified relating to the research instrument is that of self-reported questionnaires (Conway & Lance, 2010). This limitation includes the potential that self-reporting of project team members completing survey questionnaire may lead to bias (Conway & Lance, 2010). This concern has been mitigated by selecting an instrument with construct validity (Conway & Lance, 2010). Construct validity is the degree with which the theories being studied are actually measured accurately with the instrument selected (Trochim, 2006). The construct validity for this instrument is supported as the research instrument has already been tested in prior studies (Dai, 2001; Stewart 2010).

In addition to limitations related to the instrument and measures, there are also potential limitations of the research design. Some of the limitations of this research

design can be attributed to theory. A limitation of using contingency theory to study a specific managerial problem is that there is uncertainty and variation in outcomes due to the number of variables that may influence these outcomes (Hanisch & Wald, 2012). In addition to the number of possible outcomes due to variation resulting from multiple variables, results may differ based on the selected approach. Some researchers call for approaches different from what has been proposed in this research design. Specifically, some researchers suggest using a subjectivist (McLeod et al., 2012) or mixed method approach rather than an objectivist approach as in this design. McLeod et al. (2012) further suggests that a subjectivist approach to understanding project success should be integrated with an objectivist approach.

Another limitation of this research design is the complexity of the study with various dynamic variables. Project success is multidimensional (Müller & Jugdev, 2012). Numerous PMO associated factors and variables can affect project success; identifying and selecting the most significant critical variables associated with PMOs is challenging thereby increasing threats to validity. PMOs are unique and “heterogeneous” and “ephemeral in nature” (Müller, et al., 2013, p.60) which may make it difficult to study project success in context of PMO if consistency of measures and uniformity of constructs is lacking causing threats to reliability. PMOs are social complex organizations (Aubry, Hobbs, & Thuillier, 2007) and some authors suggest using qualitative research method (Aubry & Hobbs, 2011; McLeod et al., 2012) versus the recommended non-experimental correlational method to fully understand the stated research problem in terms of “exploring or understanding” the “social or human

problem” (Creswell, 2009, p. 4). Complexity of constructs of projects may make it difficult defining all the variables that contribute to project success threatening the validity of measure.

Although there are limitations in this research design, there are sufficient strengths to support the research design. This research design builds upon a theoretical foundation of contingency theory and prior research (Aubry & Hobbs, 2011; Dai, 2001; Dai & Wells, 2004; Stewart, 2010). Additionally, using a tested instrument validated in previous research (Dai, 2001; Stewart, 2010) provides increased reliability and validity of the results. This preferred instrument combined with the proper descriptive and inferential statistical techniques also supports the research design. Additionally, use of random sampling through the Survey Monkey Audience Service is expected to provide greater generalizability of the results.

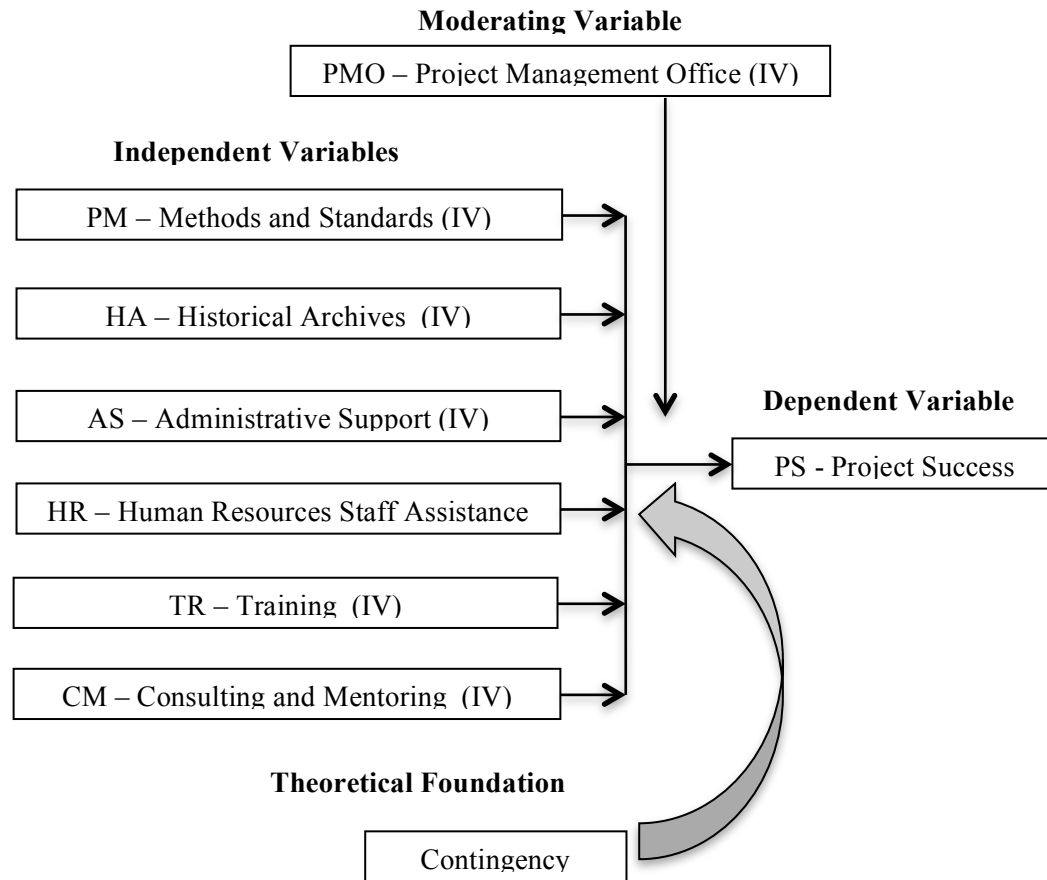
### **Theoretical/Conceptual Framework**

This research study incorporates a positivist philosophy within a theoretical framework of contingency theory (Hanisch & Wald, 2012) to support the research of PMO related variables associated with governance of projects in relationship to project success. The primary theoretical foundation of this study is contingency theory. Hanisch and Wald (2012) provide justification for this selection stating “no project can be studied comprehensively without considering its context: the congruence of a project to the external contingencies is considered to be a factor influencing the effectiveness” (p.4). Shenhar (2001) as well stresses contingency theory for context in addressing project management research. Shenhar (2001) proposes that there is no single approach to

managing projects and that project management is contingent on types of individual projects. Likewise, Howell et al. (2010) support a contingency approach to manage projects that influence an organizations project methodology and organizational structure.

From this perspective, this research analyzes variables of governance of projects associated with a PMO as well as the interaction or moderation of a formal PMO in relationship to project success. Hobbs and Aubry (2008) emphasize the potential impacts of these types of variables: “PMOs are very much influenced by the organizational dynamics in which they are embedded” (p. 81).

Figure 1 provides a graphical depiction of the relationship of these variables and the theoretical construct. These project related variables include: Methods and standards (PM), historical archives (HA), administrative support (AS), human resource staff assistance (HR), training (TR), and consulting and mentoring (CM). The moderating variable is the existence of a formal Project Management Office (PMO) and the dependent interval variable is project success (PS; Dai & Wells, 2004).



*Figure 1.* Relationship of research variables and theoretical construct.

### Organization of the Remainder of the Study

The organization of the remainder of the dissertation consists of the following chapters. Chapter 2 contains a summary of the review of relevant literature related to this research. Chapter 3 describes the research methodology, research design, population, sample, population, and data collection techniques. Chapter 4 presents the analyses and findings from the survey data. Chapter 5 summarizes the findings and poses recommendations and conclusions from the data analysis.

## **CHAPTER 2. LITERATURE REVIEW**

This chapter is a review of the literature related to project management, organizational Project Management Office (PMO) structures, and governance of projects (Müller et al., 2014) and specifically in relationship to project success (Davis, 2014). The variables indicating the presence of a PMO governance of projects consists of: methods and standards, historical archives, staff administrative support, human resource and staff assistance, training, and consulting and mentoring (Dai & Wells, 2004; Stewart, 2010). The review of PMO governance of projects in relationship to project success is accomplished within the context of the problem of the unacceptable low rate of successful projects in organizations that have PMO structures (Too & Weaver, 2013). This literature review specifically seeks to address the following areas related to this research study including: project management (PMI, 2013) as a field of study, governance of projects (Müller et al., 2014), the theoretical construct of contingency theory (Hanisch & Wald, 2012), contingency theory research (Mullaly & Thomas, 2009), project success (Cuellar, 2010), project success research (Davis, 2014), PMOs (PMI, 2013), and PMO research (Turner, Anbari, & Bredillet, 2013).

### **Overview of Projects and Project Management**

The first major section in this literature review addresses an overview of projects and project management within the framework of the research problem. Fundamentally, project management is an interdisciplinary (Shenhar & Dvir, 2007) academic field (Söderlund, 2004) to coordinate project related resources in a predictable manner to

achieve a desired outcome (Gopalasamy et al., 2013). Additionally, project management is considered a field under the broader field of organization and management (Söderlund, 2011). Project management more specifically is “the application of knowledge, skills, tools, and techniques to project activities to meet project requirements” (PMI, 2013, p. 552).

Although there is general agreement of constructs and practices within the field of project management, there is not complete agreement among scholars on the basic tenants within the discipline (Garel, 2013). Söderlund (2004) highlights this with his argument that attempts to define a universal project management theory have not been comprehensively accepted. These issues result from the understanding that projects are unique entities and there are substantial differences in approaches to managing divergent projects. With a uniqueness of every project, providing generalizability from uniqueness across the discipline of project management can be challenging (Blomquist, Hallgren, Nilsson, & Soderholm, 2012).

Caution is needed for conducting a comprehensive review of the problem of limited success of projects in PMO structures (Too & Weaver, 2013) as there is a potential bias existing in the literature (Söderlund & Lenfle, 2013). Lenfle and Loch (2010) suggested that at the very least there has been an inaccurate interpretation of project management history. Lenfle and Loch (2010) cite inaccurate historical documentation that has resulted in a failure in capturing the correct project management approach used on historical projects like the Manhattan Project. The contention is where the commonly referenced yet inaccurately identified controlled approach to project

management would have been more accurately documented if referenced as a trial and error methodology to project management (Lenfle & Loch, 2010). Additionally, literature in project management is largely skewed with bias toward “large, US, military, and space projects” (Söderlund & Lenfle, 2013, p. 654). From the review of the records of published articles in project management, a documentation of the methodologies to manage projects can be viewed with a degree of healthy inquiry. This questioning of what has been published can be view with an understanding of the potential inaccuracies and biases within the historical context of the management theories popular now in contrast with those that were popular in a given time period (Söderlund & Lenfle, 2013).

Additionally, project management is comparable yet distinct from other related governance and management approaches as portfolio management and program management. Program management is defined as “the application of knowledge, skills, tools, and techniques to a program to meet the program requirements and to obtain benefits and control not available by managing projects individually” (PMI, 2013, p. 552). Management of portfolio involves centralized management of operations, sub portfolios, programs, projects, or multiple portfolios “to achieve strategic objectives” (PMI, 2013, p. 550). The literature review for this research study will focus specifically on project management, but in some instances, other management related approaches of programs and portfolios are included as appropriate where these project management approaches overlap.



## **Projects**

This section reviews projects to gain a better understanding of how projects relate to the research problem. Projects are central to project management. A project is defined as “a temporary endeavor undertaken to create a unique result, product or service” (PMI, 2013, p. 552). Goodman and Goodman (1976) define temporary systems or temporary organizations as “a set of diversely skilled people working together on a complex task over a limited period” (p. 494). Since projects are unique and not repetitive tasks for an organization, project execution can necessitate the need for detailed planning (PMI, 2013) or training. In addition, since projects are temporary there may be requirements better suited for structures that are more permanent with greater planning capabilities (Pemsel & Wiewiora, 2013) within an organization outside the project itself. A PMO can provide this capability.

Although the project itself is temporary and a project team may disband after completion, the results of the project may last for centuries (PMI, 2013). Consequently, the lasting results of the project in addition to the temporary success criteria of a project may affect the assessment of the success of the project depending on the stakeholder perspective. This time-focused assessment of project success includes the assessment of the project at the delivery stage as well as the assessment of the projects at the post-delivery stage (Müller & Jugdev, 2012). The influence of time on a stakeholder’s assessment of project success as well as other dimensions of project success will be discussed in more detail later in this literature review.

For now, the focus of the review continues with projects. In general, projects originate from the need to coordinate various important tasks and activities of a complex nature with purpose (Söderlund, 2004). To accomplish the complex tasks and activities, a project normally has a project team from multifunctional disciplines to help the project reach desired end-state goals (PMI, 2013). In addition to the multifunctional team structure, various other factors exist that effect the execution of individual projects influencing project success. Factors identified in this literature review related to this research study include training, historical archives of project related documents, methods and standards for planning and executing projects, administrative support for projects, human resources and staff assistance for projects, and counseling and mentoring within a project team (Dai & Wells, 2004). These factors are discussed in detail later in this literature review.

### **Project Management Methodology**

This next section of this literature review is a review of project management methodology. Project management methodology consists of the “the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements” (PMI, 2013, p. 554). Fundamental to a project management methodology are the methods and standards defined to manage projects. General project management methods and standards are mentioned here briefly and later in greater detail in context of governance in a PMO. Gopalasamy et al. (2013) state, project management methodology, the methods and standards for managing project, are needed in some degree for every project. PMI (2013) discusses a standard as a “document, established by

consensus and approved by a recognized body, which provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context” (p. 563). Project management methods and standards used in project management consist of a “system of practices, techniques, procedures, and rules used by those who work in a discipline” (PMI, 2013, p. 546).

In reviewing the history of project management, there are two broad categories (Lepadatu, 2010). These categories are classical project management and modern project management (Lepadatu, 2010). Classical project management can be traced throughout history (Shenhar & Dvir, 2007). Classical project management includes examples such as building the pyramids and similar examples that are “unique, complex undertakings limited in time and scope” (Packendorff, 1995, p. 319). Modern project management includes recent history as a field within organizational management and is documented mainly in the last part of the 20th Century (Fondahl, 1987; Packendorff, 1995; Shenhar & Dvir, 2007; Weaver, 2007). The modern methodology of project management consists of various approaches including PMBOK, Agile, and PRINCE2 (McKenna & Whitty, 2012). This modern project management has been cited with historical roots in the 1950s with the emergence of Program Evaluation Review Technique (PERT) and the Critical Path Method (CPM; Fondahl, 1987). Process and control involving structured planning and scheduling would characterize the approach and methodology of modern project management with emphasis on plans and standardization (Hällgren, 2012).

Perhaps the most popular and widely used project management methodology follows a plan-driven approach described in the Bodies of Knowledge (BOK) for Project Management (Howell et al., 2010). Consequently, a milestone in the field of project management was in 1969 with the establishment of the professional association, The Project Management Institute (PMI) that encouraged the growth of the field (Shenhar & Dvir, 2007). Early publication of a project management reference manual, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (Project Management Institute, 2013) became an influential leading standard to manage projects (Shenhar & Dvir, 2007). Incidentally, PMI at the time was the “world’s largest professional association” (Maylor, Vidgen, & Carver, 2008, p.15).

In contrast to the PMBOK approach, is the Agile approach to manage projects. Information technology and software development are associated with Agile project management approaches. Project management methods using Agile as opposed to PMBOK or other classical project management approaches do not focus on detailed project planning at project initiation but rather concentrate on iterative planning in smaller groups (Bonner, 2010). Under the Agile project management approach, people are favored over processes and in this environment project success hinges on having the right people as leaders (Bonner, 2010). Factors that influence project success would also need to be viewed in context of the culture an environment under which an Agile approach would call “for a less rigid and formal approach to project management” (Bonner, 2010, p. 84). For instance, planning and control under Agile would favor internal teams exercising control in contrast to classical project management where

external levels of management would exercise control (Misra, Kumar, & Kumar, 2009). In comparing a classical project management methodology with the Agile approach; the latter would place more emphasis on continuous learning, training, as well as mentoring (Misra et al., 2009).

Other project management approaches are also referenced in the literature including Projects IN Controlled Environments, PRINCE2 (McHugh & Hogan, 2011) and Critical Chain Project Management (CCPM; McKenna & Whitty, 2012). Since the PMBOK project management approach is perhaps one of the more widely used and referenced project management approaches (McHugh & Hogan, 2011), the remainder of the literature review will focus on this approach. The PMBOK approach is assumed unless otherwise stated in the review.

### **Project Management and the Governance of Projects**

In continuing the literature review, the next area of review related to this research study includes project management and the relationship to the governance of projects. Project management as a methodology is not a separate function in many organizations today but is embedded in the management of the organization (Gopalasamy et al., 2013). In this sense, a project as a unique temporary endeavor could be better understood considering how the project and the project team interact and influence the overall organization and vice versa. Likewise, the governance of a project could be viewed in a broader context of the organization rather than just the project itself. Müller et al. (2014) emphasize for the governance of projects there is a need for a project to add to the overall value for the organization “a project is not an objective in itself but a means of achieving

strategic change or future benefits” (p. 2). Additionally, project team interaction to the overall organization is important as positive interaction and adequate resourcing can influence the success of projects. Moreover, project failure or project success may be out of the control of the project team or project manager (Too & Weaver, 2013). This evidence provides justification for an organizational structure that can provide additional project management support to a project manager and a project team. As discussed later in this chapter a PMO is a valid structure to provide this support. The PMO permanence of structure may also impart some of the corporate governance policies required to allow temporary organizations like projects to be more successful. The PMO in this respect can provide project management business opportunities related to value and success of projects (Too & Weaver, 2013). For greater clarity on the business and operations aspect of project management and governance (Müller et al., 2014), the following paragraph will highlight the differences in project governance and governance of projects.

Project governance consists of a methodological approach and structure to execute and manage projects (Pinto, 2014). Project governance is the process to provide oversight to individual projects also described as “the use of systems, structures of authority and processes to allocate resources and coordinate or control activity in a project” (Pinto, 2014, p. 8). Approaches to project governance vary (Aubry et al., 2013). In contrast, the governance of projects is not the same as management of the project (Too & Weaver; 2013). The governance of projects encompasses a broader range of factors as “ the value system, responsibilities, processes and policies that allow projects to achieve organizational objectives and foster implementation that is in the best interest of all the

stakeholders, internal and external, and the corporation itself” (Müller & Lecoivre, 2014, p. 2). Müller et al. (2014) recognize the presence of governance of projects with structures and functions identified as PMOs as well as steering committees in organizations managing projects. The governance of projects as depicted through a PMO has broader applications associated with business objectives and organizational strategic objectives (Müller et al., 2014). The specific factors that influence PMO governance and relationship to project success will be discussed later in this literature review.

### **Contingency Theory a Theoretical Construct**

In the next few sections of this literature review, contingency theory (Mullaly & Thomas, 2009) from the perspective of the research problem is discussed as a theoretical construct. This review includes the concept of fit and contingency theory associated with project management research in relation to the research design for this study.

Contingency theory as a theory states that any situation must consider both internal and external constraints (Mullaly & Thomas, 2009). Seminal authors of contingency theory, Burns and Stalker (1961), Lawrence and Lorsch (1967), and Woodward (1958), are cited by Hanisch and Wald (2012) as being the first to take the position there is “no single best way of managing and organizing” (p. 4). Managing an organization is contingent on various factors that influence that management. Rejc (2004) further describe contingency theory as a basis for organizational analysis “as a loosely organized set of propositions which in principle are committed to an open systems view of organisation, which are committed to some form of multivariate analysis of the relationship between key organisational variables” (p. 246). This concept of

contingency theory is in alignment with the research design for this study analyzing multiple variables in relationship to a dependent variable of project success using multiple linear regression.

