Walden University

COLLEGE OF MANAGEMENT AND TECHNOLOGY

This is to certify that the doctoral study by

Jonathan Lim

has been found to be complete and satisfactory in all respects,
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2012

Abstract

Examining an Effective Project Management Office Model for

Global Software Development Environments

by

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MBA, University of Western Sydney, Australia 1995

M.Eng.Sc., University of New South Wales, Australia, 1991

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

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Abstract

The failure rates of information technology (IT) projects remain relatively high with 30% to 70% of IT projects failing because of issues with unstructured and decentralized project management processes and procedures. The purpose of this quantitative correlational study was to examine the relationship between roles and methods used to manage projects and project success. Variables associated with roles and methods included (a) monitoring and controlling performance, (b) development of project management competencies and methodologies, (c) multi-project management, (d) strategic management, (e) organizational learning, and (f) PMO organizational structure; project success was the dependent variable. Leadership theory served as the theoretical framework guiding the study. In this study, 107 information technology professionals from a major global software organization with operations in the United States, India, and Argentina completed an electronic survey. The data were analyzed using a multiple regression analysis to examine whether the 6 independent variables were significant predictors of project success. All variables associated with project management roles and methods were significant predictors of project success. Implications for positive social change include increased morale and improved knowledge sharing practices for leaders, project teams, and executive sponsors.

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Dedication

I dedicate this doctoral study to my family, who has been and always will be my primary driver in life. I offer a special feeling of gratitude to my father, Eddi Harijanto, who passed away a few years ago, and to my mother, Martha Inggawati. Although they never completed university education and came from a relatively poor small town in Indonesia, I would never have been able to reach this level of academic achievement without the values instilled by them and their loving, ongoing support.

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Finally, I give special thanks to my lovely young children—Darryl, Cynthia, and Lisa—for being my inspiration and motivation to achieve something great in life, and to my wife, Megawati, for being their loving mother. I would like to especially thank 10-year-old Darryl, my oldest son, who has never forgotten to pray for the success of my doctoral study.

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Section 1: Foundation of the Study

Project management offices (PMOs) have become important entities of many organizations since the 1990s because of their leaders' ability to build structure within an organization and ensure project success (Aubry, Hobbs, & Thuillier, 2007, 2008). The American financial company A.G. Edwards reinvented its PMO to increase the success rate of a project from 50% to 88% (Levinson, 2006). The strengths of the PMO include "instilling structured leadership, methodology, and infrastructure across all programs to make the best use of the company's time, money and human resources" (Milosevic, Martinelli, & Waddell, 2007, p. 460). Despite the importance of PMOs within organizations, neither academia nor business communities fully understand the underlying logic for the existence of PMOs and their sustainability (Aubry, Muller, Hobbs, & Blomquist, 2010; Hobbs, Aubry, & Thuillier, 2008). Many divergent perspectives exist regarding PMO models, including (a) how to structure effective PMOs (Curlee, 2008; Kerzner, 2009), (b) what functions and roles PMOs may have within an organization (Binder, 2007; Krebs, 2009; Mohan, 2006), and (c) what frameworks should be used when measuring the maturity level of PMOs (Brown, 2008; Persse, 2007).

In this study, an effective PMO model for managing projects in global software development (GSD) environments was examined. This section includes the background of the problem, the problem statement, and significance of the study. A description of the overall research problem being addressed and the importance of this research problem to the overall practice of project management in a practical setting are also included. The purpose and nature of the study are also included to explain the focus of the study and the

research method and design. The theoretical framework and the literature review contain materials from the professional and academic literature that grounds and complements the business research conducted in the study.

Background of the Problem

The failure rates of information technology (IT) projects remain high despite numerous advancements and improvements in the field of project management (Marchewka, 2006; Simon, 2010). The CHAOS study is the largest continuous-research study conducted in the history of IT and details the results of more than 40,000 completed IT projects. Results of the study indicated that only 32% of technical projects are considered successful in meeting budget, schedule, and scope parameters, which are essential measurements of traditional project management (Standish Group, 2009). Of these IT projects, 24% failed and were cancelled prior to completion or were delivered but never used. Anywhere from 30% to 70% of IT projects failed from a schedule, scope, or goals perspective (Simon, 2010). Key items contributing to either IT project success or failure included many factors that were organizational in nature including (a) stakeholder and user engagement, (b) executive sponsorship, (c) third-party relationships, (d) project management, (e) change management, and (f) resource availability (Simon, 2010).

In a survey of 252 organizations, 69% of all project failures related to either lack of project management methodologies or the ineffective implementation of the methodologies (Krebs, 2009). GSD projects are even more risky because they involve additional factors such as distance, time zone, and national culture (Carmel & Tjia, 2005; Mohan, 2006; Reed & Knight, 2009). Leaders in organizations need to maximize project

value beyond just addressing the project failures (Highsmith, 2010). Project value goes beyond meeting traditional project constraints of scope, cost, and time to focus on delivering true business value for customers (Highsmith, 2010).

Establishing a PMO has been considered a potential solution for addressing the problem regarding the high failure rates of IT projects (Center for Business Practices, 2007, 2010). Having a PMO can lead to some level of centralization of project management functions within the company, which could increase the use of standard project procedures throughout the organization and result in better management of projects (Crawford, 2002). Leaders in a PMO can also facilitate the transfer of knowledge and lessons learned from earlier project successes or failures to subsequent projects and provide a range of project support. Project support includes training, consulting, and mentoring (Dai & Wells, 2004); implementing and maintaining a project management information system where all project information can be captured (Raymond & Bergeron, 2008); and increasing the use of applicable project management software for a higher rate of project success (Bani, Anbari, & Money, 2008). Leaders within PMOs can help organizational leaders navigate through increasing complexities due to a rise in the number of projects undertaken at the same time, economic pressure to reduce the time to market, and increasing innovation competitiveness (Aubry et al., 2007).

The PMO itself is a relatively recent innovation and is still evolving (Aubry, Hobbs, & Thuillier, 2009). As such, divergent perspectives exist regarding an effective PMO model, including how it should be structured (centralized vs. decentralized PMO structure), PMO roles and functions (many variations from limited project office roles to

enterprise-level roles), and the PMO perceived values (Aubry et al., 2010; Hobbs & Aubry, 2007). With the lack of a consensus for an effective PMO model, the structures of PMOs are often not stable (Aubry & Hobbs, 2011). Further, the average age of a PMO is approximately 2 years (Aubry & Hobbs, 2011). Members of the practitioner community are looking for standards or guidelines to help establish and maintain effective PMOs, while the academic community is looking for theoretical bases that can be used to expand the body of knowledge related to the PMO (Aubry et al., 2010).

The concept of PMO maturity level was recently introduced to both the academic and practitioner communities. PMOs have a higher level of effectiveness and more positive impacts to organizations as they gain higher maturity levels (Center for Business Practices, 2007). To be able to optimize the investments of an organization when setting up a PMO, it is important to understand whether a higher PMO maturity level can result in improved organizational performance. Having a better understanding of this topic may help organizations to develop objectives and frameworks for improving the maturity level of PMOs.

Problem Statement

Based on the comprehensive yearly studies since 1994 by the Standish Group, an evaluative IT organization focused on project and value performance, the failure rates of general IT projects still remain relatively high, with project success rates having been as low as 16% in 1994 and 28% in 2004 (Marchewka, 2006; Simon, 2010; Standish Group, 2009). The dominant root cause of these failures is poor implementation of project management processes and principles, which leads to a general disarray of the

organization (Al-Ahmad et al., 2009; Highsmith, 2010; Krebs, 2009). Establishing a PMO is a potential solution for addressing the problem regarding the high failure rates of IT projects because the PMO provides structure and organization (Center for Business Practices, 2007, 2010). The general business problem is the inability of global organizations to manage IT projects causing organizational disarray and resulting in a loss of revenue to the organization. The specific business issue is the lack of an effective PMO model in GSD environments that can contribute to increasing the success rates of IT projects and to delivering higher project success.

Purpose Statement

The purpose of this quantitative, descriptive, and associational study is to examine the relationship between the six factors of the PMO model ($X_{1\text{-}6}$; independent variables), as highlighted by Curlee (2008) and Hobbs and Aubry (2007) and project success (Y_1; dependent variable) within the GSD environment. The following six factors of the PMO model are the independent variables: (a) monitoring and controlling performance (X_1), (b) development of project management competencies and methodologies (X_2), (c) multi-project management (X_3), (d) strategic management (X_4), (e) organizational learning (X_5), and (f) PMO organizational structure (X_6). The researcher collected data within a large software company, which for the purposes of this study will be known as *ABC Corporation*. The researcher chose the XYZ division of the ABC Corporation as a representative sample of a typical GSD environment, consisting of 107 participants from multiple geographic locations who responded to the survey. The positive elements of social change included the increased morale of the project teams due to increased project

success rates resulting from increased organization with the introduction of a PMO (Sauser, Reilly, & Shenhar, 2009; Shepherd & Cardon, 2009) and the potential facilitation from the PMO leaders of establishing shared knowledge by establishing project management community of practices (CoPs) both inside and outside the boundary of ABC Corporation to provide knowledge to the organization.

Nature of the Study

The study included a quantitative strategy of inquiry. The quantitative research method is appropriate for analyzing results because the researcher uses hard data and a linear trajectory to examine relationships among variables (Creswell, 2009; Weathington, Cunningham, & Pittinger, 2010). The primary characteristics of the qualitative method are the use of (a) instrument-based questions for quantitative versus open-ended questions, (b) statistical analysis and interpretation for quantitative versus text/image analysis, and (c) themes/patterns interpretation (Creswell, 2009). Considering these characteristics, using a quantitative method was more appropriate than the qualitative method.

In this study, an examination regarding the nature of the relationship among variables that fits perfectly with the descriptive and associational approach of the quantitative research method was used (Black, 1999; Vogt, 2007). Two of the most commonly used quantitative research designs are associational studies and experimental approaches (Black, 1999). A descriptive and associational research design was used based on alignment with the central purpose for the study, which is to examine the association between PMO roles (independent variables) and project success (dependent

variable). Because of the scope and complexity of the underlying variables, controlling and manipulating their values are impractical for this study, effectively ruling out any experimental designs (Howell, 2010; Whitley, 2002). The researcher examined the major variables of the PMO model (PMO organizational structure, PMO functions and roles, and PMO maturity) and how these variables correlated to higher project success. Using a quantitative research design allowed capture of these data from a large sample size to provide some level of empirical evidence. The researcher also considered using a mixed method because of the richness of results that could be realized by triangulating findings using both qualitative and quantitative forms of research (Creswell & Clark, 2007). For this study, using a quantitative research design only was sufficient to assess the relationship between PMO roles and project success (Vogt, 2007). Furthermore, the mixed method was not a preferred option because the methodology would require significantly more time and resources than the time and budget allowance provided for this study.

Research Questions

The purpose of this quantitative, descriptive, and associational research study was to examine the relationship between factors of PMO model and project success within the GSD environment. Thus, the following research questions served as the guiding elements of this study:

1. To what extent, if any, is there a relationship between the PMO roles of monitoring and controlling performance and project success?

2. To what extent, if any, is there a relationship between the PMO roles of developing project management competencies and methodologies and project success?
3. To what extent, if any, is there a relationship between the PMO roles of managing multiple projects and project success?
4. To what extent, if any, is there a relationship between the PMO roles of strategic management and project success?
5. To what extent, if any, is there a relationship between the PMO roles of organizational learning and project success?
6. To what extent, if any, is there a relationship between the PMO organizational structures and project success?