Using contingency theory as a theoretical construct, is an appropriate approach for this research study as similar research in project management in the past has used a contingent approach for project research studies (Söderlund, 2004). Additionally, contingency theory is commonly referenced in the literature in organizational research (Sauser et al., 2009) including project management (Howell et al., 2010). The theoretical assumptions of contingency theory in relation to this research design are considered valid as project management methodologies are contingent on the situation (Sauser et al., 2009).

In addition, this research study acknowledges the varying perspectives and definitions of project success (Müller & Jugdev, 2012) by assuming a contingency approach as a theoretical foundation. This approach analyzes multiple factors associated with PMOs and governance of projects. The typology of a PMO as well as project management methods and standards provide the basis for analysis of fit to determine value represented by project success. Models of contingency theory “share in common an underlying premise that context and structure must somehow fit together if the organization is to perform well” (Drazin & Van de Ven, 1985, p. 514). Fisher (1998) provides further evidence for the use of contingency theory in understanding governance of projects. This governance is reference by controls systems that can also be identified



as a PMO structure in the context of the setting, or level of fit, within which an organization operates (Fisher, 1998).

### **Concept of Fit**

In continuing the review, the concept of “fit”, briefly mentioned in the preceding section is a concept within contingency theory. Venkatraman (1989) references the concept of “fit” in the following terms: “matched with, contingent upon, consistent with, fit, congruence, and coalignment” (p.423). As applied to this research design, project management and PMO structures in organizations are contingent upon the environment and appropriate “fit” in relationship to the environment (Mullaly & Thomas, 2009). The contingent relationship of the organization and the environment influences success as “context and structure must somehow fit together if the organization is to perform well” (Drazin and Van de Ven, 1985, p. 514). In addition, the type of structure for governance of projects as a PMO is contingent on the organizational culture, maturity, and the level of “fit” (Fisher, 1998; Mullaly & Thomas, 2009). The value of project management is dependent on “fit” of requirements within the organization (Mir & Pinnington, 2014), but this value may vary among research studies (Mir & Pinnington, 2014).

An objective evaluation of fit requires an understanding of what “delivers value in a particular context” (Mullaly & Thomas, 2009, p. 128). Value in this research design is associated with project success and is measured from the perspective of the stakeholder providing their assessment of what constitutes project success.

## **Project Management and Contingency Theory Related Research**

In addition to the concept of fit and contingency theory in the broad sense, there are project management specific approaches associated with contingency theory. Two approaches for example are the project contingency theory and structural contingency theory. Project contingency theory originates from the foundation of contingency theory and “argues that the best approach to managing a project depends on context: different conditions require different project organisational characteristics, and the effectiveness of the project is related to how well organisation and conditions fit each other” (Howell et al., 2010, p. 256). Sauser et al., (2009) deviate slightly from the nomenclature of project contingency theory referencing this specific theory as project management contingency theory. The premise of this distinction is related to the degree of fit or in some cases misfit between the project management methodology and the type of project (Sauser et al., 2009). Yet, another slight difference in the terminology yields the term structural contingency theory. Structural contingency theory within an organization is associated with the influence a variable has on the effectiveness of the organization as moderated by some contingency (Hanisch & Wald, 2012).

Overall, research on project management is still evolving and is “far too complex to be explained by one unified theory” (Shenhar & Dvir, 2007, p. 97). However, project management related contingency theory does provide options and has seen relative growth in academic research in the past decade. Hanisch and Wald (2012) in their bibliometric review of 1,622 studies noted an “increasing use of that theory since 2002” (p. 13) with four documented project contingency articles in 1990 and 19 in 2010.

Following this trend in academic research, contingency theory is selected as the theoretical construct used in this research design. Subsequently, contingency theory in context of project management supports the proposed research design in that “congruence of a project to the external contingencies is considered to be a factor influencing the effectiveness” of projects (Hanisch & Wald, 2012).

### **Project Success, Measures, and Project Success Research**

The next few sections of this literature review address project success and measures of project success within a framework of approaches for defining project success as well as methods for research design on project success. Approaches to define project success range from a classical approach as the triple constraint (Cuellar, 2010) to a more modern multidimensional approach (Müller and Jugdev, 2012) to measure project success. It is important to study and analyze project success, as project success is a significant focus topic and a central component of project management research (Cooke-Davies, 2002). Müller and Jugdev (2012) go so far to say project success “is at the heart of project management” (p. 758).

In general, academic literature documents numerous articles dedicated to project success (de Wit, 1988; Mir & Pinnington, 2014; Müller & Jugdev, 2012). However, consensus on what defines project success (Mishra et al., 2011) is an evolving concept. As a result, the construct of project success continues to expand (Cserhádi & Szabó, 2014; Davis, 2014) with additional clarity on what constitutes project success (Mir & Pinnington, 2014). Ambiguity is further compounded by selecting appropriate instruments and measures viewed from various perspectives of the stakeholders trying to

determine a complete and comprehensive meaning of success (Ika, 2009). The varying perspectives and meaning of project success from different stakeholders is expressed by Müller and Jugdev (2012) where project success continues to be “in the eyes of the beholder” (p. 763). This is consistent with McLeod et al. (2012) who discuss the perspectives of the stakeholders and associate these perspectives with a subjective philosophical approach for greater understand of the meaning of those stakeholders’ perceptions (p. 69).

With the limited universal agreement of the definition of project success (Ika, 2009), various research methods and approaches are used to study constructs like project success. Söderlund (2004) identifies two approaches used. One approach is focused on hard science in techniques as planning and scheduling while the other approach is focused on the social sciences considering the “behavioral aspects” of project management (Söderlund, 2004, p. 185). The hard science approach is an “outgrowth of system management” (Kerzner, 2009, p. 38) related to system theory with the tools and techniques of project management related to planning, controlling, and executing (Kerzner, 2009). The social science approach takes a broader perspective with greater focus on the project manager and constructs like leadership and team dynamics (Turner et al., 2013).

### **Project Success – Golden Triangle to Multidimensional approach**

Classical project management methods and project related studies normally considered the degree of project success based on the relationship of scope, budget, and schedule (Cuellar, 2010). This approach to a manage projects is often referred to as the

“Iron Triangle” (McLeod et al., 2012, p.69) or the “Golden Triangle” (Turner & Zolin, 2012). The rationale for this approach to manage projects was if a project manager or project team could successfully balance relationship of scope, budget, and schedule, ultimately the project manager or project team could manage a successful project. This approach is a control-based approach to project management emphasizing systems and methods like PERT and CPM (Lenfle & Loch, 2010). Additionally the policies and procedures of the leading agencies in project management like the Department of Defense and (DOD) and National Aeronautics and Space Administration (NASA) as well as the establishment of professional organization like PMI all stressed control (Lenfle & Loch, 2010).

Practitioners of project management today still apply the triple constraint of classical project management, but research in modern project management has minimized some the accuracy and reliability of this triple constraint approach (McLeod et al., 2012). A variation to the triple constraint is a multidimensional approach to project success (Shenhar, Dvir, Levy, & Maltz, 2001). The multidimensional approach to project success is the approach selected in this research design. A multidimensional approach to project success consists of analyzing the influence of multiple independent variables on the single outcome of project success. Müller and Jugdev (2012) supported this approach “addressing success as a multidimensional concept versus using a single measure” (p. 760). Additionally, Mir and Pinnington (2014) suggest perceptions of project success “are influenced by various other factors” (p. 14) and recommends additional research in the “sources of unexplained variance” (p. 14). The seminal works on project success

research by Pinto and Slevin cited by Davis (2014) have a multidimensional component influenced by various factors or variables. These factors have been termed as success factors or critical success factors (Davis, 2014) and are reviewed later in this chapter.

While there is compelling reasons to address the limitations of a triple constraint approach to project success, success measures using scope, budget, and schedule are still important elements of the overall construct of project success (Guru, 2008). Guru (2008) further goes on to state other influences on variables like quality to determine project success “subject to variation in perception by multiple project stakeholders” (p. 7). Since stakeholder perspective is an influential component of the assessment of project success (Müller & Jugdev, 2012), it is further discussed in the following section.

### **Stakeholder Perspective and Dimension of Time on Project Success**

Unfortunately for researchers, the ambiguity of project success is further compounded by the measure of success viewed from the perspective of those trying to determine exactly what success is (Ika, 2009). The meaning of success “continues to have different meanings for different stakeholders in the project context” (Müller & Jugdev, 2012, p.763). This is consistent with McLeod et al. (2012) who discuss the perspectives of the stakeholders and associate these perspectives with a subjective philosophical approach for greater understanding of the meaning of those stakeholders’ perceptions. A subjective philosophical approach (McLeod et al., 2012) conflicts with the selected philosophical approach for this research study based on an objective view of reality. This does not indicate the proposed design for the research study is invalid, but is

mentioned to point out there can be multiple philosophical approaches to research fields in project management.

In addition, the stakeholder perspective assessing project success over the life cycle of the project has been referenced as important to capture the significance of what defines a successful project (Müller & Jugdev, 2012). This position may also indicate another limitation to the research design proposed for this study since the proposed research design is based on a perspective of a cross sectional study captured as a quantitative measure after completion of the project, not specifically assessing success over the project life cycle and at a time in the future. However, the concept of the dimension of time on the assessment of project success may equally impart limitations on other measures like the measure of Iron Triangle (McLeod et al., 2012) of budget, schedule, and quality. For instance, a project may be considered a failure for being over budget and schedule in the short term, but have lasting value considering stakeholder satisfaction that may eventually lead to the project being categorized as a success (Turner & Zolin, 2012).

Dimension of time and perspective also influence other variables. For example, Lundin and Söderholm (1995) from their studies of traditional project management and projects “emphasizes relevant action as being fundamental to the success of a project” (p. 438). This emphasis of what may constitute relevance is viewed from the perspective of a stakeholder as well as the period with which the project was completed (Bannerman & Thorogood, 2012). To introduce complexity and uncertainty to the measure of success, Bannerman and Thorogood (2012) comment on the issue of inconsistent stakeholder

judgment. Bannerman and Thorogood (2012) state the comparison of project success is difficult as what constitutes success is defined differently in varying empirical studies. The section that follows provides background of some accepted approaches to measure project success in academic literature.

### **Critical Success Factors (CSF)**

Part of the reason for the lack of clarity of a definition of project success has to do with the various factors influencing the “degree of project success” (Müller & Jugdev, 2012, p. 759). The measures of project success often involve two key concepts, “criteria for success” (Guru, 2008) and “critical success factors” (Tabish & Jha, 2011).

These two concepts are defined as:

1. Project success factors, which are the elements of a project which, when influenced, increase the likelihood of success; these are the independent variables that make success more likely.
2. Project success criteria, which are the measures used to judge on the success or failure of a project; these are the dependent variables that measure success.

(Müller & Jugdev, 2012, p. 758)

Additionally, Rockart (1979) was one of the earlier researchers identifying the need to process information by classifying factors using CSFs. His approach used a concept of success factors, which originated with Ronald Daniel in 1961 (Rockart, 1979). Critical success factors’ (CSFs) are “the few key areas where “things must go right” for the business to flourish” (Rockart, 1979, p. 85). Various lists of CSFs for project success have been published (Belassi & Tukel, 1996). More notably, seminal authors Pinto,



Slevin, and Prescott are recognized for producing one of the more popular lists of critical success factors (Müller & Jugdev, 2012). This list is as follows:

1. Project mission - Initial clarity of goals and general directions.
2. Top management support -Willingness of top management to provide the necessary resources and authority/power for project success.
3. Project schedule/plans - A detailed specification of the individual action steps required for project implementation.
4. Client consultation - Communication, consultation, and active listening to all impacted parties.
5. Personnel - Recruitment, selection, and training of the necessary personnel for the project team.
6. Technical tasks - Availability of the required technology and expertise to accomplish the specific technical action steps.
7. Client acceptance - The act of "selling" the final project to its ultimate intended users.
8. Monitoring and feedback -Timely provision of comprehensive control information at each phase in the implementation process.
9. Communication - The provision of an appropriate network and necessary data to all key factors in the project implementation.
10. Trouble-shooting - Ability to handle unexpected crises and deviations from plan. (Pinto, 1988, p.68).

Although using CSFs have been an accepted method in academic research to analyze project success in project management (Müller & Jugdev, 2012), there are still question on the degree of their validity. Fortune et al. (2011) determined only “limited agreement” (p. 561) in their study on what factors were critical to the outcome of a project. Additionally, Mir and Pinnington (2014) in citing Müller and Jugdev (2012) determined using CSFs were not sufficient as a measure of project success “that a clear definition of project success does not exist and there is a need to develop meaningful and measurable constructs of project success” (p. 2).

### **Unsuccessful Projects**

A slight contrast to research on project success is research on unsuccessful projects. Mir and Pinnington (2014) highlight many project do not meet stated objectives or fail all together. This perspective on success or failure of projects relates back to the problem identified for this research study of the continuation of unsuccessful projects in organizations that have Project Management Office (PMO) structures (Too & Weaver, 2013). Gopalasamy et al. (2013) mention, “Vague system understanding and improper documentation are the basic reasons for failure of any project which ultimately yields almost negligible productivity” (p.2).

The problem of continuing unsuccessful projects has broader significance as project failure adversely affects business operations. Examples include a failure rate of 50-60 percent of new product development (Rungi, 2010). Müller et al. (2014) identify the presence of governance as PMOs and steering committees in organizations that manage projects. Governance of projects provides structure to execute projects (Pinto, 2014) to

increase the probability of project success and the approaches to governance vary (Aubry et al., 2013).

### **Project Management Office and PMO Research**

The next few sections in this literature review will address governance of projects with structures referred to as PMOs as well as the research on PMOs. To begin with, PMO research is just one category within general project management research. PMO research is also associated with several schools of thought within the field of project management. One associated school of thought for PMO research is the governance school of thought (Turner et al., 2013). Similarly, the project management functions emphasized by PMOs are contingent upon the various organization factors and are associated with the contingency school of thought (Turner et al., 2013). Lastly, the focus of the PMO to support the project team in achieving successful project goals is addressed with the success school of thought (Turner et al., 2013). The governance school of thought, the contingency school of thought, and the success school of thought are all included in an approach to research project management and PMOs within nine “schools of thought: optimization, modeling, governance, behavior, success, decision, process, contingency, and marketing” (Turner et al., 2013, p. 3). The three schools of thought mentioned above have relevance to this research design as the research design is interested in project success associated with the governance of projects related to PMOs within the framework of the contingency theory.

The project success school of thought is a frequent topic of project management and PMO research (Müller & Jugdev, 2012). To highlight, researchers explain PMOs

exist to bring value and success to organization (Anderson et al., 2007; Pellegrinelli & Garagna, 2009). Dai and Wells (2004) in their research advocate for establishing PMOs as an approach to attempt to mitigate the issues related to project failure. Desouza and Evaristo (2006) likewise propose implementing a PMO as a strategy to mitigate project failure and promote project success. It follows from this evidence; PMOs have a role in the governance of project management methods and standards and can positively affect performance in the organization (Spalek, 2013). Multiple authors (Hurt & Thomas, 2009; Mathur et al., 2013; Mir & Pinnington, 2014) subscribe to a defined project management structure and methodology associated with a PMO to support a positive influence on project and organizational success (Jugdev & Müller, 2005). For greater understanding of the dynamics of PMOs related to project success, the PMOs roles and functions are addressed next. This review includes typological classification as well as a discussion of PMO governance within an organization.

### **PMO Typologies**

The PMO structure follows on the capabilities of PMO to influence project success. In reviewing the typology of PMOs, the reference of PMOs as an organizational structure dates back to the 1950s (Aubry et al., 2007). Beginning in the 1990's, organizations viewed PMOs as a way to control project related functions (Hobbs & Aubry, 2007). A majority of PMO from the 234 responses in the research by Dai and Wells (2004) were “established in the mid-1990s to 2000” (p. 526). Additionally, Anderson et al. (2007) documented that before the common acceptance of use of the term project management office as a PMO (PMI, 2013); the PMO organizational structure

referred to by NASA was a program management office. The current research today draws a distinction for the offices that provides for governance for operations, projects, portfolios, and programs (PMI, 2013). For this literature review, a project management office is defined using the definition of a PMO from PMI (2013) “an organizational structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques” (p. 554).

Even with a standard PMO definition by PMI (2013), there are differing descriptions of the types of PMOs. Hobbs and Aubry (2008) document three different types of a PMO: “PMOs with many projects and project managers and considerable decision-making authority; PMOs with few projects ... and finally, PMOs with few if any project managers” (p. 81). Kerzner (2009) also identifies three separate types of PMOs or Project Offices (PO): customer group, functional, and strategic. Desouza and Evaristo (2006) also list strategic as a PMO type with the other two types classified as operational and tactical. The research by Aubry, Müller, Hobbs, and Blomquist (2010) cite the Gartner Group typology using a three-type PMO classification “(1) project repository, (2) coach, and (3) enterprise” (p. 767). Research on 500 PMOs by Hobbs and Aubry (2007) provide the names of the PMO as “Project Office, Project Support Office, Project Management Office, Central Project Office, Program Office, Project Management Oversight, Project Management Centre Of Excellence” (p. 75). Other authors in their literature list the different types of structures in an attempt to categorize PMOs as seen in Table 1.

Table 1

*Project Management Office (PMO) by author and type (Desouza & Evaristo, 2006; Garfein, 2005; Hill, 2004; Hobbs & Aubry, 2007; Kerzner, 2009)*

Authors		Type of PMO Structure		
Crawford (2002)	Level 1: Project Control Office	Level 2: Business Unit Project Office	Level 3: Strategic Project Office	
Desouza & Evaristo (2006)	Tactical	Operational	Strategic	
Dinsmore (1999)	Autonomous Project Team	Project Support Office	Project Management Center of Excellence	Program Management Office
Englund, Graham & Dinsmore (2003)	Project Support Office	Project Management Center of Excellence	Program Management Office	
Garfein (2005)	Project Office	Basic PMO	Mature PMO	Enterprise PMO
Gartner Research Group	Project Repository	Coach	Enterprise	
Kendall & Rollins (2003)	Project Repository	Coach	Enterprise	Deliver Now
Kerzner (2009)	Customer group	Functional	Strategic	
Hill (2004)	Project office	Basic PMO	Standard PMO Advance PMO	Center of excellence

However, in their attempt to provide representative models from a review of the literature, Hobbs and Aubry (2007) openly admit that reduction to simple models is just the starting point and further research to understand the PMO is necessary beyond the initial model. Finally, the PMO types identified by Garfein (2005) consist of multiple types where maturity of the PMO and the host organization is a significant component of the structural model. These types of PMO range from elementary to mature models

identified as project office, basic PMO, mature PMO, and the enterprise PMO (Garfein, 2005).

Additionally, academic literature similar to Garfein (2005) further defines PMO functions contingent upon the environment within which the PMO exist (Aubry et al., 2010; Hobbs & Aubry, 2008; Pemsel & Wiewiora, 2013). The PMO is embedded within the main organization (Pellegrinelli & Garagna, 2009). This contingent approach is supportive of the contingency theoretical framework of this research design. The PMO and the host organization interact and co-evolve (Aubry et al., 2010) with strategic guidance from the main organization shaping the methods and standards used by a PMO for governance of projects. The analysis of the literature of the varying levels of PMO typologies indicates project success and governance of projects is related to PMO structure. An assessment of this perspective would indicate organizations with few projects and limited requirements require limited governance in contrast to a more mature PMO as an enterprise PMO with increased governance capabilities.