Hypotheses

The hypotheses were based on the research question described above. Each hypothesis was divided into several questions that were sent to survey participants to collect quantitative data.

$H1_0$: The PMO roles of monitoring and controlling performance are not correlated with project success in the context of GSD environments.

$H1_a$: The PMO roles of monitoring and controlling performance are correlated with project success in the context of GSD environments.

$H2_0$: The PMO roles of developing project management competencies and methodologies are not correlated with project success in the context of GSD environments.

$H2_a$: The PMO roles of developing project management competencies and methodologies are correlated with project success in the context of GSD environments.

$H3_0$: The PMO roles of multiple project management are not correlated with project success in the context of GSD environments.

$H3_a$: The PMO roles of multiple project management are correlated with project success in the context of GSD environments.

$H4_0$: The PMO roles of strategic management are not correlated with project success in the context of GSD environments.

$H4_a$: The PMO roles of strategic management are correlated with project success in the context of GSD environments.

$H5_0$: The PMO roles of organizational learning are not correlated with project success in the context of GSD environments.

$H5_a$: The PMO roles of organizational learning are correlated with project success in the context of GSD environments.

$H6_0$: The PMO structures of centralized or decentralized organizations are not correlated with project success in the context of GSD environments.

$H6_a$: The PMO structures of centralized or decentralized organizations are correlated with project success in the context of GSD environments.

Survey Questions

The detailed survey questions are listed in Appendix A. The main concept measured using the electronic questionnaire was the associations between the implemented PMO model and project success (see Appendix A). The data collection

section includes a detailed breakdown of the main concept—associations between the selected attributes of the PMO model (PMO roles/functions, PMO organization structure, and PMO maturity level), which was the independent variable, and project success, which was the dependent variable. Section 2 of the survey questions was related to the project success parts of Research Questions 1 to 7. Section 3 of the survey questions was related to the PMO roles/functions parts of research questions 1 to 6. Section 4 of the survey questions was related to the PMO organizational structure part of research question 7. The other sections of the survey questions (Sections 1, 5, and 6) established the background for GSD environments, PMO maturity level, and demographic information of the research participants. For Section 6, the GSD complexity index was rated based on how many of the eight factors are checked—Complexity Index: 1–2 = some complexity, 3–5 = moderate complexity, and 6–8 = high complexity.

Theoretical Framework

Trait leadership theory provides an effective framework for discussing the various leadership and management functions of the PMO according to how they will be analyzed in this study (Binder, 2007). Trait leadership theory is based on the premise that people are born with certain traits and skills that will differentiate leaders from followers, and research was concentrated on finding those specific traits and skills (Yukl, 2002). The theory was prominent at the beginning of the modern study of leadership, with hundreds of studies conducted between 1930 and 1940 to discover these elusive traits and skills (Yukl, 2002). No single author stands out as the founder of trait leadership theory,

but the following discussion presents examples of the prominent studies regarding this theory.

Stogdill conducted one study in 1948 and a second study in 1974. Stogdill (1948) related consistent patterns of leadership taken from 124 trait studies conducted from 1904 to 1947, including elements such as intelligence, responsibility, self-confidence, and sociability. Stogdill (1974) reported more leader traits taken from 163 trait studies conducted between 1948 and 1970, including vigor and persistence in pursuit of goals, originality in problem solving, ability to influence other people's behavior, and capacity to structure social interaction systems to the purpose at hand. The *big five* models of personality Digman proposed (1990) listed the following personality traits of (a) surgency, (b) dependability, (c) agreeableness, (d) adjustment, and (e) intelligence. Yukl (2002) mentioned the three-category taxonomy of leadership skills, which included technical skills primarily concerned with things, interpersonal skills primarily concerned with people, and conceptual skills primarily concerned with ideas and concepts.

At a more specific project environment, Turner (1999) looked at project management and suggested the following six traits of effective project managers similar to the trait approach of the leadership theory: problem-solving ability and results orientation, energy and initiative, self-assuredness, perspective, communication, and negotiating ability. Analyzing different stages within a project's life cycle would provide one with other perspectives. Throughout the project life cycle, different levels require different factors. Some examples of these factors are leadership styles, motivational factors, and cultural approaches. Turner highlighted the fact that different motivational

levels and management styles are required depending on where a manager-leader is in the project management life cycle. Leading projects in the 21st century may require a different set of leadership competencies (Walker & Walker, 2011). The characteristics of an authentic leader for the 21st-century project include being a relationship-centered, fair and unbiased, and value-centered person (Walker & Walker, 2011).

Many PMO researchers have used trait leadership theory between 2000 and 2010 as the theoretical framework for their research (e.g., Anantatmula, 2010; Korrapati & Kocherla, 2010; Korrapati & Rapaka, 2010; Muller & Turner, 2007b; Nauman, Khan, & Ehsan, 2010; Turner, Muller, & Dulewicz, 2009; Yang, Huang, & Wu, 2011). These studies provided precedence for using trait leadership theory as the theoretical framework for the present study. The following examples are how researchers have used trait leadership theory as a theoretical framework. Gehring (2007) investigated how trait leadership theory applies to project management and determined how trait leadership theory correlates to core project management competencies. Trait leadership theory is applicable to project leadership related to the importance of the development and realization of project visions to meet the project objectives (Muller & Turner, 2007b). A study on the criticality of the people-related factors of a project manager's leadership roles in improving project performance provided a second example of an application of trait leadership theory (Anantatmula, 2010). Turner et al. (2009) compared the leadership styles of 414 project managers to the leadership styles of more than 1,000 functional managers by looking at the traits related to leadership competencies and leadership performance. Yang et al. (2011) analyzed the relationships between project managers'

leadership style and project success. The study by Nauman et al. (2010), which highlighted the criticality of good project leadership skills in contributing to project success, gives a third example of an application of trait leadership theory.