Similar to Garfein (2005), Hill (2004) approaches the typology of PMOs as scaled templates including five stages of a PMO. These stages range from the project office, to the basic PMO, then including both the standard PMO as well as advance PMO, with the fifth stage as a center of excellence (Hill, 2004). Although it is challenging to reduce the variation of PMOs to a “limited number of types” (Hobbs & Aubry, 2008, p. 69), the following paragraphs provide a summary from the literature of a segment of the varying types of PMOs. This summary places emphasis on project success based on

Garfein (2005) previously mentioned typological models: project office, basic PMO, mature PMO, and the enterprise PMO.

### **Project Office, Basic PMO, Mature PMO, and Enterprise PMO**

Discussions on the PMO focus on the functions of the structure. The project office provides governance and project oversight (Hill, 2004). This organizational structure may influence project success as the project office is responsible for monitoring the metrics for project performance (Hill, 2004). A project office can manage a single project or represent an organization entity responsible for assisting project managers and project teams implementing project management (Singh et al., 2009). The basic PMO structure (Hill, 2004) is an organizational categorization capable for managing multiple projects and enable the host organization to implement a standard approach to manage projects. Assistance from the basic PMO provides standardization for project management methods, assistance on individual projects, and maintaining project databases and historical records (Dai & Wells, 2004)

Contingent upon the organization, the PMO structure may provide greater capabilities of governance (Too & Weaver, 2013). More robust PMOs with greater dedicated resources are the mature PMO and enterprise PMO (Garfein, 2005). The mature and enterprise PMO structures govern resource allocation to provide as needed coordination on multiple competing projects (Dai & Wells, 2004). An advantage of a more mature PMO is the capacity to assess and track multiple projects, programs, and portfolios. In contrast to a basic PMO, the mature PMO provides greater synchronization capabilities not usually existing in a less mature PMO (Singh et al., 2009). For instance,



mature PMOs usually have greater capacity for the integration and transfer of knowledge (Pensel & Wiewiora, 2013) usually involving technology and enhanced information systems. A sharing of information and synchronization of knowledge may result in more informed project related as well as business decisions that are reasoned to be more conducive for achieving greater project success (Anderson et al., 2007; Hobbs & Aubry, 2007). Examples of this may include using lesson learned (Gasik, 2011) and historical archives (Desouza & Evaristo, 2006) from previous projects to avoid similar pitfalls on currently executed projects.

### **PMO Governance of Projects, and Related Research**

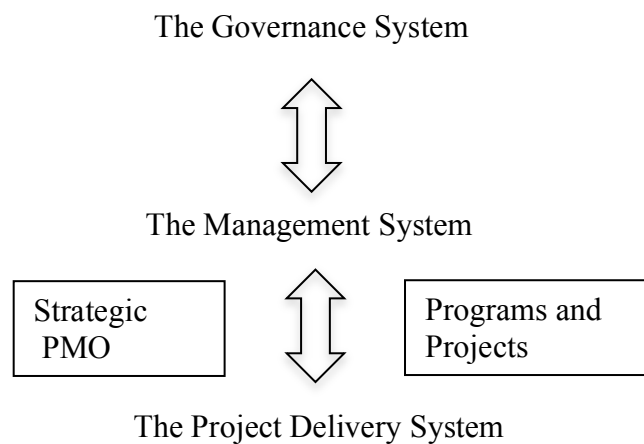
Referring back to discussion in an earlier section in this literature review under governance of projects, PMOs are associated with corporate governance, governance of projects, and project governance. Müller et al., (2014) make a subtle distinction between, governmentality, governance of projects, and project governance. This distinction in governance suggests a need for further inquiry related to this research study reflecting on the variables associated with a PMO and governance of projects in relationship to project success. This literature review recognizes PMOs are organizational enablers of project governance (Müller et al., 2014). As an enabler of project governance, the PMO can likewise influence the outcome of project success (Anderson et al., 2007).

Governance is associated with accountability, oversight, control, and organizational management in an ethical manner (Too & Weaver, 2013). Good governance is the "creation and maintenance of sustainable value for the organization and its stakeholders" (Too & Weaver, 2013, p.4). As a subset of this overall governance,

project governance and governance of projects are related but have a different focus of attention depending on multiple perspectives from the academic literature. Project governance is interrelated with organizational governance and provides functional oversight of the project life cycle through a “comprehensive, consistent method of controlling the project and ensuring its success by defining and documenting and communicating reliable, repeatable project practices” (PMI, 2013, p. 34). Pinto (2014) defines project governance primarily for oversight of individual projects as “use of systems, structures of authority and processes to allocate resources and coordinate or control activity in a project” (Pinto, 2014, p. 8). Müller and Lecoivre, (2014) references the governance of projects as “the collective governance of all projects in an organization from the corporate or board level perspective” (p. 2). These references just cited provide a distinction between governance of project and project governance.

Bekker (2013), however, approaches governance of projects and project governance as a single construct with multiple levels. In referring to the construct, Bekker (2013) defines project governance in relation to the levels of technical, strategic, and institutional. The technical level is associated with daily activities to execute projects, the strategic level is associated with a holistic perspective of value and effectiveness for the organization, and the institutional is associated with a macro-economic level of governance. For this study, governance of projects is treated separate from project governance, although it is recognized that the terminology is related and at time the concepts may overlap. Governance of projects does include methods and standards, but also has application to the larger organization for creating value.

Too and Weaver (2013) provide an example of the role a PMO can play in the governance of projects bridging the levels of project management methodology from project delivery to corporate governance as shown in Figure 2. This relationship reinforces the multidimensional approach of project management where the goal of a successful project as an output of an effective project delivery system is contingent on multiple other factors like those of processes, best practices, and PMO structure (Too & Weaver, 2013).



*Figure 2.* The project governance framework (Too & Weaver, 2013).

Too & Weaver (2013) mentioned project governance and governance of projects are similar although with distinct characteristics. Project governance is interrelated with organizational governance and provides functional oversight of the project life cycle through a “comprehensive, consistent method of controlling the project and ensuring its success by defining and documenting and communicating reliable, repeatable project practices” (PMI, 2013, p. 34). Project governance provides “the alignment of project objectives with the strategy of the larger organization by the project sponsor and the

project team” (PMI, 2013, p. 553) relating to the fit of a project within a larger organizational context in relationship to the environment (Mullaly & Thomas, 2009).

### **PMO and Contingency Research**

In this next section, the review of the PMO office continues with an emphasis on relevant PMO and contingency related research. The literature reveals research on PMO has been accomplished in studies with a contingency theory as the requirements for PMO as based on “needs and environments - unique structural arrangements” (Pellegrinelli & Garagna, 2009, p. 651). This perspective assumes the role of the PMO is contingent on external factors and the application of PMO functions in large part depends on varying organizational conditions. However, since PMOs are heterogeneous, they take on the differing responsibilities and varying roles associated with their unique organizational structure like partnering, controlling, and serving (Müller et al., 2013) as well as various functions as knowledge management, maintaining standards, and resourcing special skills (Pellegrinelli & Garagna, 2009). This uniqueness of PMOs increases the challenges of researching and analyzing PMOs due to diversity of functions with up to 75 different specific PMO function identified (Aubry et al., 2007). Therefore, a certain degree of contingency is assumed in research of PMOs and is justified as appropriate for this proposed research study.

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### **PMO Research Quantitative versus Qualitative**

In addition to the contingency theory and the schools of thought that shape the research mentioned previously in this literature review, “success”, “contingency”, and “governance”, PMO research is also associated with general project management research. This research assumes a framework from the theoretical traditions associated with engineering and science as well as social sciences (Söderlund, 2004). The theoretical traditions of project management associated with both engineering and social science also can be used either qualitative or a quantitative research design (Bredillet, 2010). PMO research and project management research use commonly accepted research design methods including: mixed methods (Hobbs & Aubry, 2008), case studies (Müller et al., 2013; Pemsel & Wiewiora, 2013) longitudinal studies, and quantitative empirical research to including regression analysis (Unger, Gemünden, & Aubry, 2012).

Examples of the qualitative methods research study include Pemsel and Wiewiora (2013) qualitative case study research methodology on PMOs. The approach for their

research study (Pemsel & Wiewiora, 2013) was selected due to the complex nature of the behavior of project managers. Their research design consisted of multiple interviews for data collection, pattern coding, and analysis of subsequent higher-level categories of the results (Pemsel & Wiewiora, 2013). Additionally, the social structure of the PMO may lend itself to a qualitative study as Müller et al. (2013) used in their mixed method case study approach. In contrast, the selected research design for this study will examine project management variables in relationship to the multidimensional aspect of project success (Müller & Jugdev, 2012). This is a different approach than the researcher using a qualitative approach, but not any less valid.

As mentioned previously in this chapter under the review of PMO governance of projects, a critical aspect of the PMO is to provide support to the project managers (PMI, 2013). This support occurs in a number of ways to include: training (Anderson et al., 2007), mentoring (Müller et al., 2013), providing a project management methodology of methods and standards (Rozenes & Vitner, 2009), managing shared resources like historical documents (Desouza & Evaristo, 2006), providing administrative support, and human resource staff assistance (PMI, 2013), and providing project related consulting and mentoring (Dai, 2001; Dai & Wells, 2004; Stewart, 2010). The next few sections will cover the categories that discuss the aspect of governance of projects and indicate the presence of PMO.

## **Project Management Methods and Standards**

The first category that helps define the presence of a PMO and governance of projects is the project management methodology methods and standards. Project management methodology methods and standards consist of: assistance provided in developing a proposal for a project, change request methods, risk assessment processes, standards used for documentation as reports or time sheets, and project closeout procedures (Stewart, 2010). A project management office is the organizational structure that maintains project management standards and methods for the organization (Rozenes & Vitner, 2009). The PMO provides a source for “established procedures, documentation, guidance, and metrics within the practice of project management” (Rozenes & Vitner, 2009, p. 37). Standardized project management methodologies and a formal framework can correspond to increased project success (Milosevic & Patanakul, 2005; Papke-Shields, Beise, & Quan, 2010). Since the multiple authors just mentioned support project management methods and standards when considering project success, it is reasoned that project management methods and standards can be used in similar research as in this study.

However, research indicates it is essential to balance the consistency of standardized methods (Hällgren, 2012) with the flexibility to address uncertainty, complexity, and contingent situations in project management (Leybourne & Sainter, 2012). Milosevic and Patanakul (2005) highlight for standardization there comes a point where the standardization becomes too rigid and the benefits obtained by increased project management standardization are lost in the increased bureaucratic organizational

structure "increasing standardization further beyond this point – which we referred to as an inflection point – may actually stifle project success" (Milosevic & Patanakul, 2005, p. 191). When standardization begins to reach the point of limiting flexibility a contingency approach of standardized project management may be more appropriate (Milosevic & Patanakul, 2005). An applied contingency approach based on the situation and conditions of the organization would balance standards with flexibility. A balanced approach like this is referred to as ambidexterity (Leybourne & Sainter, 2012).

Ambidexterity in organizations “considers the benefits of utilizing routine, process, and structure and more emergent, improvisational working styles, and leveraging the benefits of both simultaneously to improve performance” (Leybourne & Sainter, 2012, p. 5). Ambidexterity considers exploitation and exploration (Leybourne & Sainter, 2012). Exploitation concentrate on an existing condition and exploration capitalizes on the changing conditions of the organization in relation to the environment (Leybourne & Sainter, 2012). This approach is consistent with the theoretical foundation of a contingency approach where the organization makes adjustments considering internal and external conditions (Mullaly & Thomas, 2009).

### **Project Historical Archives**

The next category that helps define the presence of a PMO and governance of projects is historical archives. Project historical archives consist of change information from previous projects, risk management documentation from prior projects, plan versus actual variance analysis, metrics and information on prior successful and unsuccessful projects, and lesson learned databases (Stewart, 2010).



Project archives are significant as they provide reference of collected project knowledge and future projects (Pemsel & Wiewiora, 2013). Project teams often have the internal resources as project software like MS Project, or Primavera (Jugdev, Perkins, Fortune, White, & Walker, 2013) to monitor the status of project execution within their team. However, the ability to access and assess similar ongoing or completed projects may be beyond the capacity of a single project team. A PMO resource of historical archives of lesson learned, a database of prior project risk management documents, or information on successful and unsuccessful prior projects (Desouza & Evaristo, 2006) could be of benefit to a project team. Historical archives help provide a conduit of knowledge repository (Gasik, 2011) to document and share knowledge to mitigate risk to project failure (Desouza & Evaristo, 2006) and improve likelihood of project success.

Desouza and Evaristo (2006) highlight a primary reason for project failure is inadequate knowledge management in the form of poor communication, poor use of previous lesson learned, and inadequate use of information sharing. PMO functions include the capacity for knowledge management (Aubry, Müller, & Glückler, 2011) to include managing project management document archives as well as databases on risks and on lesson learned. Pemsel and Wiewiora (2013) additionally state PMOs provide the added capacity to provide a “repository for lessons learned” (p. 36). Müller et al., (2014) refer to components of the elements of historical archives such as databases as mechanisms that in combination with the critical success factors (CSF) previously mentioned in this literature review result in organizational enablers. The consideration of combining multiple factors of project success is noted as the significant. Specifically,

that CSFs alone are not necessarily the sole determinant of project success, but rather a multidimensional approach of a combination of CSF and mechanisms as those found in variables like the presence of historical archives may influence project success.

In contrast, Julian (2008) indicated using historical archives was not a significant factor for project success. Julian (2008) highlights citing Keegan and Turner (2001) from a study of 19 project-based firms “that all the companies in their study “without exception” had lessons learned policies in place to capture learning from projects once completed. Yet even though policies were in place to hold the reviews, it rarely happened” (Julian, 2008, p. 90). Julian (2008) further comments on this study of the high dissatisfaction level of those using the policies of maintaining lessons learned. Pemsel and Wiewiora (2013) also highlight that there are limitations of just establishing policies for knowledge sharing of historical archives. However, along with certain limitations there are also opportunities for the “role of a PMO as a knowledge broker” (Pemsel & Wiewiora, 2013, p. 32) to facilitate knowledge sharing among the projects. In considering the pros and cons of application for this research design, it was reasoned appropriate to include historical archives as a valid component of the governance of projects related to project success due to the number of researcher mentioned that support the inclusion in their research.

### **Project Administrative Support and Human Resource Staff Assistance**

The next two categories that help define a PMO and governance of projects are project administrative support and project human resource staff assistance. Project administrative support consists of administrative staff to coordinated periodically with the

project team, administrative assistance provided to help document project results through standard documentation, use of a project conference room or meeting place available for the project team, standardized project management software made available to project team (Stewart, 2010). Project human resources staff assistance consists of: proper person identified to manage project, skill requirements to manage project provided to project manager, assistance for performance evaluation of project team members provided to project manager, project staff recruitment guidelines provided, and project staff recruitment assistance provided (Stewart, 2010).

Administrative support can be considered a role of a PMO (Hurt & Thomas, 2009). In this capacity, administrative support as a function of the PMO along with vision and leadership can add value to an organization (Hurt & Thomas, 2009). Desouza and Evaristo (2006) also document administrative as a type of PMO dimensions along with the dimension of knowledge to provide support as, coach, information manager, and knowledge manager.

PMOs are also a “facilitator of human resources” (Spalek, 2013, p. 88). Costa (2013) highlights that inadequate allocation of human resources to projects can result in “problems that negatively influence the success of projects” (p. 102). Additionally, Zwikaël and Unger-Aviram (2010) state, “Human resource management (HRM) practices are critical for organizational success” (p. 413). Contingency theory and concept of “fit” mentioned earlier in this chapter have application with respect to the level and degree of human resource staff assistance. PMOs can facilitate support to a project team with recruitment of managers and team members as team dynamics and the fit considering

social ties of the team is important (Ballesteros-Pérez, González-Cruz, & Fernández-Diego, 2012). In addition, contingency theory is important in establishing project teams influencing decisions on assignment of personnel as “fit between a candidate's set of skills and the skills required for the tasks” (Costa, 2013, p. 101) are important to the function of a project team.

### **Project Related Training, Consulting, and Mentoring**

The final two categories discussed that define the presence of a PMO governance of projects are project related training and consulting and mentoring. Project related training consist of: Assistance provided to project team members to identify and document skill sets, training provided to project team members on project management and it's relationship within the organization, training provided to project team members on relevant project management software, management supported attendance at training courses for strategic training requirement, and training and coaching provided as appropriate in one-on-one settings (Stewart, 2010). Project consulting and mentoring consist of assistance provided as appropriate ensuring utilization of project management in correct manner, assistance provided in deciding viable solutions for unexpected problems in timely fashion, project managers receiving mentoring as needed for unique situation to ensure success of project, executive management receiving suggestions on unique measures required for projects as appropriate, and project managers having access to face-to-face or electronic group sharing sessions (Stewart, 2010).

Since project are temporary organizations “that disband upon the completion of their work” (Julian, 2008, p. 88), the training and competence of individual team

members may be difficult to manage with project internal resources. The PMO typology identified as a headquarters PMO (Müller et al., 2013) provides “tools, techniques, training, and certification programs” (p. 66). A PMO additionally, can help coordinate training, track training competence, and monitor training needs (Anderson et al., 2007). Müller et al. (2013) state that a PMO provides support to a project team and “provides for operational support in projects through training, consulting, and specialized task execution” (p. 61).

In addition to training as a PMO governance factor are other PMO factors of mentoring and consulting. Anderson et al. (2007) state roles of PMO include “having “mentors” to offer aid, monitoring the projects’ performance, harmonizing approaches and tools between the projects, and competence development” (p. 99). PMOs can provide the structure needed to guide and assist in the development of members of the project team. Dai and Wells (2004) highlight the role for the PMO as “mentoring on unique measures that must sometimes be taken to foster project success” (p. 525).

### **Summary**

In summary, this literature reviewed provided a review of project management variables associated with Project Management Office (PMO) governance of projects (Müller et al., 2014) in relationship to project success (Davis, 2014). The review explored relevant literature related to the research problem of the reoccurrence of unsuccessful projects in organizations that have PMO structures (Too & Weaver, 2013).

The first portion of the literature review approached an overview of the research from a holistic perspective. The element in this overview included projects, project

management methodologies, and the governance of projects. The review discussed key definitions related to the research study. The definitions included definition of a project as “a temporary endeavor undertaken to create a unique result, product or service” (PMI, 2013, p. 552). Likewise, the definition of a project management methodology was identified as “the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements” (PMI, 2013, p. 554). Finally, governance of projects was defined as factors for “the value system, responsibilities, processes and policies that allow projects to achieve organizational objectives and foster implementation that is in the best interest of all the stakeholders, internal and external, and the corporation itself” (Müller & Lecoivre, 2014, p. 2). Projects and project management offices defined projects as temporary and unique (PMI, 2013) while PMOs were characterized as unique (Aubry et al., 2007) yet had a more permanent structure in organization. These characteristics were important to this research study due to the way in which they might influence project success. Additionally, the review highlighted the heterogeneous nature of PMOs that could potentially create limitation for research design with regard to the generalizability of PMO related research results to other organizational structures (Müller et al., 2013).

The next section in the literature review identified the theoretical construct of contingency theory (Hanisch & Wald, 2012). Contingency theory states that any situation must consider both internal and external constraints (Mullaly & Thomas, 2009). In context of research design, the effectiveness of project management and the governance of projects are dependent on degree of “fit” among variables within the

organization and the environment (Mir, & Pinnington, 2014). However, this approach of using contingency theory does have limitations as project management is “far too complex to be explained by one unified theory” (Shenhar & Dvir, 2007, p. 97).