In this study, an examination of PMO roles to improve GSD project success was conducted. Considering the roles of PMO leaders play in an organization in leading and managing projects, programs, and portfolios, and many other functions related to mentoring and developing processes and standards (Binder, 2007), *trait leadership theory* seemed the appropriate theoretical framework to use for this research study.

Definition of Terms

The following terms and phrases are defined as used in this study.

Global software development (GSD): Improvements in technology and software development tools and methods have allowed geographically and culturally diverse groups to come together into GSD teams. Other terms used to describe GSD include *geographically distributed software development* and *international software development*. The term *software development* can be defined more formally as collaborative software development activities focused on common systems or projects that transcend national boundaries (Prikladnicki, Audy, & Evaristo, 2004).

Project management office (PMO): A PMO is typically a department or group within an organization that defines and maintains the standards and processes related to project management. One formal definition of a PMO is as follows: "A project management office is a centralized body within an organization that is responsible for instilling structured leadership, methodology, and infrastructure across all programs to

make the best use of the company's time, money and human resources" (Milosevic et al., 2007, p. 460).

Project value: Project value goes beyond meeting traditional project constraints of scope, cost, and time to focus on delivering true business value for customers (Highsmith, 2010).

PMO model/roles: Many authors have talked about PMO model/roles, as highlighted in the literature review section. For the purpose of this study, the PMO roles Hobbs and Aubry highlighted (2007) will be used. This study focused on the following six factors of the PMO model: (a) monitoring and controlling performance, (b) development of project management competencies and methodologies, (c) multiproject management, (d) strategic management, (e) organizational learning, and (f) PMO organizational structure.

Assumptions, Limitations, and Delimitations

This section includes topics related to assumptions, limitations, and delimitations of this study. Assumptions are facts considered to be true, but are not actually verified. Limitations include potential weaknesses of the study. Delimitations include the scope of the study.

Assumptions

Two assumptions were considered true but were not verified for this study. One assumption is the individuals participating in the study understands and answers the survey questions truthfully and to the best of their knowledge. To mitigate these risks, the consent form sent with the survey questions contained anonymity, rights, and other

related matters. Another assumption is that leaders of ABC Corporation can bring positive effects to the organizational performance by implementing an effective PMO model. Hence, having a better understanding of how to implement an effective PMO model is something that leaders of ABC Corporation should aspire to achieve.

Limitations

Possible limitations might include generalizing findings beyond the original scope of the study. The first limitation was related to the fact that the research participants were all from ABC Corporation, and ABC Corporation might not fully represent the overall population of the GSD environment. The use of a combination of purposive and convenience sampling inherently limited the generalizability of results. The second limitation was that the research participants were geographically located in the United States, India, and Argentina. The division might not be sufficiently diverse to represent the potential complexities of all GSD environments.

Delimitations

The hypotheses, that formulated a priori based on previous research and literature in the field of project management and organization of the PMO, bounded the study. The PMO organizational structure, PMO functions and roles, and PMO maturity were included in the scope of the model. Other aspects of the PMO model might be important to certain organizational leaders but might not be critical for leaders of ABC Corporation at this stage. Such aspects of the PMO model were not in the scope of this study. This study included a baseline examination to determine how effective the existing PMO model was, as implemented within the XYZ division of ABC Corporation, and to

develop suggestions for future improvements based on the existing framework taken from the literature review. The follow-up on how successful the implementation of these suggestions might be is not part of the scope of this study.

Significance of the Study

This section includes topics related to the reduction of gaps and the implications for social change. The first subsection will include how this study can fill gaps in the understanding and effective practice of business. The second subsection includes a statement of positive social change or the improvement of human or social conditions.

Reduction of Gaps

The doctoral-study topic involves an examination of effective PMO roles, as highlighted by Hobbs and Aubry (2007), within the context of a GSD environment. The study involves a practical emphasis by using ABC Corporation to represent one of the largest GSD environments in the world as a case study. The PMO is a recent innovation and is still evolving, with many divergent perspectives that still exist regarding an effective PMO model (Aubry et al., 2009; Aubry et al., 2010; Hobbs & Aubry, 2007). Members of the practitioner community are looking for standards or guidelines to help establish and maintain effective PMOs, while the academic community is looking for theoretical bases that can be used to expand the body of knowledge related to the PMO (Aubry et al., 2010). The findings from this study may help in reducing these gaps by offering practical perspectives that can be implemented in professional practice by the executives and project or program managers in various GSD environments who want to use the PMO model to help maximize project success in managing their projects and

portfolios. The academic community, who has an interest in either the PMO or the GSD environment, may be able to use the study findings as a practical point of reference for further studies. This study may be of value to the process of business/social impacts by helping to reduce these gaps, especially with the emphasis on the practical perspective. The following section contains additional applications concerning social change.

Implications for Social Change

The negative impact of project failures affects the project teams, project stakeholders, and society when considering the economic perspectives of stakeholders. Project failure is likely to trigger negative emotional impacts, which can result in a lack of organizational morale (Shepherd & Cardon, 2009). The negative emotional impacts can translate to attitudes and behaviors that decrease trust in and commitments to the organization and to increased turnovers and lower productivity, which will also negatively affect the organization (Shepherd & Cardon, 2009).

A general economic perspective, as highlighted by Charette (2005), on IT software project failures follows:

> The failures are universally unprejudiced: they happen in every country; to large companies and small; in commercial, nonprofit, and governmental organizations; and without regard to status or reputation. The business and societal costs of these failures—in terms of wasted taxpayer and shareholder dollars as well as investments that can't be made—are now well into the billions of dollars a year. (p. 1)

Leaders of organizations and governments worldwide spent more than $1 trillion on IT hardware and software projects in 2005. Charette (2005) predicted 5% to 15% of these projects would be abandoned before or shortly after delivery. Software has become ubiquitous, handling many important daily and critical functions within modern society, from banking to air-traffic control. Software project failure on some of these critical functions can cause fatalities, such as the shooting down of an Iranian commercial airliner, killing 263 innocent people due to software failure of the Aegis radar system (Gotterbarn, 2002) and the loss of NASA's Mars Climate Orbiter (Sauser et al., 2009).