Additional insight was provided for the research study from the literature review from the perspective of the schools of thought within the field of project management. The schools of thought having the greatest application for this research study were the governance school of thought, the contingency school of thought, and the success school of thought (Turner et al., 2013).

Subsequent sections of the literature review addressed project success, measures of project success, and project success research. The review revealed the definition of what constitutes project success has little universal agreement (Mir & Pinnington, 2014). Additionally, there were at least two approaches to measuring project management successes. The classical approach is referred to by authors as “Iron Triangle” (McLeod et al., 2012, p.69) or the “Golden Triangle” (Turner & Zolin, 2012) and balances scope, budget and schedule (Cuellar, 2010). In contrast, another approach to measure project success is a multidimensional approach (McLeod et al., 2012; Shenhar et al., 2001). A multidimensional approach to project success consists of analyzing the influence of multiple independent variables on the single outcome of project success. This multidimensional approach is judged valid for this research design as project management is a complex field of study with multiple complex variables (McLeod et al., 2012). Additionally, project success is largely determined by the perspective of the stakeholder (Müller & Jugdev, 2012).

The final sections of the literature review addressed the PMO, PMO research, research of governance of projects, PMO and contingency research, and qualitative versus quantitative research with respect to the research problem. From the review, PMO governance of projects, an important function of a PMO, is to provide support to the project managers (PMI, 2013). This occurs through training (Anderson et al., 2007), mentoring (Müller et al., 2013), providing a project management methodology of methods and standards (Rozenes & Vitner, 2009), managing shared resources like historical documents (Desouza & Evaristo, 2006), providing administrative support, and human resource staff assistance (PMI, 2013), and providing project related consulting and mentoring (Dai, 2001; Dai & Wells, 2004; Stewart, 2010). From these variables (Dai & Wells, 2004), research can be conducted on the presence of PMOs (Dai, 2001) and governance of projects (Müller et al., 2014) in relationship to project success as proposed in this research study.



### **CHAPTER 3. METHODOLOGY**

The purpose of this non-experimental correlational research study is to analyze the significance of the variables that indicate the presence of a PMO (Dai & Wells, 2004) and governances of projects (Müller et al., 2014) in relationship to project success. The study will also analyze the relationship of project management methods and standards to project success. This study will further analyze project management methods and standards in relationship with project success when moderated by a formal PMO structure. This research study analyzes the problem of the reoccurring issue of unsuccessful projects in organizations with a project management office (PMO). The research methodology supports the research design and considers the theoretical foundation of contingency theory (Mullaly & Thomas, 2009). The research systematically addresses multiple variables to assess level of “fit” (Venkatraman, 1989) with degree and direction of variables using correlation analysis as well analyzing the predictive nature of the variables using linear regression. This chapter includes discussions on the research design and methodology, research sample, data collection, data analysis, instruments and measures, validity and reliability, and ethical consideration. Finally, this chapter concludes with a summary of the discussed methodology the study.

#### **Research Design**

The methodological approach for this research study is non-experimental correlational study to determine what extent the independent variables explain the

dependent variable (Aubry & Hobbs, 2011; Singh et al., 2009). The research design seeks to provide results to add empirical evidence for the relationship of PMOs and governance of projects to project success (Singh et al., 2009). Additionally, this design requires the collection of data from a single reference point in time and is a cross-sectional correlational research design using statistical analysis based on a positivist perspective (Bryant, 2005).

The methodology for this type approach is consistent with similar research in the literature (Dai, 2001; Stewart, 2010). Linear regression analysis for research with multiple independent variables and a dependent variable is supported in statistical textbooks (Field, 2009). Prior authors have influenced the framework of the research design, as Thomas and Mullaney (2007) encourages additional analysis and thorough investigations to better understand how the value of project management can contribute to organizations.

From a positivist perspective, data for this study is collected considering an object view of reality. This is accomplished using the Survey Monkey Audience Service and a validated instrument survey questionnaire. The Survey Monkey Audience Service was selected as a method for collecting data as it provides a random sample of data to “maximize external validity” (Vogt, 2007, p. 78) from Survey Monkey’s extensive database increasing the generalizability of the results (Creswell, 2009). The data collected from the survey will be imported into the IBM Statistical Package for the Social Sciences (SPSS), version 22 also referenced as IBM SPSS v22. IBM SPSS v22 is an accepted commercial statistical software commonly used in academic research (Field,

2009). This analysis will attempt to identify statistical significances between the selected independent and dependent variables. The tests used to investigate the hypotheses involve three inferential statistical tests to draw conclusion beyond just the data (Trochim, 2006). These tests are multiple linear regression, bivariate correlation, and regression with moderation.

The descriptive statistics will seek to describe (Trochim, 2006) and test for the measure of the central tendency, measure of relative position, measure of association, and measure of dispersion (Vogt, 2007). To complete the analysis of the data using descriptive statistics, exploratory data analysis will also be conducted on the variables generated from the data in the survey instrument. The exploratory analysis will be conducted checking for violations of assumptions of the statistical test. One test required is the test for normality since parametric test of regression and correlation are used. This analysis will include visual inspection as well as analysis based on established norms of each test assessing the report outputs from IBM SPSS v22. Test for normality include visual analysis of the histogram looking for a pattern similar to a bell shaped curve as well as visually inspecting the scatter plot for data expected to represent generally a straight line (Field, 2009). Likewise, analysis will be conducted looking for trends or indicators from the mean, standard deviation, as well as inspecting for outliers or missing data.

The first inferential statistical test is multiple linear regression to analyze independent variables in relation to the single dependent variable (Hoyt, Imel, & Chan, 2008). This analysis is predictive in nature, and the regression is use to determine the

relationship of the variables indicating the presence of a PMO and governances of projects (Müller et al., 2014) to project success. The second statistical test for this study is bivariate correlation to determine strength and directional relationship between variables. It is used to analyze the relationship of project management methods and standards to project success. No cause and effect is sought in this bivariate correlational test (Rockinson-Szapkiw, 2013), as this would not be appropriate for this type of test. Finally, this study will conduct linear regression testing for moderation. Linear regression will analyze the relationship between project management methods and standards and project success when moderated by a formal PMO structure.

This research study seeks to collect and analyze data to answer the research question. The research question has been further divided into multiple sub-questions for greater specificity with respect to the identified research problem. The research questions are identified as the central research question, sub-question 1, and sub-question 2.

The central research question is as follows:

What is the relationship between the six independent variables associated with presence of PMO governance of projects: project management methods and standards, project historical archives, project administrative support, project human resource staff assistance, project related training, and project related consulting and mentoring, to the dependent variable of project success (Dai & Wells, 2004)?

For the central research question, inferential statistical test using multiple linear regression will be conducted for hypothesis H1.

H<sub>0</sub>1: There is no statistically significant relationship between variables associated with presence of PMO and governance of projects to project success.

H<sub>A</sub>1: There is a statistically significant relationship between variables associated with presence of PMO and governance of projects to project success.

The next inferential statistical test is bivariate correlation on research sub-question 1. Bivariate correlational analysis will be conducted with the variable project management methods and standards as the independent variable with project success as the dependent variable.

Sub-Question 1: Is there a relationship between project management methods and standards to project success?

H<sub>0</sub>2: Project management methods and standards have no linear relationship with project success.

H<sub>A</sub>2: Project management methods and standards have a linear relationship with project success.

Additionally, bivariate correlational analysis will similarly be conducted on all six independent variables associated with the presence of a PMO and governance of projects in relation to projects success for hypothesis H3 through H7.

H<sub>0</sub>3: Project historical archives have no linear relationship with project success.

H<sub>A</sub>3: Project historical archives have a linear relationship with project success.

H<sub>0</sub>4: Project administrative support has no linear relationship with project success.

H<sub>A</sub>4: Project administrative support has a linear relationship with project success.

H<sub>0</sub>5: Project human resource and assistance has no linear relationship with project success.

H<sub>A</sub>5: Project human resource and staff assistance has a linear relationship with project success.

H<sub>0</sub>6: Project related training has no linear relationship with project success.

H<sub>A</sub>6: Project related training has a linear relationship with project success.

H<sub>0</sub>7: Project related consulting and mentoring has no linear relationship with project success.

H<sub>A</sub>7: Project related consulting and mentoring has a linear relationship with project success.

The final inferential statistical test is linear regression with moderation on research sub-question 2 and hypothesis H8.

Sub-Question 2: What is the relationship of project management methods and standards to project success when moderated by a formal PMO?

H<sub>0</sub>8: Project management methods and standards have no linear relationship with project success when moderated by a formal PMO.

H<sub>A</sub>8: Project management methods and standards have a linear relationship with project success when moderated by a formal PMO.

### **Sample**

The data for this research study will be collected from a population of project team members in organizations that execute projects. The inclusion criteria for the sample frame are project-oriented organizations executing project management methods

and standards with or without a PMO. Exclusion criteria eliminate those project team members that are not participants in the Survey Monkey Audience Service. Other exclusion criteria are those potential respondents that cannot respond to an English based survey.

The sample frame is generated from a collection of random respondents using Survey Monkey Audience Service. The random respondents will complete an online survey of questions using the selected instrument. This sample frame includes individual project team members (project manager, project support manager, project coordinator, operational business team member affected by project, or project sponsor) in organizations that execute projects. The sample frame is comparable to previous research samples (Stewart, 2010).

This research design seeks to achieve the largest practical sample size for the representative sample (Vogt, 2007). From an A priori sample size for multiple linear regression, it was determined 109 respondents would be required for this study. This number was determined using several sample calculators as G\*Power 3 software and selecting the largest sample size from multiple calculators to help to reduce risk to the study. To determine how feasible this number was, a review of the literature was also conducted. This review recommends 10 to 20 times respondents as the number of variables (StatSoft Inc., 2013). This indicates a sample size 50-100 for this research design with five independent predictor variables planned using multiple regression. An A priori sample size calculator for multiple linear regression yielded lower numbers of a sample of 91 based on effect size = .15, probability of error  $\alpha$  = .05 and Power = .8

(Soper, 2014). A lower estimated sample resulted in a number of 43 when using G\*Power 3 software (Faul, Erdfelder, Buchner, & Lang, 2009). Field (2009) describes a sample size of 109 for a multiple regression analysis with five independent predictor variables as in this research design. 109 was determine as most appropriate sample size for this research design as it was the largest A priori result from multiple different statistical calculators and corresponded with similar sizes from a review of the literature.

### **Instrumentation/Measures**

The data collection instrument for this research analysis is the “Project Management Institute Members Questionnaire” (Stewart, 2010, p.116-122). This validated instrument is used because of the similarity of this design to previous research on project management and PMO related variables (Stewart, 2010). Stewart’s (2010) instrument expands upon a previous study of PMOs and project management (Dai, 2001). This instrument is considered valid to consistently measure the independent and dependent variables with a high degree of accuracy for survey research (Trochim, 2006) as Dai (2001) completed Confirmatory Factor Analysis with the instrument in her study to assess construct validity. Additionally, Stewart (2010) built on Dai’s (2001) reliability of the instrument by conducting a pilot study using this instrument on selected professionals in the field.

This instrument consists of 67 questions subdivided into several sections. The first section consists of 11 questions related to background information and demographics of the respondent and the respondents association with projects and project management. The next section consists of 14 questions on project performance including one question,



question 25, which provides inquiry on the overall assessment of project success by the respondent. The next section has 12 questions specific to PMO related information. The final section of the questionnaire consists of 30 questions in five specific areas defined in the next several sections in this chapter.

### **Constructs and Variables**

This validated instrument is used to measure the identified variables considering the constructs of governance of projects and project success (Müller & Lecoivre, 2014). Governance of projects (Müller & Lecoivre, 2014) is defined by Pinto (2014), “The use of systems, structures of authority and processes to allocate resources and coordinate or control activity in a project” (p. 383). This definition includes organizational structure (Hatch, 2006; Mihm, Loch, Wilkinson, & Huberman, 2010; Reed, 2003) like a PMO. The governance of projects is analyzed within the organizational structure of a PMO in relationship to project success. Project success as a construct includes the factors of success consisting of: projects on schedule, projects within budget, completed projects used by client, completed projects having direct benefits to clients, completed project being a best choice from competing alternative projects, degree of clients satisfied with the process to manage a project, project meeting intended use, and project leading to improved performance (Stewart, 2010). This project success construct assumes multidimensionality (Shenhar et al., 2001) and is contingent on one or more independent predictor variables. The construct of governance of projects and project success is clarified by measurement of defined variables. These variables include: project success (PS), Project Management Office (PMO), methods and standards (PM), project historical

archives (HA), project administrative support (AS), human resource/ staff assistance (HR), training (TR) and consulting and mentoring (CM; Dai & Wells, 2004; Stewart, 2010).

### **Data Collection**

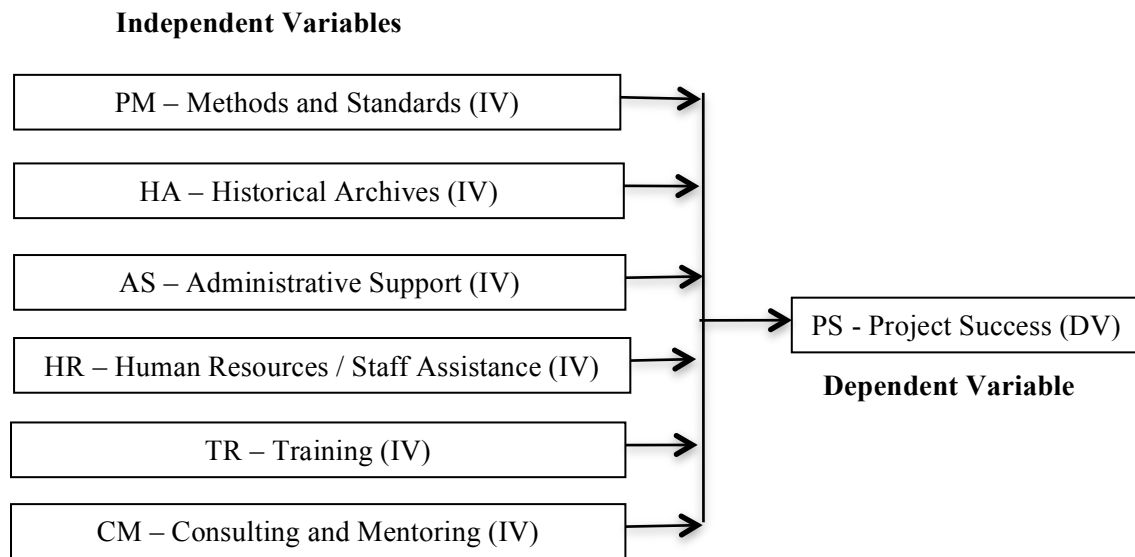
The process for data collection will be completed using the Survey Monkey Audience Service to solicit responses from a random population of project team members in organizations that execute projects. The sample frame of project team members (project manager, project support manager, project coordinator, operational business team member affected by a project, or a project sponsor) in organizations that execute projects will be used by Survey Monkey Audience Service to produce the requested responses.

The method of delivery and return is through the web based Survey Monkey Audience Service where the selected instrument, “Project Management Institute Members Questionnaire” (Stewart, 2010, p.116-122), will be uploaded. Informed consent will be included along with instructions for the potential respondents at the Survey Monkey website for the Survey Monkey administered questionnaire. The estimated time to complete the survey questionnaire is 15-20 min. Survey Monkey Audience Services will keep the survey open until at least 109 respondents have completed the online questionnaire after which the survey site access will be closed. Survey data will remain available for download and analysis through a Survey Monkey account. Data will be downloaded and screened to ensure none of the data received contains any personally identifiable information (PII).

## **Data Analysis**

After the data is collected, an SPSS data file will be created and exported from Survey Monkey Audience into IMB SPSS v22. The data will then be used to analyze the research question and hypotheses using statistical techniques of multiple regression, bivariate correlation, and regression with moderation for each of the research questions respectively. Prior research in project management relied on similar statistical analysis methods (Dai, 2001; Dai & Wells, 2004; Stewart, 2010). The statistical parametric tests selected make use of the Central Limit Theorem where the means are “approximately normally distributed” (Norman, 2010, p. 228) on data gathered using Likert scale measures (Carifio & Perla, 2008; Norman, 2010).

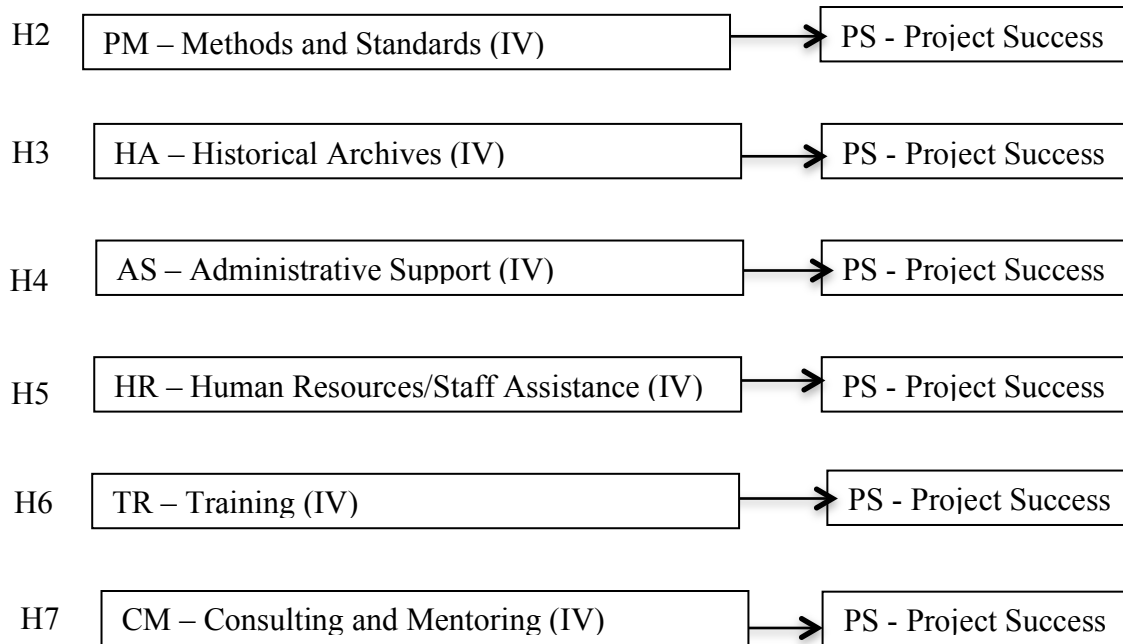
For the central research question, inferential statistical test using multiple linear regression will be conducted. Figure 3 displays the graphical relationship between the independent predictor variables and the dependent outcome variable applying the regression model.



*Figure 3.* Relationship between predictor variables and outcome variable.

For the first sub-question 1, bivariate correlational analysis will be conducted to determine the strength and direction of relationship with the variable project management methods and standards as the independent variable with project success as the dependent variable for hypothesis H2. Additionally, bivariate correlational analysis will similarly be conducted on all six independent variables associated with the presence of a PMO and governance of projects in relation to projects success for hypothesis H3 through H7.

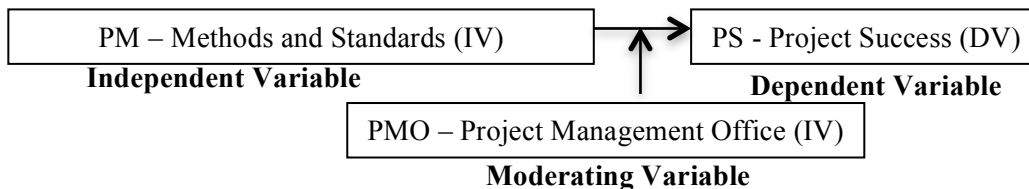
Figure 4 displays the graphical relationship between the independent predictor variables and the dependent outcome variable applying a correlation model.