From conducting the study and completing the literature review on the topic, the researcher now have a deeper theoretical knowledge of the topic and a better understanding of how to apply the knowledge in a business setting. Immediate impacts are to the projects and portfolio currently being managed within the XYZ division because they were part of the units where data were collected. The division now has feedback on the performance of the current PMO and a plan for future improvements based on the effective PMO model researched in this study.

Anything that can help to reduce the rates of project failures should have some positive social change for the organization and the community. Assuming that the study was conducted properly with minimum issues relating to validity and accuracy (Creswell, 2009), there may be some positive implications for social change by adding a practical perspective on effective PMO models for the GSD environment to the general project management body of knowledge. The study findings may add to the body of knowledge regarding the topic, as tested against a real-world practical business situation. The forum

for disseminating the findings can be local, national, and global congresses and symposia related to project management and also through the submission of articles to peer-reviewed journals, such as the *International Journal of Project Management*, the *International Journal of Managing Projects in Business*, and *Project Management Journal*.

Review of the Professional and Academic Literature

Researchers conduct literature reviews to establish an existing framework of knowledge and also to look for any gaps that might be worthy of further study (Walliman, 2011). The literature review matrix is listed in Appendix D. The relevant professional and academic literature is grouped into three major areas. The first area is GSD, the contextual environment for the study, comprising (a) GSD trends, (b) GSD risks and challenges, (c) GSD success factors, and (d) GSD typology and maturity level. The second area is PMO, the model being studied, and will consist of (a) PMO typology, (b) PMO benefits, (c) PMO organizational structure, (d) PMO roles and functions, (e) more innovative functions of the PMO, (f) PMO maturity, and (g) competencies, power, and influence. Each area will include an introduction and then deeper analysis on the relevant aspects of the study. The final area follows, consisting of the relationship between PMO model and project success within the context of GSD environments. The study includes more than 80 peer-reviewed articles and 50 books. More than 80% of these publications were published within the past 3 to 5 years of the anticipated graduation year. The study used the following main keywords to collect the publications:

(a) project management office (PMO), (b) global software development (GSD), (c) risks and challenges, (d) roles and functions, and (e) project success.

Introduction to GSD

Global software development began with the exploration of remotely located software development facilities by many organizations in the early to mid-1990s. Known as distributed software development, GSD was originally created to lower costs and gain access to skilled resources (Prikladnicki et al., 2004). Software development evolved into a multisite, multicultural, and globally distributed operation. Researchers have used many terms other than GSD to describe a similar concept. The term *global software development* is now the most frequently used term and refers to collaborative software development activities on common systems and projects that transcend national boundaries (Prikladnicki et al., 2004).

GSD trends. GSD has increasingly become not only the normal practice in the software industry but also a necessity (Damian, Sengupta, & Lanubile, 2008). In the United States, the value of the offshore software development market has increased 25-fold, from 1999 to 2009; one-fourth of overall U.S. software development spending is devoted to application development (Conchuir, Agerfalk, Olsson, & Fitzgerald, 2009). Some of the benefits of GSD, as highlighted by Conchuir et al. (2009), include reduced development costs, time-zone leveraging effectiveness, cross-site modularization of development work, access to large skilled labor pools, innovation and shared best practices, and closer proximity to markets and customers. Strategic advantages include "the increase in speed, agility, and flexibility which can rapidly ramp up (by reducing

time to get the project started) and reduce project duration (time to completion). The abundant supply of labor offshore gives companies greater agility" (Carmel & Tjia, 2005, p. 11).

Related to cost savings, which is the typical main driver for GSD, some transaction costs occasionally represent hidden costs that organizational leaders might not consider up front as part of their planning for establishing GSD (Carmel & Tjia, 2005). These costs include search and contract, travel, governance, disaster recovery, infrastructure, and knowledge transfer.

GSD risks and challenges. Software development is a relatively risky undertaking (Al-Ahmad et al., 2009; G. Thomas & Fernandez, 2008). The failure rates of software projects are still quite alarming: only 35% of the software projects started in 2006 were considered successful in 2007, 46% of software projects started were considered challenged with either cost or time overruns or not meeting users' requirements, and 19% were considered outright project failures (Cerpa & Verner, 2009). Al-Ahmad et al. (2009) developed a taxonomy of IT project failures based on the root causes of the failures: project management factors, top management factors, technology factors, organizational factors, complexity and size factors, and process factors. Stamelos (2010) used the term *antipatterns* to describe the bad practices that contribute to project failures as the result of human errors (management antipatterns) and socio-cultural pitfalls (environmental antipatterns). Cerpa and Verner (2009) identified 18 underlying factors that cause projects to fail. The top five factors include "delivery date impacted the development process; project under-estimated; risks were not re-assessed, controlled, or

managed throughout the project; staffs were not rewarded for working long hours; delivery decision made without adequate requirements information" (Cerpa & Verner, 2009, p. 131). Management causal factors, including poor project leadership, accounted for 65% of the project failure rate (McManus & Wood-Harper, 2007).

R. A. Morris (2008) noted, "More than 90% to 95% of projects that fail do so in the first five minutes of their existence. . . . Projects fail because of context, not content" (p. 22). Defining success in an IT project is difficult because success can mean different things to different stakeholders (Thomas & Fernandez, 2008). Thomas and Fernandez (2008) provided a framework for measuring project success based on three broad categories: project management success, technical success, and business success.

GSD is risky because of further challenges that include distance, time zone, and national culture. These challenges have had effects on many levels, including strategic, cultural, knowledge management , and technical issues (Prikladnicki et al., 2004). Challenges related to the physical distance between the project team can cause collaboration and other project communication-related issues (Henderson, 2008; Wolf, Nguyen, & Damian, 2008). Increased complexities for GSD are due to coordination among teams disbursed by time, distance, and cultural differences (Avritzer, Paulish, Cai, & Sethi, 2010). Along similar lines, Gupta (2008) noted the importance of risk identification as part of the due diligence conducted when setting up GSD. The types of risks that should be included are operational risks (lack of control and lack of monitoring), strategic risks (opportunistic recognition and shirking), security risks (intellectual property violation and loss of confidentiality), and cultural challenges

resulting in communication difficulties and other aspects of business operations challenges (Gupta, 2008). Some of the more detailed challenges and risks of GSD are communication breakdown, coordination breakdown, control breakdown, cohesion barriers, and culture clashes (Carmel & Tjia, 2005). All these difficulties may translate to extra costs for GSD (Carmel & Tjia, 2005). Some offshore elements include country risks (political and financial), intellectual property risks, data security risks, corruption risks, system security risks, and infrastructure risks (Carmel & Tjia, 2005).

Mohan (2006) noted that risks in GSD are from several major sources: (a) organizational risks (cultural and distance issues, new market risks, perceived loss of control, compromising confidentiality), (b) technical risks (onsite and offshore communication and coordination, limitation of management tools, infrastructure issues, knowledge management), and (c) external risks (geopolitical risks, regulatory and governmental restrictions, currency, global business risks). Additional project risks related to communications arise from the effects of physical distance as it relates to virtual teams within GSD (Reed & Knight, 2009; Wolf et al., 2008).

Risks of GSD include product and design quality, maintenance and evolution, continuous evolution, and restructuring (Yu & Mishra, 2010). Yu and Mishra (2010) brought forward other aspects of GSD risks by highlighting the longer-term risks related to software product quality and software industry competitiveness. For example, in product and design quality, it might be harder to enforce the same quality standard globally, which would result in negative effects to the overall software product quality (Yu & Mishra, 2010).

GSD success factors. To overcome the challenges and risks of GSD, Sangwan, Bass, Mullick, Paulish, and Kazmeier (2007) suggested critical success factors that included reducing ambiguity, maximizing stability, understanding dependencies, facilitating coordination, and balancing flexibility and rigidity. Critical success factors basically ensure that potentially disruptive distance effects are contained in a secure manner through the use of common tools by all teams; recruiting right talents and providing sufficient training; proper planning for projects and follow-up with a clear plan of engagement; proper team integration to help minimize cultural distances; good leadership in creating and embedding culture; a modular architecture with less coupling; good collaborative technology, including software configuration management and change management; secure IT infrastructure; and effective staff retention strategy (Hofner & Mani, 2007).

Remus and Wiener (2009) detailed some critical success factors for managing GSD projects and categorized them into a two-dimensional model, with internal versus external factors on one axis and suitability and management factors on the other axis. They identified twenty-nine factors; some of the most important include defining clear project goals, continually controlling project results, and ensuring continual communication flow. Key success factors that a virtual team must have are a high level of trust, clear communication, strong leadership, and appropriate level of technology (Bergiel, Bergiel, & Balsmeier, 2008).

The factors that might be influential for project success criteria are subjective and can be influenced by the traits of the project manager, type of project, and even type of

industry (Muller & Turner, 2007a). Certain project characteristics, such as project size and project complexity, have a direct impact on project management performance (Martin, Pearson, & Furumo, 2007). The use of adapted processes, practices, and collaboration tools could help mitigate the distance factor to improve collaboration and minimize communication delays (Wolf et al., 2008). Another aspect that can be adapted to help improve GSD success is tailoring the software development process to address the specific challenges of GSD that include resource challenges, communication challenges, requirement management challenges, and political challenges (Xu & Ramesh, 2008).

The knowledge transfer of information among distributed teams is another aspect that is typically a challenge in GSD environments. Oshri, Fenema, and Kotlarsky (2008) looked at knowledge transfer through the encoding, storing, and retrieving processes. They concluded that some specific practical actions that can be taken include the standardization of templates across teams and more frequent teleconferencing, accompanied by occasional short physical visitations (Oshri et al., 2008).

GSD typology and maturity level. Several typology models have captured important aspects of GSD. Four types of distributed software development are based on a geographic location axis (onshore versus offshore) and a control-ownership-relationship structure axis (outsource or buy vs. insource or build): (a) shared services, internal domestic supply, or onshore insourcing; (b) onshore outsourcing or outsourcing; (c) offshore outsourcing; and (d) offshore insourcing or captive or internal offshoring (Prikladnicki, Audy, & Yamaguti, 2007). Another suggested GSD typology is based on an engagement model in terms of control versus cooperation: third party, build-operate-

transfer, joint venture, and captive (Hofner & Mani, 2007). Another GSD typology is based on the dimensions of organizations, cultures, time zones, languages, and locations (Binder, 2007).

Researchers can use several models of maturity level of GSD to analyze various GSD environments. Carmel and Tjia (2005) introduced the offshore stage model. Carmel and Tjia noted that companies tend to move through four offshoring stages, from the *offshore bystander* (Level 1) (describes the companies watching others offshoring) to *leveraging offshore* (Level 4) (offshoring moves beyond mere cost savings to other strategic advantages, such as innovation, speed, flexibility, and new revenues).