*Figure 4.* Relationship between predictor variables and outcome variable.

For the first sub-question 2, the final inferential statistical test is linear regression with moderation on hypothesis H8 to determine the relationship between multiple predictor variables and the dependent variable.

Figure 5 displays the graphical relationship between the independent predictor variables and the dependent outcome variable applying a regression model with moderation.



*Figure 5.* Relationship between predictor and outcome variable with moderator.

Table 2 summarizes the statistical test mentioned and purpose of the statistical test for the associated hypothesis and related independent and dependent variables.

Table 2  
*Statistical Test*

Hypothesis	Variables	Statistical Test	Purpose of Test
H1	Independent variables: methods and standards (PM) historical archives (HA) administrative support (AS) human resource/staff assistance (HR) training (TR) consulting and mentoring (CM) Dependent variable: project success (PS)	Multiple linear regression	Determine the relationship between multiple independent variables and the dependent variable
H2-H7	Independent variable: methods and standards (PM) Dependent variable: project success (PS)	Bivariate correlation	Determine strength and direction of relationship
H8	Independent variable: methods and standards (PM) Moderator variable: formal PMO (PMO) Dependent variable: project success (PS)	Multiple linear regression with moderation	Determine the relationship between multiple predictor variables and the dependent variable

### **Validity and Reliability**

Validity consists of the level to which an implemented measure achieves the results set out to measure or the “meaningfulness of research components” (Drost, 2011, p. 114). A random sample was selected for this study to attempt to mitigate threats to external validity and increase generalizability (Vogt, 2007).

Reliability is the “extent to which measurements are repeatable” (Drost, 2011, p. 105). The reliability for this research study is increased as it builds upon previous valid results in the literature (Dai, 2001; Stewart, 2010). Dai (2001) in her research design conducted tests to measure the Cronbach’s alpha to ensure the selected instrument consistently measured what was supposed to be measured. Cronbach’s alpha approximates the split-half reliability (Field, 2009) and is the internal consistency of a test to determine the instrument reliability.

### **Ethical Considerations**

Ethical considerations in the sampling are mitigated by using an independent survey agent, Survey Monkey. The request for survey responses from this third party site is expected to offer a degree of transparency on the intent of the research survey as well as protecting confidentiality of respondents. Consideration of proper handling of gathered data is relevant and all prudent precautions to maintain the accuracy and privacy of the data will be used. There is no anticipated collection of any personally identifiable information (PII) expected during the survey. Additionally, the random respondents are from volunteers who freely choose to participate in the research study understanding the intent of the survey is to gather data for academic research and analysis. The benefits versus risks (U.S. Department of Health & Human Services, 1979) have been assessed during the research design and there are no identified ethical issues in this research design.

In addition, this research design seeks to mitigate ethical concerns for non-experimental correlational research. The data will be treated securely in an unbiased

manner. This mitigation is sensitive to the principles including respect of persons, justice, and beneficence (Bryant, 2005). Safeguards for applying these principles are implemented where subjects “must be fully informed about what participation means, including what benefits and risks they might experience” (Bryant, 2005, p. 431). Additional safeguards include, receiving Institutional Review Board (IRB) approval before beginning the research study, and getting additional IRB approval for any deviation in the research design.

In addition, this research study will also provide a statement to potential respondents of the survey instrument questionnaires that the study involves research and what the purpose of the research is. Since the only information linking the research to confidential information would be the inform consent form and the research is of minimal risk of harm to the participants, a waiver for informed consent was requested.

Finally, this research design incorporates mitigation techniques to reduce or eliminate threats to internal validity including using the same survey instrument throughout the survey to sustain the same “measurement procedures” (Patten, 2012, p. 91). Additionally, using a random sample through the Survey Monkey Audience Service is expected to also reduce or eliminate threats to internal validity.

### **Summary**

This non-experimental correlational research study seeks to determine the degree to which project success is a function of the presence of a project management office. The study also analyzes the relationship of project management methods and standards to project success. Finally, the study analyzes the relationship between project management



methods and standards when moderated by a formal PMO structure. The methodological approach of the study uses both descriptive and inferential statistical analysis on data generated from a validated research instrument consisting of a survey questionnaire with 67 questions administered through the Survey Monkey Audience Service. The random data exported from Survey Monkey is imported into IBM SPSS v.22 for analysis using three statistical tests with eight hypotheses. Hypothesis H<sub>01</sub> is proposed to answer the central research question. Hypothesis H<sub>02</sub>, H<sub>03</sub>, H<sub>04</sub>, H<sub>05</sub>, H<sub>06</sub>, and H<sub>07</sub> are proposed to answer sub-question 1 and Hypothesis H<sub>08</sub> is used to answer sub-question 2. The test on H<sub>1</sub> tests multiple independent predictor variables in relationship to dependent variables using multiple linear regression analysis. The second statistical test for testing hypotheses H<sub>2</sub> through H<sub>8</sub> is bivariate correlation on a single independent predictor variable and a single dependent variable. The final statistical test uses linear regression of an independent predictor variable on a dependent variable with moderation.

## **CHAPTER 4. RESULTS**

The purpose of this chapter is to present the results of the data analysis for this research study by addressing the central research question, two sub-questions, and their associated hypotheses. This chapter provides results of this non-experimental correlational research design used to determine the degree to which PMO related variables associated with governances of projects (Müller et al., 2014) are related to project success (Mir & Pinnington, 2014). The results documented in this chapter make use of the statistical outputs from IMB SPSS v22 applying both descriptive and inferential statistical analysis. The descriptive statistical analysis used exploratory data analysis (Trochim, 2006) while the inferential statistical analysis used multiple linear regression, bivariate correlation analysis, and linear regression with moderation (Field, 2009). This chapter encompasses the results of the analysis organized in the following sections: description of the population and sample, summary of results, details of analysis and results, and conclusion.

### **Description of the Population and Sample**

The population for this research study included project team members in organizations that execute projects. The inclusion criterion for this sample frame was project team members in project-oriented organizations executing project management methods and standards with or without a PMO.

The target sample frame requested for analysis prior to the survey was ( $n = 109$ ). The final number analyzed from random respondents generated from the Survey Monkey

Audience Service was ( $n = 114$ ) with a Power = .8 (Soper, 2014). Figure 6 lists the categories of individual project team members. A majority of the respondents were project manager ( $n = 31$ , 27.2%) and the smallest percentage of respondents identified as project sponsor ( $n = 3$ , 2.6%). The remainder of the respondent distribution included project team member (administrative;  $n = 24$ , 21.1%), project team member (technical;  $n = 21$ , 18.4%), member of business unit affected by the project ( $n = 15$ , 13.2%), project support manager ( $n = 9$ , 7.9%), and project coordinator ( $n = 11$ , 9.6%).

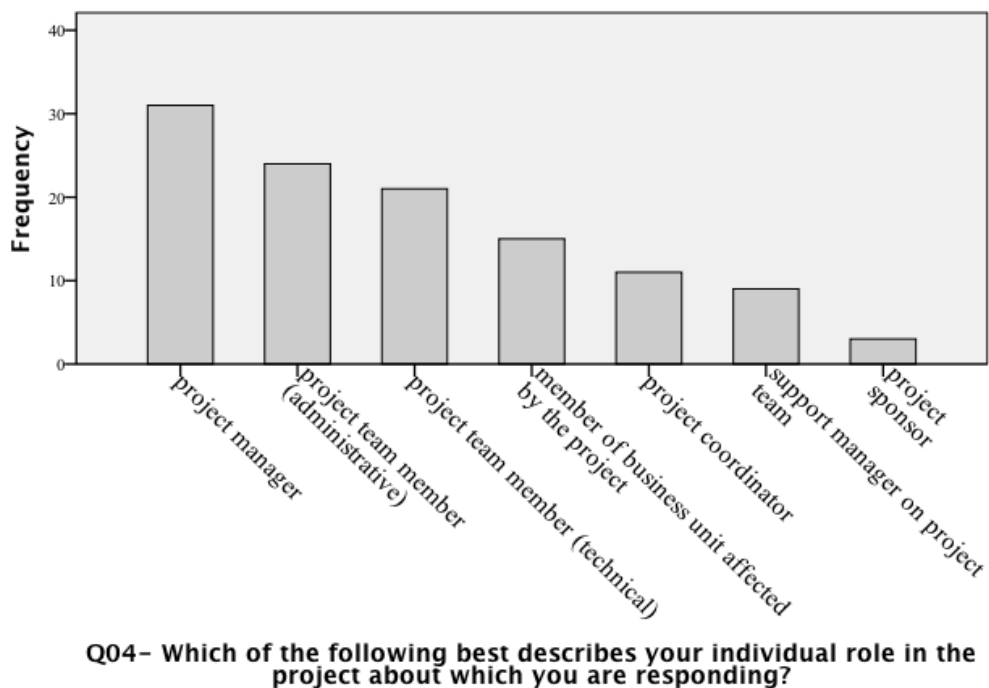


Figure 6. Bar Chart graph describing the respondent's role for the project.

The certification, level of experience, and education level varied across the demographic for the sample. 24.6% ( $n = 28$ ) were certified through the industry benchmark of the PMI Project Management Professional (PMP) while 75.4% ( $n = 100$ )

were not. Additionally, Table 3 displays the highest level of education completed for each respondent. The education level for almost half of the 114 respondents had received a bachelor's degree ( $n = 56$ , 49.1%) the remainder had a high school education ( $n = 24$ , 21.9%) or master's degree ( $n = 27$ , 23.7%), while a small percentage had a non-PhD other Doctorate education ( $n = 6$ , 5.3%).

Table 3  
*Highest level of education completed*

Education Level	Frequency	Percent	Valid Percent	Cumulative Percent
HS	25	21.9	21.9	21.9
Bachelors	56	49.1	49.1	71.1
Masters	27	23.7	23.7	94.7
Other Doctorate (ex-DBA)	6	5.3	5.3	100.0
Total	114	100.0	100.0	

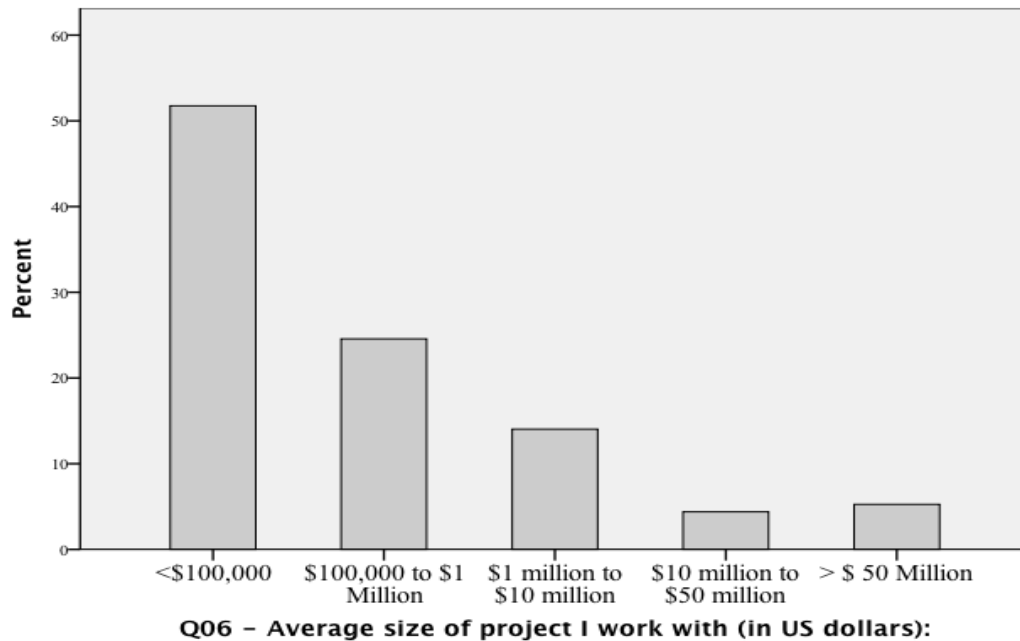
Table 4 displays the years of experience with 80.7 % or 92 of the 114 respondents having more than five years of experience.

Table 4  
*Years of full-time work experience*

Range of years of experience	Frequency	Percent	Valid Percent	Cumulative Percent
<2	4	3.5	3.5	3.5
3 to 5	18	15.8	15.8	19.3
5 to 10	17	14.9	14.9	34.2
11 to 20	26	22.8	22.8	57.0
>20	49	43.0	43.0	100.0
Total	114	100.0	100.0	

The average size of the project in US dollars is displayed in Figure 7 with a majority of the projects in the range < \$100,000 ( $n = 59$ , 51.8%). The remaining

distribution of average size project from the respondents was \$100,000 to \$1 Million ( $n = 28$ , 24.6%), \$1 million to \$10 million ( $n = 16$ , 14.0%), \$10 million to \$50 million ( $n = 5$ , 4.4%), > \$50 Million ( $n = 6$ , 5.3%).



*Figure 7. Average size of project in US dollars.*

### Summary of the Results

Analysis of the data for the research question and subsequent sub-questions was based on parametric statistical tests considering the Central Limit Theorem for multiple linear regression, bivariate correlation, and linear regression with moderation. Visual verification testing for normality and linearity were conducted and the results confirmed no apparent violation of the assumptions for each of these parametric tests and the tests were considered statistically valid for each question discussed as follows.

### **Central Research Question**

The central research question asked if there was a significant relationship between the variables associated with presence of PMO and governance of projects identified as: project management methods and standards, project historical archives, project administrative support, project resource staff assistance, project related training, and project related consulting and mentoring to the dependent variable of project success (Dai & Wells, 2004). The process used to analyze this research question and associated hypothesis was with statistical analysis using multiple linear regression.

The results of data analysis for hypothesis H1 indicated there was a statistically significant relationship with  $p < .05$  [ $F(6,101) = 22.38, p = .000$ ] between independent variables associated with presence of PMO and governance of projects to project success.

### **Sub-Question 1**

Sub-question 1 asked, if there was a relationship between project management methods and standards and project success? The process used to analyze this research question and associated hypothesis was with statistical analysis using bivariate correlation. The results of data analysis for hypothesis H2 indicated the variable project management methods and standards has a linear relationship to project success,  $r(113) = .561, p = .000$ .

Additionally, similar analysis using bivariate correlation was conducted on the other associated variables of governance of projects and presence of PMO as displayed in hypothesis H3 through H7.

The results of data analysis for hypothesis H3 indicated the variable project

historical archives has a linear relationship with project success,  $r(113) = .681, p = .000$ .

The results of data analysis for hypothesis H4 indicated the variable project administrative support has a linear relationship with project success,  $r(114) = .661, p = .000$ .

The results of data analysis for hypothesis H5 indicated the variable project human resource staff assistance has a linear relationship with project success,  $r(112) = .604, p = .000$ .

The results of data analysis for hypothesis H6 indicated the variable project related training has a linear relationship with project success,  $r(112) = .617, p = .000$ .

The results of data analysis for hypothesis H7 indicated the variable project related consulting and mentoring has a linear relationship with project success,  $r(113) = .704, p = .000$ .

## **Sub-Question 2**

Sub-question 2 asked what is the relationship of a project management methods and standards to project success when moderated by a formal PMO? The process used to analyze this research question and associated hypothesis was with statistical analysis using multiple linear regression with moderation. The result of the data analysis for hypothesis H8 was the variable project management methods and standards has no linear relationship with project success when moderated by a formal PMO. The result of the analysis on the hypothesis indicated there was no statistically significant relationship between project management methods and standards and project success when moderated by a formal PMO.

Additionally, for the dependent variable, project success, the respondents rated the project success for an example project in this survey in their organization. The response options for project performance ranged from (1) strongly disagree to (7) strongly agree on a seven point Likert scale. An overall assessment of the respondents' evaluated project is represented in the question; *All things considered this project was a success*. The results of this question are ( $n = 114$ ) with only 5.4% listing the project success as neutral, slightly disagree, or strongly disagree in Table 5.

Table 5  
*Project Success*

		Value	Count	Percent
Standard	Position	27		
Attributes	Label	Q25-All things considered this project was a success		
	Type	Numeric		
	Format	F8.2		
	Measurement	Scale		
	Role	Input		
N	Valid	114		
	Missing	0		
Central	Mean	6.0351		
Tendency and	Standard	.85113		
Dispersion	Deviation			
	Percentile 25	6.0000		
	Percentile 50	6.0000		
	Percentile 75	7.0000		
Labeled	.00	Not Applicable	0	0.0%
Values	1.00	Strongly Disagree	0	0.0%
	2.00	Disagree	0	0.0%
	3.00	Slightly Disagree	2	1.8%
	4.00	Neutral	4	3.5%
	5.00	Slightly Agree	15	13.2%
	6.00	Agree	60	52.6%
	7.00	Strongly Agree	33	28.9%



A comparison of project success related factors is presented in Table 6. This table displays the factors associated with triple constraint versus multidimensional factors. Triple constraint is normally associated with scope, budget, and schedule (Cuellar, 2010). First, schedule of project completion was represented by the question: *Q12-This project was completed on schedule*. Next, project within budget was represented by the question; *Q13-This project was completed within budget*. Finally, scope of project was represented by the question, *Q18-Given the problem for which the end product/service was developed, this project seems to do the best job of solving that problem, i.e., it was the best choice among the set of alternatives*. The total of these factors is documented as triple constraint and is an average of the factors of scope, budget, and schedule. Multidimensional is the aggregate of all factors deemed critical by respondent and is represented by the question; *Q25-All things considered this project was a success*. The results in Table 6 display the Multidimensional Construct where ( $n = 99$ ) 81.6 % of the responses were *Agree* or *Strongly Agree* while the *Triple Constraint* Construct ( $n = 80$ ) 70.1% of the responses were *Agree* or *Strongly Agree*.

Table 6

*Likert Scale “Triple Constraint” versus “Multidimensional” project success*

Success Factors	NA	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
Schedule	2	0	1	9	5	19	45	33
Budget	2	0	1	7	7	18	43	36
Scope	0	0	2	3	6	19	51	33
Triple Constraint	1	0	1	6	6	19	46	34
Multidimensional	0	0	0	2	4	15	60	33

From Table 7, 21.9% ( $n = 25$ ) responded that a formal PMO was present in their organization, while 43.9% ( $n = 50$ ) responded that there was no formal PMO and no one was performing any PMO functions. The remaining 34.2% ( $n = 39$ ) responded there was no formal PMO, but functions are performed part time or by dedicated employees.

Table 7  
*PMO Functions*

		Value	Count	Percent
Standard	Position	28		
Attributes	Label	Q26-Indicate the best description of the overall level of PMO functions and services in the organization that conducted the reported project		
	Type	Numeric		
	Format	F8.2		
	Measurement	Ordinal		
	Role	Input		
Valid Values	1.00	No formal PMO and no one performs any PMO functions	40	35.1%
	2.00	No formal PMO, but there are plans to implement a PMO in the future	10	8.8%
	3.00	PMO functions are performed on a part time basis, but no formal PMO has been established	20	17.5%
	4.00	PMO functions are performed by dedicated employees, but no formal PMO exists	19	16.7%
	5.00	A formal PMO exists	25	21.9%

### **Detailed Analysis and Results**

This section includes detailed analysis of the three research questions in this research study. The analysis was accomplished through inferential statistics including multiple linear regression, bivariate correlation, and linear regression with moderation (Field, 2009). The first question analyzed was the central research question using multiple linear regression.

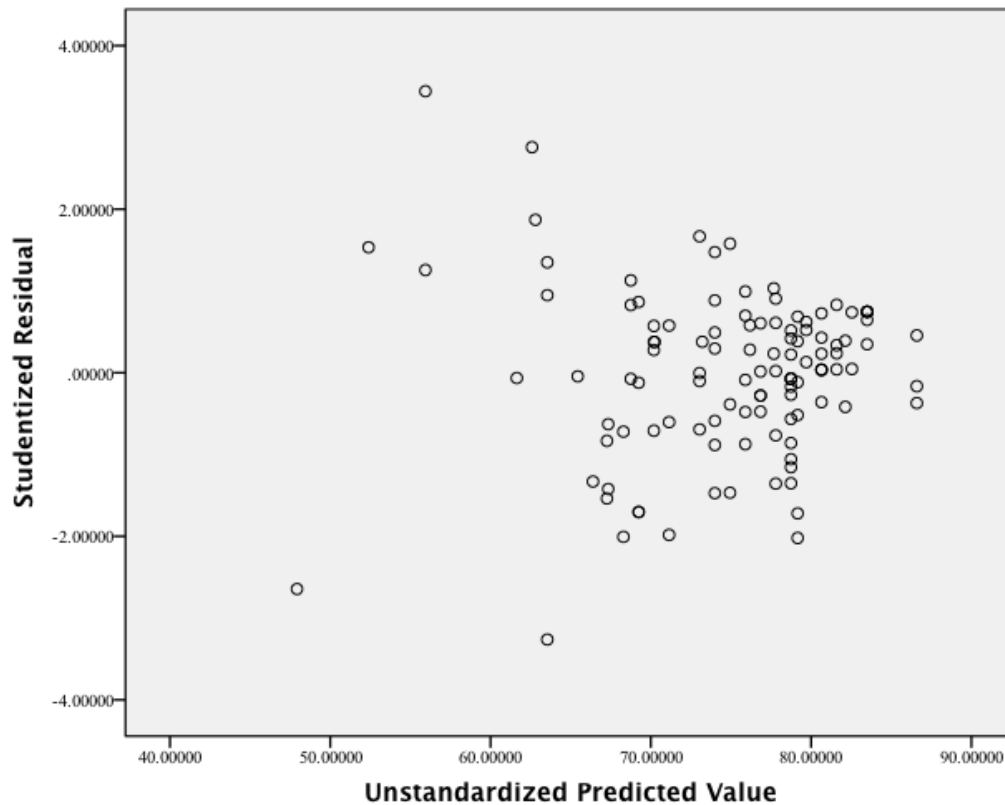
#### **Multiple Linear Regression**

To investigate the central research question, multiple regression was performed on the variables associated with governance of projects and the presence of a PMO in

relationship to project success. This study considered multiple variables to address the research question involving project success contingent on multiple factors. Previous studies of project management and project success when viewed from a multidimensional perspective also used regression analysis (Mir & Pinnington, 2014). Additionally, Mullaly and Thomas (2009) used regression analysis assessing contingent factors in relation to project management from a theoretical construct based on contingency theory as with this research design.

Before conducting linear regression, exploratory data analysis including testing for independence of observations, multicollinearity, homoscedasticity, and linearity (Field, 2009) was conducted.

From the output results there was independence of residuals indicated by a Durbin-Watson statistic of 2.466. Next in testing for linearity and homoscedasticity there was no real pattern in the data plot demonstrating both linearity and homoscedasticity from the Scatterplot in Figure 8 of the *Unstandardized Predicted Value* and the *Studentized Residual*.



*Figure 8.* Unstandardized predicted value and the studentized residual.

No multicollinearity in the variables was displayed. This was determined by examining the variance inflation factor (VIF)  $VIF < 4$  for all six independent predictor variables. Field (2009) suggests VIF of 10 as the point of which to be concerned about multicollinearity for the model. In this study, this was not the case. Additionally, in viewing the output results of Table 8 there was no indication of multicollinearity in the data correlation ( $r > .9$ ) among predictors as a threshold measure (Field, 2009). The highest correlation was .783 between HA SUM (composite variable of historical archives) and PM SUM (composite variable of methods and standards).

Table 8

*Correlations Matrix (project success and six independent variables)*

		Project Success TOT	PM Sum	HA Sum	AS Sum	HR Sum	TR Sum	CM Sum
Pearson Correlati on	Project	1.000	.657	.617	.635	.598	.597	.697
	Success TOT							
	PM Sum	.657	1.000	.783	.747	.624	.730	.667
	HA Sum	.617	.783	1.000	.677	.656	.770	.629
	AS Sum	.635	.747	.677	1.000	.656	.743	.717
	HR Sum	.598	.624	.656	.656	1.000	.741	.714
	TR Sum	.597	.730	.770	.743	.741	1.000	.745
Sig. (1- tailed)	CM Sum	.697	.667	.629	.717	.714	.745	1.000
	Project	.	.000	.000	.000	.000	.000	.000
	Success TOT							
	PM Sum	.000	.	.000	.000	.000	.000	.000
	HA Sum	.000	.000	.	.000	.000	.000	.000
	AS Sum	.000	.000	.000	.	.000	.000	.000
	HR Sum	.000	.000	.000	.000	.	.000	.000
N	TR Sum	.000	.000	.000	.000	.000	.	.000
	CM Sum	.000	.000	.000	.000	.000	.000	.
	Project	108	108	108	108	108	108	108
	Success TOT							
	PM Sum	108	108	108	108	108	108	108
	HA Sum	108	108	108	108	108	108	108
	AS Sum	108	108	108	108	108	108	108
	HR Sum	108	108	108	108	108	108	108
	TR Sum	108	108	108	108	108	108	108
	CM Sum	108	108	108	108	108	108	108

The assumption for normality was verified from visual inspection of the histogram with normal plot Figure 9 resembling a normal bell shaped curve.

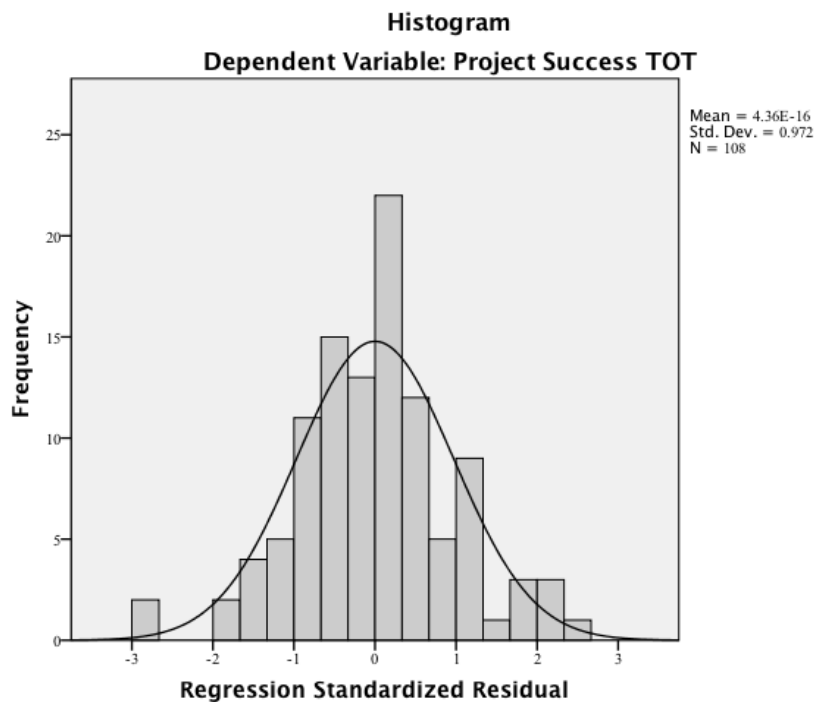
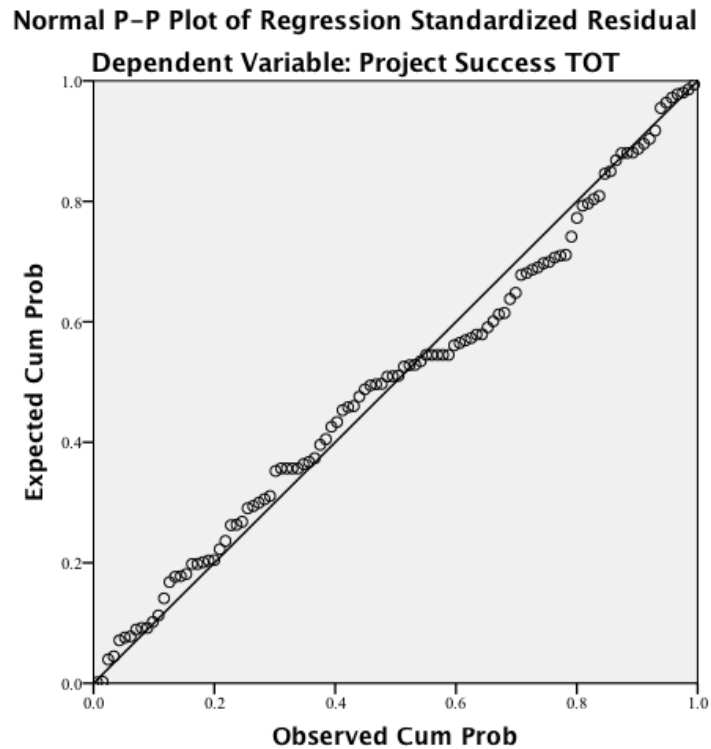


Figure 9. Histogram regression standardized residual.

Finally, the assumption for normality also was verified from visual inspection of the P-P Plot, Figure 10 with points closely associated with the plotted line signaling normality



*Figure 10.* Normal P-P Plot of regression standardized residual.

After testing for the assumption for multicollinearity, homoscedasticity, linearity, and normality a detailed analysis of the data for the central research question was conducted. This central research question asked the relationship between the six independent variables associated with presence of a PMO and governance of projects identified as: project management methods and standards, project historical archives, project administrative support, project human resource staff assistance, project related training, and project related consulting and mentoring to the dependent variable of project success.



In analyzing the output results in Table 9, we reject the null hypothesis,  $H_01$ : There is no statistically significant relationship between variables associated with presence of PMO and governance of projects to project success.

We accept the alternate hypothesis of a statistically significant relationship between variables associated with presence of PMO and governance of projects to project success with  $p < .05$  [ $F(6,101) = 22.38, p = .000$ ].

Table 9  
*ANOVA (Project success and six independent variables)*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9240.346	6	1540.058	22.383	.000 <sup>b</sup>
	Residual	6949.321	101	68.805		
	Total	16189.667	107			

Note. a. Dependent Variable: Project Success TOT

Additionally, the adjusted R<sup>2</sup> displayed in Table 10 displays 54.5% of the variance in project success can be predicted from the model of the combination of the six variables analyzed in the model.

Table 10  
*Model Summary<sup>b</sup> (Project success and six independent variables)*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.755 <sup>a</sup>	.571	.545	8.29489	2.466

Note. a. Predictors: (Constant), CM Sum TOT, HA Sum TOT, HR Sum TOT, AS Sum TOT, PM Sum TOT, TR Sum TOT

b. Dependent Variable: Project Success TOT

The linear equation for the model represents the straight line of the outcome variable (PS) project success predicted by the following variables: Methods and standards (MS), project historical archives (HA), project administrative support (AS), human

resource / staff assistance (HR), training (TR) and consulting and mentoring (CM; Dai & Wells, 2004). The coefficients are represented by  $b_1$  through  $b_6$  for each of the respective predictor variables and  $\varepsilon_1$  representing the error or residual (Field, 2009). The multiple linear regression model is used is:  $PS = b_0 + b_1PM + b_2HA + b_3AS + b_4HR + b_5TR + b_6CM + \varepsilon_1$ . Using the IMB SPSS v22 output from the Table 11 the coefficients entered into the model provide the following equation:

$$PS = 26.99 + .46PM + .29HA + .23AS + .21HR + -.29TR + .91CM + \varepsilon_1$$

In reviewing the significance level the individual variables from Table 11, only the variable CM, consulting and mentoring, is significant at  $p < .05$  resulting in only this variable providing a significant contribution to the model.

Table 11  
*Coefficients (Project success and six independent variables)*

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics	
		B	Std. Error	Beta	T	Sig.	Tolerance VIF
1	(Constant)	26.986	4.344		6.213	.000	
	PM Sum	.462	.251	.222	1.836	.069	.291 3.437
	HA Sum	.285	.212	.161	1.347	.181	.297 3.363
	AS Sum	.229	.226	.116	1.014	.313	.326 3.065
	HR Sum	.207	.216	.101	.957	.341	.378 2.643
	TR Sum	-.291	.250	-.151	-1.162	.248	.250 3.992
	CM Sum	.910	.250	.404	3.642	.000	.345 2.902

Note. a. Dependent Variable: Project Success TOT

### Bivariate Correlation

To investigate sub-question 1 an associated hypothesizes, bivariate correlation was performed on the variables project management methods and standards and project

success to determine the strength and direction of the relationship (Rockinson-Szapkiw, 2013).

Sub-Question 1: Is there a relationship between project management methods and standards to project success?

H<sub>0</sub>2: Project management methods and standards have no linear relationship with project success.

This test analyzed the Pearson product moment coefficient, Pearson  $r$ , (Rockinson-Szapkiw, 2013) as used successfully in similar previous academic research in project management (Alagba, 2013).

Additionally, bivariate correlational analysis will similarly be conducted on all six independent variables associated with the presence of a PMO and governance of projects in relation to projects success for hypothesis H3 through H7.

H<sub>0</sub>3: Project historical archives have no linear relationship with project success.

H<sub>0</sub>4: Project administrative support has no linear relationship with project success.

H<sub>0</sub>5: Project human resource and assistance has no linear relationship with project success.

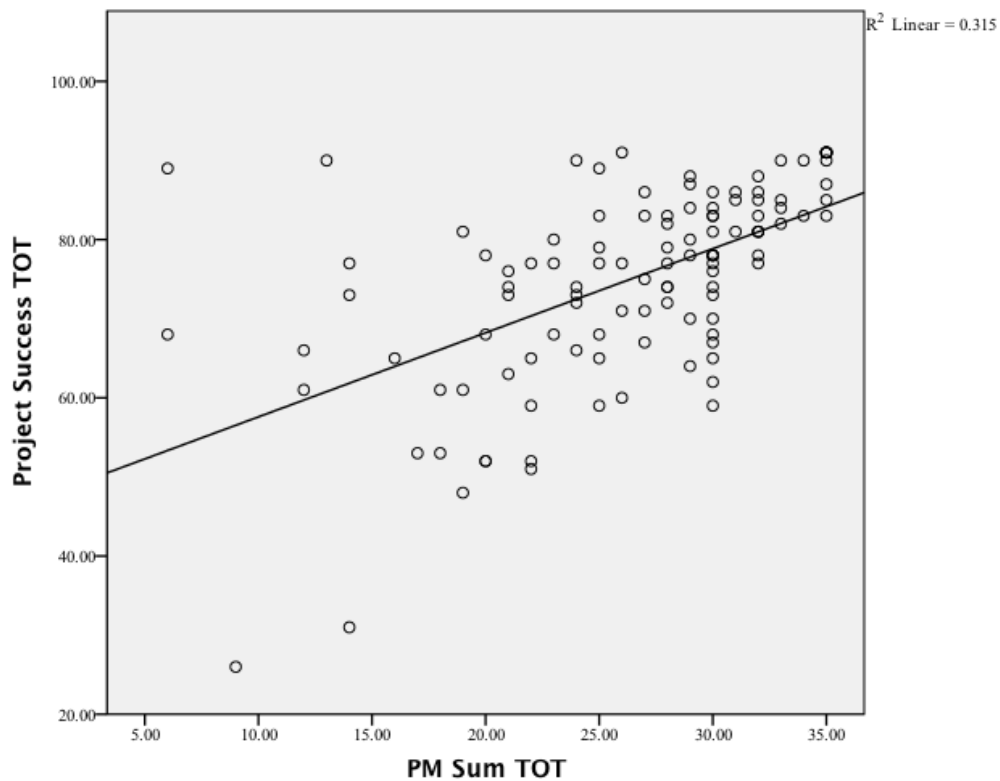
H<sub>0</sub>6: Project related training has no linear relationship with project success.

H<sub>0</sub>7: Project related consulting and mentoring has no linear relationship with project success.

The variables used in the bivariate correlation statistical test were all interval level of measurement (Field, 2009) and a parametric test was determined appropriate based on

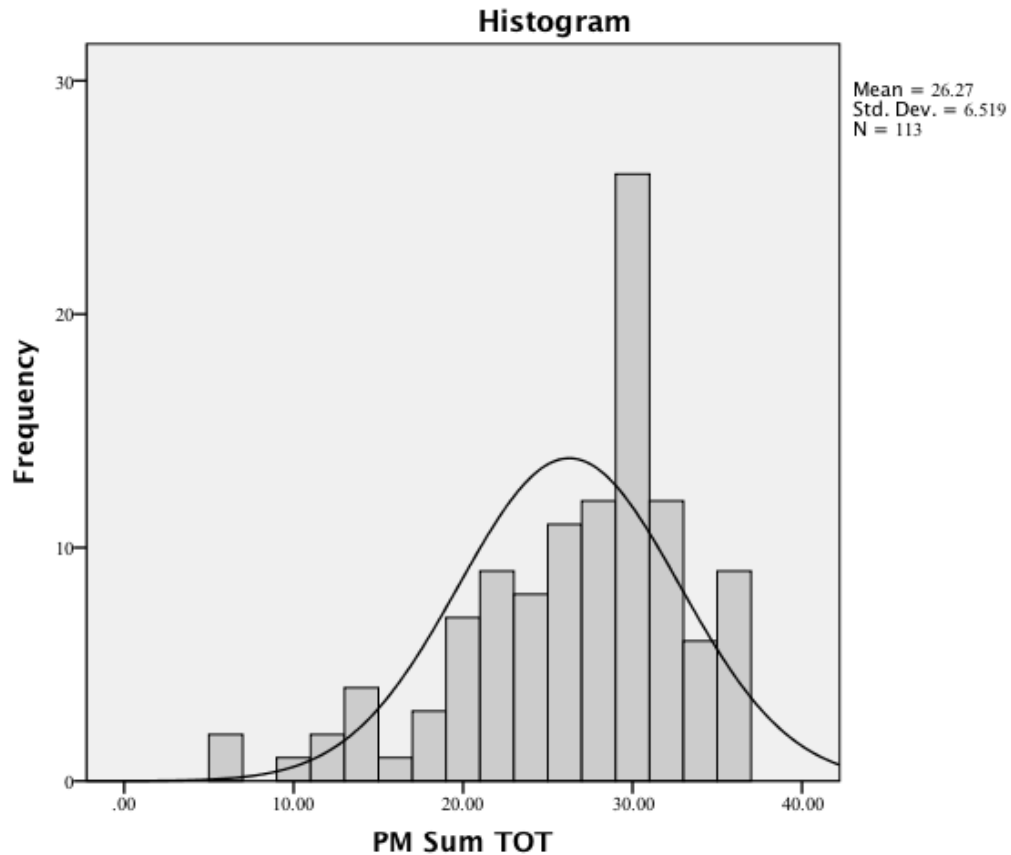
the Central Limit Theorem (Norman, 2010) using Pearson  $r$  (Rockinson-Szapkiw, 2013) and a one-tail test since the hypotheses was directional (Field, 2009).

Assumption testing was required for this correlation analysis. First the data was tested for linearity. Linearity was verified as seen in the graph Figure 11 for the variable project management methods and standards (PM) graphed against the variable Project Success (PS).