Introduction to the PMO

The concept of the PMO is a subset of overarching project management theories. Project management consists of many theoretical frameworks and continues to expand the various areas of leadership, management, and organizational studies (Söderlund, 2011). Söderlund (2011) found that project management research is related to many other schools of thought, some include the contingency school, the behavior school, the relationship school, and the decision school. The institutionalization of the project management role began in the 1950s; since then project management has played a role in the general management of projects in organizations (Sewchurran, 2008). Sewchurran (2008) noted that scholars are still developing the underlying theory of project management. Although the origin of the PMOs can be traced back to the 1950s, the concept of the modern-day PMO did not emerge until the 1990s (Aubry et al., 2007, 2008). At a basic level, Dinsmore and Cabanis-Brewin (2011) outlined the characteristics

of projects: “unique undertakings, composed of independent activities, create unique deliverables, involve multiple resources, not synonymous with the products of the project, and driven by the competing constraints” (pp. 2–3). Others have used many recent alternative approaches, other than the traditional project management approach, in managing projects, such as extreme, adaptive, lean, and agile project management (Levardy & Browning, 2009).

At the beginning of modern project management, the terms *project* and *program* were used interchangeably (Artto, Martinsuo, Gemünden, & Murtoaro, 2009). Eleven distinctive characteristics of programs and projects were based on a bibliometric study of 1,681 articles related to programs and projects published over more than two decades.

Several differences exist between project and program management roles (Brown, 2008). The project manager is accountable for delivering assigned projects within the triple constraints of time, cost, and scope established by a program manager. The program manager works on a more complex level of managing multiple projects that are typically linked to a business strategy. Program managers are responsible for establishing a policy and culture within the organization such that they can successfully execute projects. The strategic nature of program management is focused on business success compared to the tactical nature of project management, which is focused on successful execution (Milosevic et al., 2007). Milosevic et al. (2007) noted that the main role of program management is “the mechanism by which the work of the various operating functions within a company is integrated to create an effective business model” (p. 38).

Three themes have been common in discussions of program management, including (a) management for both tangible and intangible benefits, (b) program stakeholder management, and (c) program governance (Sanghera, 2008). Thiry (2010) provided more detail discussion about the differences between project, program, and portfolio management, based on factors such as scope, attitude toward change, success criteria, leadership style, roles, responsibilities, main tasks, and control. Another consideration has been to look at the importance of a holistic approach to projects, programs, and portfolios: "A project is not isolated and it must be considered inside an organization which links the projects with programs, project portfolios, and the strategic goals of the organization" (Sanchez, Robert, Bourgault, & Pellerin, 2009, p. 14). One of the functions of PMOs has been to focus on the integration and interdependencies of these projects, programs, and project portfolios (Sanchez et al., 2009). Some of the challenges organizations commonly face when achieving these objectives are factors such as lack of strategic focus and strategy awareness, lack of benefits understanding, and lack of leadership and commitment (Shehu & Akintoye, 2010).

PMO typology. The PMO, a relatively recent phenomenon within the field of project management, has been growing in popularity and being adopted as a best practice within organizations to improve the effectiveness and consistency of project management (*Computer Economics*, 2011). The PMO started to become popular in 1994 and has since grown in popularity (Hobbs & Aubry, 2007). The growth rate was quite sharp during the U.S. recession, increasing from 43% in 2008 to 63% in 2010 (*Computer Economics*, 2011).

The PMO is known by many similar names, such as *project office*, *project support office*, *project management group*, and *project management center of excellence*. One of the many definitions for the PMO is "a centralized body within an organization that is responsible for instilling structured leadership, methodology, and infrastructure across all programs to make the best use of the company's time, money and human resources" (Milosevic et al., 2007, p. 460). The Project Management Institute's (PMI, 2004) definition of PMO is:

> An organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain. The responsibilities of the PMO can range from providing project management support functions to actually being responsible for the direct management of a project. (p. 369)

There are many variations among PMOs. Milosevic et al. (2007) highlighted the following variations of PMOs: project control office (established to provide administrative and tracking support for the project teams), functional program office (set up to support the program managers within a department), and enterprise PMO (the center for program management competencies and practices within a company). Hobbs and Aubry (2007) proposed a distinction between PMOs with single-project responsibilities and PMOs with multi-project responsibilities, which is the focus of this doctoral study. Hobbs and Aubry (2008) developed a typology of PMOs based on an empirically grounded study of 500 PMOs and proposed three types of PMOs:

> PMOs with many projects and project managers and considerable decision-making authority; PMOs with few projects and few, if any, project managers and less decision-making authority; and finally PMOs with few if any project managers, a mandate including most of the organization's projects, and a moderate level of decision-making authority. (p. 81)

Do Valle, Silvia, and Soares (2008) provided the following classifications regarding PMOs: (a) strategic PMO, (b) directive PMO, (c) support PMO, and (d) hybrid PMO (a combination of any of the previous three classifications). Along these lines, Andersen, Henriksen, and Aarseth (2007) described three levels of PMOs: Level 1—project office, or project-level PMO; Level 2—unit project office, or program-level PMO; and Level 3—strategic PMO, or corporate-level PMO.

PMO benefits. Although the concept of the PMO has existed since the mid-1990s, recent studies have indicated inconclusive results related to the values that a PMO brings to an organization (Hurt & Thomas, 2009; J. Thomas & Mullaly, 2008). A PMO is often seen as a nonrevenue entity that would only incur overhead costs within an organization (Stanleigh, 2009). The existing literature review on the topic has taken two approaches to demonstrate the PMO's value: economic and pragmatic (Aubry & Hobbs, 2011). The economic approach demonstrates the economic contribution to the bottom line of the organization compared to the pragmatic approach, which acknowledges the problem of identifying the success factors and the PMO's contribution to company performance.

Some of the benefits that can be realized from PMO implementation to the organization include: standardization of operations, company rather than silo decision making, better capacity planning, quicker access to higher-quality information, and more realistic prioritization of work (Kerzner, 2009). Other benefits of the PMO include: reducing the time and cost to set up a project, providing consistency in measuring projects throughout the company, improving reporting to the executives, managing prioritization and interdependency of projects, and helping to improve overall business performance (Tjahjana, Dwyer, & Habib, 2009). Other perspectives related to PMO benefits are global recognition; profitability improvement; productive project team; organizational improvement; culture shift to project management; staff professionalism in project management; and predictable, reusable project management tools and techniques (Goncalves, 2007).