*Figure 11.* Composite project management methods and standards versus composite project success.

In testing for assumptions of normality, a visual inspection of the histogram for the variables indicated an approximate normal distribution as depicted in Figure 12 with a normal bell shaped curve.



*Figure 12.* Histogram SUM PM – Composite Likert for PM methods and standards.

Next, using bivariate correlation on each of the six independent predictor variables examined, it was determined there was a high correlation with the dependent variable project success. The strength of the relationship used the convention  $r < .30$  as small strength of relationship while  $r > .50$  was considered a high or strong relationship and a positive value for Pearson  $r$  indicated a positive relationship and the negative value indicated a negative relationship (Rockinson-Szapkiw, 2013). The research design also used a statistical significance of  $> .05$ , or 5% (Vogt, 2007). Those values of  $p < .05$

indicated rejecting the null hypothesis, as the results would be considered statistically significant.

The results of the bivariate correlation analysis for Hypothesis H2 for sub-question 1 demonstrated significant evidence to reject the null hypothesis. Therefore, the variable project management methods and standards has a linear relationship with project success. The results of using Pearson  $r$  are there is a strong positive correlation between project management methods and standards and project success,  $r(113) = .561$ ,  $p = .000$  as displayed in Table 12.

Table 12  
*Correlation (Project success and methods and standards)*

Variable	Pearson Correlation	Project Success	PM Sum
Project	Pearson Correlation	1	.561**
Success	Sig. (1-tailed)		.000
	N	114	113
PM Sum	Pearson Correlation	.561**	1
	Sig. (1-tailed)	.000	
	N	113	113

Note. \*\*. Correlation is significant at the 0.01 level (1-tailed).

The results of the bivariate correlation analysis for Hypothesis H3 for sub-question 1 demonstrated significant evidence to reject the null hypothesis. Therefore, the variable project historical archives has a linear relationship with project success. The results of the using Pearson  $r$  are there is a strong positive correlation between project historical archives and project success,  $r(113) = .681$ ,  $p = .000$  as displayed in Table 13.

Table 13  
*Correlation (Project success and historical archives)*

Variable	Pearson Correlation	Project Success
Project Success	Pearson Correlation	1
	Sig. (1-tailed)	
	N	114
HA Sum	Pearson Correlation	.618**
	Sig. (1-tailed)	.000
	N	113

*Note.* \*\*. Correlation is significant at the 0.01 level (1-tailed).

The results of the bivariate correlation analysis for Hypothesis H4 for sub-question 1 demonstrated significant evidence to reject the null hypothesis. Therefore, the variable project administrative support has a linear relationship with project success. The results of the using Pearson  $r$  are there is a strong positive correlation between project administrative support and project success,  $r(114) = .661, p = .000$  as displayed in Table 14.

Table 14  
*Correlation (Project success and administrative support)*

Variable	Pearson Correlation	Project Success	AS Sum
Project Success	Pearson Correlation	1	.661**
	Sig. (1-tailed)		.000
	N	114	114
AS Sum	Pearson Correlation	.661**	1
	Sig. (1-tailed)	.000	
	N	114	114

*Note.* \*\*. Correlation is significant at the 0.01 level (1-tailed).

The results of the bivariate correlation analysis for Hypothesis H5 for sub-question 1 demonstrated significant evidence to reject the null hypothesis. Therefore, the variable project human resource support has a linear relationship with project success.

The results of the using Pearson  $r$  are there is a strong positive correlation between project human resource and project success,  $r(112) = .604, p = .000$  as displayed in Table 15.

Table 15  
*Correlation (Project success and human resource support)*

Variable	Pearson Correlation	Project Success	HR Sum
Project	Pearson Correlation	1	.604**
Success	Sig. (1-tailed)		.000
	N	114	112
HR Sum	Pearson Correlation	.604**	1
	Sig. (1-tailed)	.000	
	N	112	112

Note. \*\*. Correlation is significant at the 0.01 level (1-tailed).

The results of the bivariate correlation analysis for Hypothesis H6 for sub-question 1 demonstrated significant evidence to reject the null hypothesis. Therefore, the variable project training has a linear relationship with project success. The results of the using Pearson  $r$  are there is a strong positive correlation between project training and project success,  $r(112) = .617, p = .000$  as displayed in Table 16.

Table 16  
*Correlation (Project success and training)*

Variable	Pearson Correlation	Project Success	TR Sum
Project	Pearson Correlation	1	.617**
Success	Sig. (1-tailed)		.000
	N	114	112
TR Sum	Pearson Correlation	.617**	1
	Sig. (1-tailed)	.000	
	N	112	112

Note. \*\*. Correlation is significant at the 0.01 level (1-tailed).



The results of the bivariate correlation analysis for Hypothesis H7 for sub-question 1 demonstrated significant evidence to reject the null hypothesis. Therefore, the variable project consulting and mentoring has a linear relationship with project success. The results of the using Pearson  $r$  are there is a strong positive correlation between project consulting and mentoring and project success,  $r(113) = .704, p = .000$  as displayed in Table 17.

Table 17  
*Correlation (Project success and human consulting and mentoring)*

Variable	Pearson Correlation	Project Success	CM Sum
Project	Pearson Correlation	1	.704**
Success	Sig. (1-tailed)		.000
	N	114	113
CM Sum	Pearson Correlation	.704**	1
	Sig. (1-tailed)	.000	
	N	113	113

Note. \*\*. Correlation is significant at the 0.01 level (1-tailed).

### Regression with Moderation

To investigate the sub-question 2 hierarchal multiple regression testing for moderation was performed on the variables project management methods and standards and project success.

Sub-Question 2: What is the relationship of project management methods and standards to project success when moderated by a formal PMO?

H<sub>0</sub>8: Project management methods and standards have no linear relationship with project success when moderated by a formal PMO.

The statistical test of hierarchical multiple regression relied on the technique of Centering. This technique was performed by “subtracting the mean from predictor variables” in the model to control for the other variables (Garson, 2012, p. 13). This test analyzed the effect of “two or more variables in combination” (Field, 2009, p.279) to get a moderation or interaction effect of a formal PMO. Results from the hierarchical multiple regression provided evidence where the null hypothesis was not rejected and the variable project management methods and standards was determined not to have a significant linear relationship with project success when moderated by a formal PMO.

Before the statistical test was conducted, tests on the assumption of the statistical test were done. Tests on the assumptions of linearity was completed by visual inspection of the graphical output data, a scatter plot Figure 13 of *Project Success* against project management *Methods and Standards*. Assumption of linearity was valid for this statistical test.

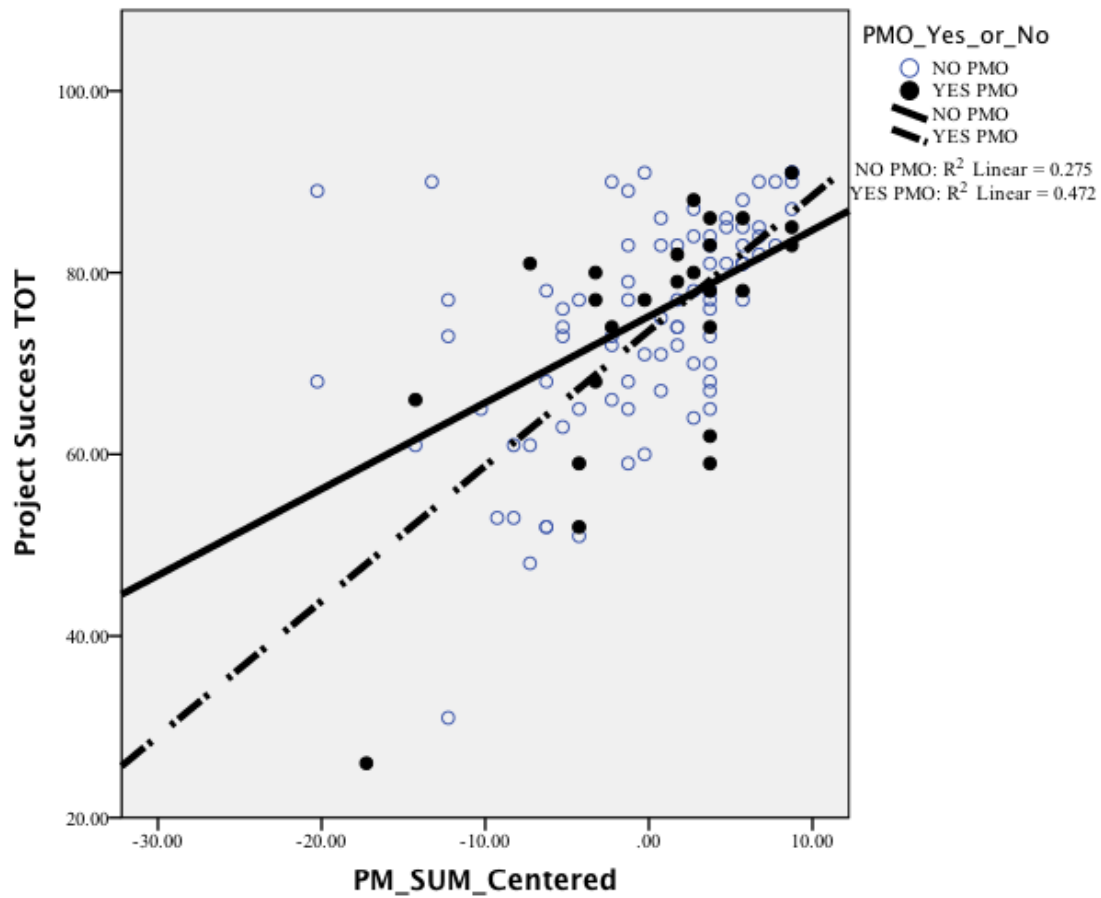


Figure 13. Scatter Plot to test assumptions of linearity.

In testing for multicollinearity against  $VIF < 10$  (Field, 2009) resulted in a determination of no multicollinearity based on a  $VIF = 1.278$  from Table 18.

Table 18  
*Coefficients<sup>a</sup>*

		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance VIF
1	(Constant)	75.204	1.098		68.517	.000	
	PM_SUM_Centered	1.066	.149	.563	7.139	.000	.999 1.001
	PMO_YES_Dummy	-1.443	2.334	-.049	-.618	.538	.999 1.001
2	(Constant)	75.192	1.092		68.879	.000	
	PM_SUM_Centered	.950	.168	.502	5.669	.000	.784 1.276
	PMO_YES_Dummy	-1.589	2.324	-.054	-.684	.496	.997 1.003
	PM_Centx_PMO_Yes Interaction	.537	.361	.132	1.486	.140	.783 1.278

*Note.* a. Dependent Variable: Project Success TOT

The visual inspection of the histogram in Figure 14 indicated an approximate normal distribution resembling a normal bell shaped curve and confirming using the statistical methods of linear regression was appropriate.

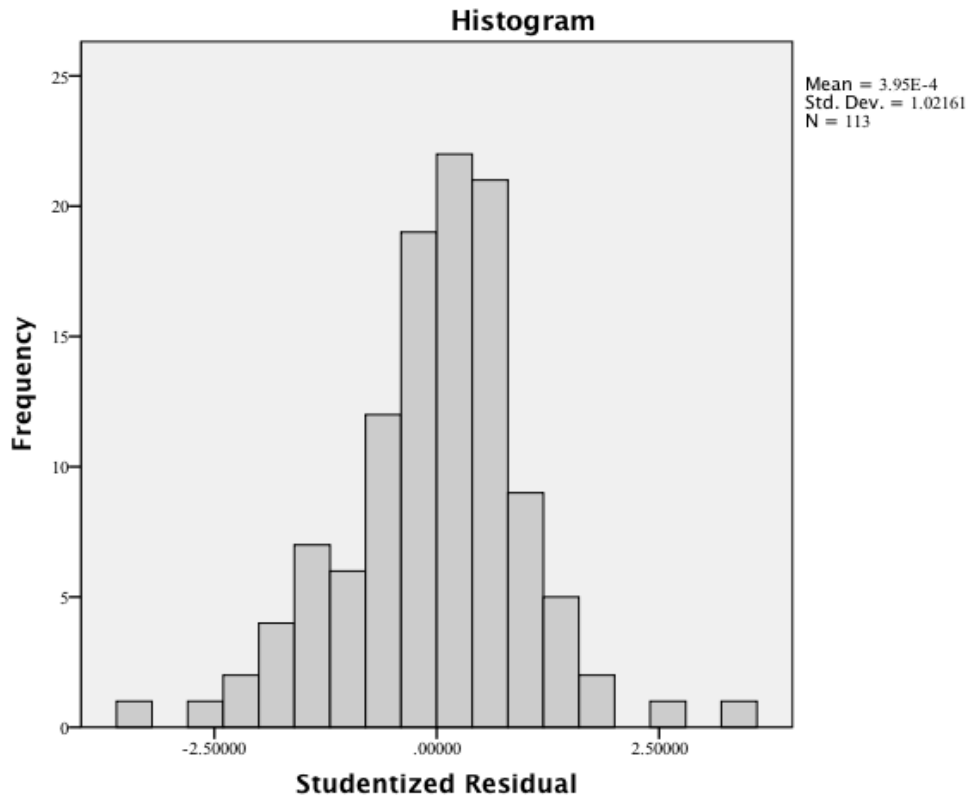


Figure 14. Histogram of studentized residual.

The assumption for linearity and normality allow using parametric test of hierarchal multiple regression testing for moderation. The test resulted in a determination of a failure to reject the null hypotheses from the evidence of the increase in total variation explained, 1.4%, as displayed in Table 19 which was not statistically significant  $p > .05$  [ $F(1,109) = 2.21, p = .14$ ].

Table 19  
*Model Summary<sup>c</sup> (Centering)*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change
					R Square Change	F Change	df1	df2	
1	.563 <sup>a</sup>	.317	.305	10.29531	.317	25.559	2	110	.000
2	.575 <sup>b</sup>	.331	.312	10.23918	.014	2.209	1	109	.140

The linear regression model of both predictor variables of the Model was significant  $p < .05$  [ $F(3, 109) = 18.01, p = .000$ ]. However, the interaction affect of project management methods and standards in relationship to a formal PMO and project success was not significant and the null hypothesis was rejected. From these results, the variable project management methods and standards has no significant relationship with project success when moderated by a formal PMO.

### Summary

The analysis of the central research question resulted in a documented predictive linear equation for project success.

$$PS = 26.99 + .46PM + .29HA + .23AS + .21HR + -.29TR + .91CM + \varepsilon_1$$

The linear equation for the model represents the straight line of the outcome variable (PS) project success predicted by the following variables: Methods and standards (MS), project historical archives (HA), project administrative support (AS), human resource / staff assistance (HR), training (TR) and consulting and mentoring (CM; Dai & Wells, 2004). The coefficients were represented by  $b_1$  through  $b_6$  for each of the respective predictor variables and  $\varepsilon_1$  representing the error or residual (Field, 2009).

From the detailed analysis, using multiple linear regression 54.5% of the variance in project success can be predicted from the model of the combination of the six variables analyzed in the model. The null hypothesis was rejected as the results were considered statistically significant with  $p < .05$  [ $F(6,101) = 22.38, p = .000$ ].

Next, using bivariate correlation analysis Hypothesis H2 for Sub-question 1 was evaluated indicating significant evidence to reject the null hypothesis. Therefore, project management methods and standards were determined to have a significant statistical relationship with project success,  $r(113) = .561, p = .000$ .

Similar bivariate correlational analysis was conducted on the other variables of interest in this study: project historical archives (HA), project administrative support (AS), human resource / staff assistance (HR), training (TR) and consulting and mentoring (CM). Each of these variables likewise displayed similar statistical results with strong positive correlation to project success.

Strong positive correlation between project historical archives and project success,  $r(113) = .681, p = .000$ .

Strong positive correlation between project administrative support and project success,  $r(114) = .661, p = .000$ .

Strong positive correlation between project human resource and project success,  $r(112) = .604, p = .000$ .

Strong positive correlation between project training and project success,  $r(112) = .617, p = .000$ .

Strong positive correlation between project consulting and mentoring and project success,  $r(113) = .704, p = .000$ .

Finally, analyzing the moderating affect of a PMO on project management methods and standards to project success, the null hypothesis was not rejected. The results of the hierarchal multiple regression with interaction was not statistically significant at  $p > .05$  [ $F(1,109) = 2.21, p = .14$ ].



## **CHAPTER 5. DISCUSSION, IMPLICATIONS, RECOMMENDATIONS**

The problem identified in this research study was the continuing issue of lack of success of projects (Ika, 2009; Nixon et al., 2012; Sauser et al., 2009; Young & Poon, 2013) in organizations that have a Project Management Office (PMO; Dai & Wells, 2004, Too & Weaver, 2013). The purpose of the study focused on this problem and contributed to the project management body of knowledge by developing a greater understanding of the relationship between the researched variables associated with presence of a PMO and governance of projects and project success.

### **Summary and Discussion and Results**

The analysis and answers to the research questions resulted in three statistical findings for this research study. First, the analyses of the data resulted in a determination of a statistically significant relationship between independent variables associated with presence of a PMO and governance of projects and project success. Secondly, the analyses of the data resulted in a determination of a statistically significant relationship between project management methods and standards and project success. Lastly, project management methods and standards were determined not to have a statistically significant relationship with project success when moderated by a formal PMO.

The interpretation of the analyses that follows is viewed in context of previous research related to project success including the triple constraint approach (Cuellar, 2010) as well as a multidimensional construct of project success (Müller & Jugdev, 2012). Additionally, the analysis is viewed within the context of governance of projects (Müller

et al., 2014; Turner et al., 2013) PMOs and PMO research (Anderson et. al., 2007; Pellegrinelli & Garagna, 2009) and the theoretical framework of contingency theory (Mullaly & Thomas, 2009; Turner et al., 2013).

### **PMO and Governance of Projects and Influence on Project Success**

Governance of projects and project success was analyzed in this research study. To quantify the presence of a PMO and therefore the governance of projects, several variables were identified and analyzed. The variables indicating the presence of a PMO as well as governance of projects were: project management methods and standards (PM), project historical archives (HA), project administrative support (AS), human resource / staff assistance (HR), training (TR), and consulting and mentoring (CM; Dai, 2001; Dai & Wells, 2004; Stewart, 2010). The selection and analysis of these variables and the methods for analysis was significant since conducting a non-experimental correlational research within this study provided additional empirical results related to research of project management and PMOs.

The results of this study provided a predictive linear equation that accounted for 54.5% of the variability in project success from the combination of the six variables identified in the previous paragraph.

$$PS = 26.99 + .46PM + .29HA + .23AS + .21HR + -.29TR + .91CM + \epsilon_1$$

The results of this predictive equation suggested a valid role for PMOs in organizational project management. An organizational framework of a PMO can provide the structure to oversee methods and standards, provide human resource and administrative support, schedule, conduct, and track training, provide historical archived

data as well as foster and provide consulting and mentoring. These functions provided by a PMO governance structure assist project managers and project teams. Organization providing these functions to the project teams can have a greater than 50% chance of influencing project success based on the research results.

The results of this research also indicated the variable consulting and mentoring was significant at  $p < .05$  resulting in this variable providing a significant contribution to the predictive linear equation documented. Identifying consulting and mentoring as significant to the equation is further empirical evidence and justification to include this variable as a primary success factor (Davis, 2014) contributing to project success.

Additionally, the identification of this variable as a primary success factor may warrant greater analysis for similar constructs. Mentoring and consulting connotes expertise, experience, and reliance on organizational subject matter experts (SME). The experience and expertise of SMEs integrated into a broader organizational project knowledge management structure, as a PMO to assist in project management, is a factor critical to project success (Sokhanvar, Matthews, & Yarlagadda, 2014).

However, comparing the results from this research study with similar research from the academic literature highlighted areas of contrast. The results in this research were not consistent with the results of the prior research of Dai and Wells (2004). Dai and Wells (2004) stated that standards and methods explained the variability the most in a similar model of six PMO presence categories, while the results of this study indicated consulting and mentoring explained variability the most. Both variables are associated with the presence of a PMO and indicators of governance of projects. Both studies used

simple linear regression as a statistical test. Dai and Wells (2004) sample was larger ( $n = 234$ ) with 48.3% of the responses having a PMO while this research study had ( $n = 114$ ) with 21.9% identified with a formal PMO. There is no further indication from this research that could account for this difference and this could be an area that would warrant additional analysis in future research.

In addition, adjusting the combination of the six variables indicating governance of projects and PMOs could positively influence project success from a contingency perspective. The variables could be tailored to provide the proper “fit” within the organization to increase the likelihood of project success and reduce project failure. This is inferred based on the results of this study with  $> 50\%$  of the variability of project success resulting from a combination of the six identified variables.

The combination of variables for a particular situation does not have to be addressed in the form of a formal PMO. As documented in the results of sub-question 2 in this study, the variable project management methods and standards has no significant relationship with project success when moderated by a formal PMO. This would indicate a formal PMO is not needed for project success, but rather the capabilities resident in a PMO-type framework could be enough to positively influence project success.

Also, identified from this study is a potential for uncertainty from the respondents on what is a PMO. The definition of a PMO is “an organizational structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques” (PMI, 2013, p. 554). From the respondents, 24.6% ( $n = 28$ ) were certified with PMI PMPs and 80.7 % ( $n = 92$ ) had

greater than five years of experience. However, 43.9% ( $n = 50$ ) responded that there was no formal PMO and no one was performing any PMO functions. This result is counter to a majority of the responses to the survey questionnaire (Q38-67) that were answered in from the range *Slightly Disagree to Strongly Agree* on the Likert scale signaling the partial or full presence of a PMO based on the PMI definition of a PMO. This would indicate a need for the project management community to further clarify and publish definitions for PMOs and educate practitioners on the types of PMOs and their functions contingent upon the organization.

### **Project Management Methods and Standards and Project Success**

Next, the results of the bivariate correlation analyses for sub-question 1 indicated a high positive correlation between the variable project management methods and standards (PM) and project success (PS),  $r(113) = .561, p = .000$ . Higher degrees of methods and standards are associated with higher degrees of project success.

This high positive correlation between project management methods and standards and project success might be expected. Project management is “defined by an expanding body of professional associations, standards, methodologies and tools seeking to reduce failure” (Davis, 2014, p. 192). A reasonable premise is project managers continually seek successful project completion as a matter of practice and practical application as project success is “among the top priorities of project managers” (Müller & Jugdev, 2012, p. 758). A strategy for project managers to achieve successful goals is through applied methods and standards from various project management approaches as seen with PMBOK, Agile, or PRINCE2 (McKenna & Whitty, 2012).

The structure of this research design, however, might indicate an over simplification of the complex nature of project management methods and standards and the relationship with project success related to governance of projects. There is the potential for a limitation of the study in this area. The identified limitation of an over simplification of the complex nature of project management related research may indicate a recommended area for future research. Embedded an organization's methodology for the methods and standards is the assumption that methods and standards are contingent upon the organization to provide not only structure but also flexibility. This is consistent with previous research where organization must find "the right balance between restrictive processes to prevent malfeasance, and allowing management the freedom to support effective growth and innovation" (Too & Weaver, 2013, p.10).

In additional to the positive correlation between methods and standards and project success, there were strong positive correlations for the other variables associated with presence of PMO, governance, and project success. These correlations are:

The variable project historical archives (HA) has a strong positive correlation with project success,  $r(113) = .681, p = .000$ . Higher degrees of historical archives are associated with higher degrees of project success.

The variable project administrative support (AS) has a strong positive correlation with project success,  $r(114) = .661, p = .000$ . Higher degrees of administrative support are associated with higher degrees of project success.

The variable project human resource / staff assistance (HR) has a strong positive correlation with project success,  $r(112) = .604, p = .000$ . Higher degrees of human

resource / staff assistance are associated with higher degrees of project success.

The variable project related training (TR) has a strong positive correlation with project success,  $r(112) = .617, p = .000$ . Higher degrees of project related training are associated with higher degrees of project success.

The variable project consulting and mentoring (CM) has a strong positive correlation with project success,  $r(113) = .704, p = .000$ . Higher degrees of consulting and mentoring are associated with higher degrees of project success.

From a practical perspective, the strong positive correlations for these variables indicate areas for exploration in organizations for dedicating resources for possible increase probability of project success. The strong positive correlation may be grounds for further research expanding not only the research of degree and direction with correlational analysis, but also to explore causal relations. A cause and effect relationship analysis was delimitation as it was considered outside the scope of the research design due to resource limitations. Although outside the scope of the research, it does have theoretical merit as a recommendation for future research analysis to question the cause and effect relationship for these variables with project success.

### **Methods and Standards and Project Success Moderated by PMO**

Lastly, the variable project management methods and standards has no significant relationship with project success when moderated by a formal PMO. This result means project success related to project management methods and standards is not significantly influenced from the governance of projects provided by a PMO. The research results from sub-question 1 provided evidence of the high positive correlation between project

management methods and standards (PM) and project success (PS),  $r(113) = .561, p = .000$ . However, the relationship of methods and standards to project success was not any more significant when moderate by a formal PMO structure. This could substantiate the power of project management methods and standards as an independent indicator of project success.

This failure to reject the null hypothesis could warrant further research for future studies. However, interaction or moderating effects of a PMO may be difficult to assess due to the complexity of the constructs. The construct of project success (Müller & Jugdev, 2012) and governance of projects (Too & Weaver, 2013) were not clearly defined in the academic literature. Additionally, although PMOs have been categorized (Aubry et al., 2007) their structures are unique (Müller et al., 2013) and may be difficult to measure in an objective manner.

The linear regression model of both predictor variables of the Model was significant  $p < .05$  [ $F(3,109) = 18.01, p = .000$ ]. However, the interaction affect of project management methods and standards in relationship to a formal PMO and project success was not significant and the null hypothesis was rejected. From these results, the variable project management methods and standards has no significant relationship with project success when moderated by a formal PMO. This would indicate that a PMO that provides additional project governance capability might not provide any additional influence on project success. As a result, the conclusion reached is that project management methods and standards are of greater importance to project success than the PMO.



## Implications of the Study Results

This study has theoretical and practical implications related to the research design. First, the theoretical implication is documented in the additional empirical analysis that helps bridge the previously identified gaps in the literature (Aubry & Hobbs, 2011). Specifically, this research design has identified a linear equation that may assist in predicting project success in relation to the independent variable associated with governance of projects and presence of a PMO. Additionally, the analysis and results from this research provide a small amount of empirical evidence slightly favoring a multidimensional approach for project success in contrast to a traditional triple constraint approach. This documented empirical evidence from this study indicates a multidimensional project success construct (Müller and Jugdev, 2012) yields a 9% higher positive agreement from respondents than a triple constraint based project success construct. The results showed a higher rated project success response from the *Multidimensional Construct* ( $n = 108$ ) 94.7 % then for the *Triple Constraint Construct* ( $n = 99$ ) 86.8%. The higher positive level for perception of project success from respondents using two slightly different types of success measures means that success is a complex construct that is difficult to measure accurately. This 9% difference between a triple constraint measure and multidimensional measure may warrant further analysis in future research studies.

This study expanded the understanding of the governance of projects associated with PMOs. This study indicated a 54.5% of the variability in project success could be predicted from the combination of the six variables identifying the presence of a PMO as

well as governance of projects. With 54.5% of the variability attributed to six variables, there are both practical and theoretical implications of this research. The practical implication could lead to justifications for organization to implement any one of these variables or a combination of the variables to attempt to increase the degree of project success. Additionally, the theoretical implications may include further refinement of comparable research to determine if other factors may increase or decrease the percentage of variability on project success for these variables.

This study has implication not only on what was determined in the findings, but also what was not determined. Specifically, 56.6% of the variability in project success could be attributed to variables other than those listed in this study. These variables might consist of the role of the project manager, experience of members of the project team, or the cultural maturity of an organization just to name a few.

Additionally, organization can address the variable of consulting and mentoring with results of  $p < .05$  for this variable to provide a significant contribution to the predictive linear equation,  $PS = 26.99 + .46PM + .29HA + .23AS + .21HR + -.29TR + .91CM + \epsilon_1$ . The degree of consulting and mentoring influencing project success could be identified from a contingency perspective and experienced project managers and leaders in the organization might be a crucial in predicting the likelihood of project success.

### **Limitations**

There were several limitations with this study. The first limitation involved the quality of the data from the selected survey method. An assumption in the research design was data from the survey method would provide a random representative sample.

A review and verification of the data before performing statistical tests resulted in questioning this assumption. Of the 129 cases available in the database, 15 of these cases were suspicious due to the identical responses across the entire survey indicating the respondent may have responded with same number on the Likert scale to allow for a quick completion of the survey. Additionally, there were also a higher number of *NA* responses in these 15 cases in question. An examination of the length of the time period for those respondents to complete the survey was less than 3 minutes versus an estimated time 10-15 minute to complete the survey of 67 questions. As a result, 15 cases were discarded before statistical analysis. This concern on these cases may indicate other concerns in the responses to questions from the remaining respondents that may influence the validity of the results. Additionally, in analyzing the results from Table 20, the highest percentage of respondents by industry was ( $n = 17$ ), 14.9% *education*. With other industries heavily involved in project management, it may have been anticipated to have one of the other industries at a higher percentage rather than as depicted by the those industries closest following *education* at ( $n = 16$ ), 14.0% *Computers/Information Technology*, ( $n = 12$ ), 14.0% *Healthcare related (Biology, Hospital, Pharmaceutical)*, and *construction* and *engineering* with still smaller percentages. The responses by industry to the survey in this research study may skew the sample and limit the results of the research.

Another limitation of the research design is with the survey instrument. Although the instrument had been validated from prior academic research (Dai, 2001; Stewart, 2010), the instrument was adequate but not completely conclusive. For instance, the premise for the survey questionnaire used was that the respondents were capable of providing objective measures of project success from a self-reported questionnaire. Self reported data could lead to bias (Conway & Lance, 2010) whereby compromising the results. Additionally, the survey instrument included a number of questions that could have been modified for better accuracy addressing the research design. For instance, the survey instrument had several IT specific questions. Since this study was design for non-industry specific research, some of these questions could have been modified and confirmed with a field test and pilot study.

Another limitation of this research design is the complexity of the constructs and complexity of the study. These constructs include governance of projects and project success. The construct of project success is multidimensional (Müller & Jugdev, 2012). Various factors influence project success; identifying and researching the most significant critical factors is difficult and can be a threat to validity. PMOs are unique (Aubry et al., 2007) and “heterogeneous” and “ephemeral in nature” (Müller, et al., 2013, p.60). Defining variables in the research design that have been referenced as unique or heterogeneous could cause concerns for the results and how these results are related to a broader academic discipline. This characteristic of uniqueness of the structure could make it difficult to research project success in context of PMO causing threats to the reliability of the research.

Causality was identified as a delimitation. The research design sought to provide prediction with multiple linear regression as well as degree and direction of relationship with bivariate correlation. However, this research design did not address cause and effect of the variables and this could be a potential area for future research with respect to the research problem.

The cross sectional approach for this research design versus a longitudinal approach may also be considered a limitation of this study. Due to resource constraint, the data collection method was to sample the population at as single point in time. The research questionnaire requested respondents to define project success for a project that had been completed. Müller and Jugdev (2012) mention to assess project success over the life cycle of the project.

### **Recommendations for Future Research**

This non-experimental correlational research builds upon prior research of Dai (2001) and Stewart (2010) to provide empirical evidence for the presence of a PMO and governance of projects in relationship to project success. To expand on what has been documented in this research study, recommendations for future research consists of additional multiple methodological approaches. These recommended approaches would add greater clarity and include studies using mixed methods, quantitative, and qualitative research methods.

The first recommendation is to conduct additional quantitative studies and further analyze the problem within the theoretical constructs of contingency theory. As the contingency theory considers the internal and external constraints (Mullaly & Thomas,

2009), future research can expand on selected variables to provide additional empirical evidence. Specifically, the survey instrument can be modified to look at implicit and tacit project management knowledge (Sokhanvar et al., 2014) to build upon the results of central research question and the significance of the consulting and mentoring variable from the multiple regression analysis in this study.

This research analyzed multiple project management and PMO related variables in relationship to project success. However, other factors may need to be considered to analyze project success that were beyond the scope of this research. What was not determined in this research study is what accounted for 56.6% of the variability in project success that may be attributed to variables other than those listed in this study. Sauser et al. (2009) mentions project success depends on not only the project management methods and standards, but is contingent upon environment, situation, and task. Shenhar (2001) in his research likewise addresses contingency in project management methodologies presenting projects of different types should be managed in different ways. Considering this prior research in context of the results of this study, future research could analyze project management methods and standards with respect to any or all of the constructs of situation, environment, task (Sauser et al., 2009) or project type (Shenhar, 2001). This could further the understanding of how project management methods and standards relate to project success.

The second recommendation is to continue with a quantitative approach and determine if there are industry specific factors that affect project management methods and standards, governance, and PMO in relationship to project success. The results from

Table 20 indicate the various industries in this research design coming from 25.4% *Other* ( $n = 29$ ), 17.5% *Computers/Information Technology and Software Development* ( $n = 20$ ), 14.9% *Education* ( $n = 17$ ), 11.4% *Engineering and Construction* ( $n = 13$ ), 10.5% *Healthcare related* ( $n = 12$ ), 8.8% *Government* ( $n = 10$ ), 7% *Manufacturing* ( $n = 8$ ), 3.5% *Telecommunication* ( $n = 4$ ). A quarter of the population identified their primary industry as *Other* and is difficult to determine what this would include. There may be value in determining if governance of projects and PMOs affect project success differently by industry.

Table 20  
*Industry of respondents*

		Value	Count	Percent
Standard Attributes	Position	11		
	Label	Q09 - Industry of primary end user of the project:		
	Type	Numeric		
	Format	F8		
	Measurement	Nominal		
Valid Values	Role	Input		
	1	Computers/Information Technology	16	14.0%
	2	Construction	5	4.4%
	3	Education	17	14.9%
	4	Engineering	8	7.0%
	5	Government	10	8.8%
	6	Healthcare related (Biology, Hospital, Pharmaceutical)	12	10.5%
	7	Manufacturing	8	7.0%
	8	Software Development	5	4.4%
	9	Telecommunication	4	3.5%
	10	Other	29	25.4%

The third recommendation is to combine the empirical results generated by this research study with additional qualitative research as case studies or exploratory

qualitative research for a mix-method approach. Based on the literature review it was documented that project management (Shenhar & Dvir, 2007) project success (Mir & Pinnington, 2014) and PMOs (Aubry et al., 2008) are complex construct. Mixed method research could provide the understanding of subjectivist philosophical perspective (McLeod et al., 2012) of qualitative analyses to address complex constructs that may be difficult to measure with the rigor of a quantitative approach. Mixed method provides an alternate approach since construct in project management and project success have a “subjective and objective nature of how project success is perceived and defined” (Mir & Pinnington, 2014, p. 2).

The fourth recommendation is to seek additional empirical evidence for project management methods and standards in relation to project success. The analysis from Chapter 4 indicated project management methods had a strong positive correlation with project success,  $r(113) = .561, p = .000$ . Additional research could analyze if there is an inflection point where the additional degrees of methods and standards would have a negative correlation with project success. A future research study could be viewed from the perspective of ambidexterity of organization balancing the structure of methods and standards with organizational flexibility. Ambidexterity in organizations “considers the benefits of utilizing routine, process, and structure and more emergent, improvisational working styles, and leveraging the benefits of both simultaneously to improve performance” (Leybourne & Sainter, 2012, p. 5).

The fifth recommendation is to approach the research question from the theoretical construct of system theory. System theory can be traced by to the 1950s from



the work by von Bertalanffy (Lindskog, 2012). Using system theory, the interaction of various components that comprise the systems of successful project execution might be analyzed from the perspective of PMO governance that lead to project success.

The final recommendation for future research would include using a qualitative approach with a longitudinal study (Bryant, 2005). This cross-sectional research used data gathered from a single reference point in time. There may be other factors that could influence the determination of project success based on the experience over time of the respondents and the project life cycle.

### **Conclusion**

This study provided further empirical evidence on governance of projects with variables associated with the presence of a PMO in relation to project success. The study determined there was a significant relationship between the independent variables associated with presence of a PMO and governance of projects to the dependent variable of project success. The specific variable indicating the presence of the PMO included project management methods and standards, project historical archives, project administrative support, human resource / staff assistance, training, and consulting and mentoring (Dai, 2001; Dai & Wells, 2004). The study also determined there was a statistically significant relationship between project management methods and standards and project success. The determination on the relationship was consistent with prior research related to the multidimensional concept of project success (Müller & Jugdev, 2012) where project success is a complex construct consisting of various factors. The multidimensional view of project success depicted a contrast to the traditional factors for

project success consisting primarily of assessing the balance of scope, budget, and schedule (Cuellar, 2010). Lastly, the results indicate project management methods and standards have no statistical relationship with project success when moderated by a formal PMO.

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## APPENDIX A. STATEMENT OF ORIGINAL WORK

### Academic Honesty Policy

Capella University's Academic Honesty Policy ([3.01.01](#)) holds learners accountable for the integrity of work they submit, which includes but is not limited to discussion postings, assignments, comprehensive exams, and the dissertation or capstone project.

Established in the Policy are the expectations for original work, rationale for the policy, definition of terms that pertain to academic honesty and original work, and disciplinary consequences of academic dishonesty. Also stated in the Policy is the expectation that learners will follow APA rules for citing another person's ideas or works.

The following standards for original work and definition of *plagiarism* are discussed in the Policy:

Learners are expected to be the sole authors of their work and to acknowledge the authorship of others' work through proper citation and reference. Use of another person's ideas, including another learner's, without proper reference or citation constitutes plagiarism and academic dishonesty and is prohibited conduct. (p. 1)

Plagiarism is one example of academic dishonesty. Plagiarism is presenting someone else's ideas or work as your own. Plagiarism also includes copying verbatim or rephrasing ideas without properly acknowledging the source by author, date, and publication medium. (p. 2)

Capella University's Research Misconduct Policy ([3.03.06](#)) holds learners accountable for research integrity. What constitutes research misconduct is discussed in the Policy:

Research misconduct includes but is not limited to falsification, fabrication, plagiarism, misappropriation, or other practices that seriously deviate from those that are commonly accepted within the academic community for proposing, conducting, or reviewing research, or in reporting research results. (p. 1)

Learners failing to abide by these policies are subject to consequences, including but not limited to dismissal or revocation of the degree.



### Statement of Original Work and Signature

I have read, understood, and abided by Capella University's Academic Honesty Policy (3.01.01) and Research Misconduct Policy (3.03.06), including the Policy Statements, Rationale, and Definitions.

I attest that this dissertation or capstone project is my own work. Where I have used the ideas or words of others, I have paraphrased, summarized, or used direct quotes following the guidelines set forth in the *APA Publication Manual*.

Learner name  
and date

Michael Neaverth    March 2015

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Mentor name  
and school

Werner (Don) Gottwald    Capella University

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