Another benefit that PMO leaders can bring to an organization is to become agents of change and renewal (Pellegrinelli & Garagna, 2009). The PMO is an important part of contributing to project performance, especially where project task uncertainty is high (Liu & Yetton, 2007). Organizations can also realize the benefits of PMO implementation by performing an integrative role and establishing some sort of control mechanisms for the front-end innovation type of projects (Artto, Kulvik, Poskela, & Turkulainen, 2011). Leaders of PMOs can help to manage the coexistence of contradictory demands faced by organizations, such as focusing on regional versus global markets or focusing on innovation versus mass production (Geraldi, 2009). The leaders of PMOs can play active roles in managing risk in projects, programs, and portfolios to

increase the overall organizational performance (Sanchez et al., 2009; Sanchez, Robert, & Pellerin, 2008). Leaders at PMOs can help with continuous process improvement and implementing project management best practices (Kaufman & Korrapati, 2007; Nwachukwu, 2010; Papke-Shields, Beise, & Quan, 2010; Rozenes & Vitner, 2009; Rummler, Ramias, & Rummler, 2009a, 2009b). Leaders of PMOs can also help to manage unexpected events and environmental impact not planned that might come up during project implementation (Söderholm, 2008).

The concept of organizational immaturity is primarily characterized by the lack of ability to embrace any needed change throughout the culture of the company (Klubeck, Langthorne, & Padgett, 2010). To help overcome organizational immaturity, Brown (2008) highlighted the following benefits from the implementation of an effective program management:

> The organization that can learn, change, adapt, and do so rapidly is destined for success. Unfortunately, many of today's organizations exist in a state of chaos. These companies exist in this dysfunctional state because they do not have an effective program management structure in place. Without great program management, no business can readily adapt to changing business conditions. (p. 5)

PMO organizational structure. The traditional structure evolved into a centralized PMO organization (Kerzner, 2009). The traditional organizational structure is hierarchical, with separate functional departments, each responsible for its own projects. This traditional structure has been used for more than two centuries. The traditional organizational structure evolved to a departmental project management structure and a

line-staff organizational structure, where the role or position of project managers is more formally defined. Then a structure of projectized organization emerged to provide a complete line of authority over the project.

Further along, the concept of matrix organizational structure emerged to take advantage of both the pure functional structure and the product organizational structure. The variations of the matrix organizational structure are strong, weak, and balanced matrices, depending on the influence of the project managers over the line or functional managers. In a strong matrix, the project manager possesses more authority than the line or functional manager does (Kerzner, 2009). Morris and Pinto (2007a) highlighted the differentiation between organizing projects within the functional organization versus the other end of the spectrum of having dedicated project teams and the hybrid of the matrix arrangements of weak, balanced, or strong matrix. Leaders within a project-driven company readily accept the creation of the PMO as its own organization as a necessity for conducting business. The basic factors that influence the selection of a project organizational form are project size, project length, project location, experience with PMOs, philosophy and visibility of upper management, and available resources (Kerzner, 2009; Morris & Pinto, 2007b).

Best practices can be used as benchmarks in establishing, developing, and implementing PMOs (Andersen et al., 2007). Thiry and Deguire (2007) discussed project-based or project-led organizations within the contexts of strategy, governance, and structure and noted that project management practices will influence practices within an organization and vice versa. Thus, in determining the organizational structure of a

PMO, organizational leaders need to take into consideration organizational practices, including corporate and business strategies. The right organizational structure is important in order to have a good governance model at a project and corporate level (Marnewick & Labuschagne, 2010).

Centralized and decentralized PMOs have different effects on how training, standardized processes, electronic communication and collaboration, and leader behaviors should be conducted (Curlee, 2008). The project personnel report to a chain of command within a centralized PMO, whereas the responsibility for maintaining project management methods, training, and best practices is disbursed among many business units within an organization in a decentralized PMO.

PMO roles and functions. The traditional PMO functions include project-focused functions—consult, mentor, and enhance specific information and knowledge for individual project managers to complete their projects successfully—and enterprise-oriented functions—promote, practice, and train project management best practices in a formalized and consistent manner throughout the organization to improve project performance (Rad & Levin, 2002). The concept of an enterprise program management office (EPMO) is to address the shortcomings of the traditional PMO (Williams & Parr, 2004). The EPMO goes beyond the traditional PMO because it addresses all components mentioned in the enterprise program management framework.

A strategic portfolio management EPMO is designed to coordinate all projects and program activities to make sure that alignment is maintained between an organization's strategic imperatives and its investment in projects and programs. A

program delivery management EPMO should develop standard best practices program delivery and project management tools and methodologies, spanning all activities within the organization. EPMOs whose focus is project management program architecture should represent the portfolio of change programs, with authority at the most senior levels of an organization's leadership. The EPMO in change architecture is the main change agent and functions to maintain a big-picture perspective on all of the change activities within an organization. The mission of the EPMO is to facilitate the success of all projects in the organization, compared to a PMO, which has a scope of influence only in one division or organizational unit, or compared to a project office, which is focused only on one project (Rad & Levin, 2007). The right focus in the enterprise or portfolio aspect of the projects enables organizational leaders to achieve more by doing less through a results orientation instead of an effort orientation, and to do the right work instead of the most work, for example (Linetsky, 2008).

The focus areas for the PMO include (a) relationship management, (b) change management, (c) infrastructure management, (d) communications management, (e) contract administration, (f) managing management, and (g) knowledge management (Mohan, 2006). Similarly, PMOs typically perform the following tasks: project resource plans, financial reporting, project schedules, risk assessment and mitigation management, quality assurance, and communications plan (Goncalves, 2007). The global PMO needs to perform the following services (Binder, 2007): (a) project knowledge management services (including central lessons-learned databases, centralized configuration management, centralized risk repository, centralized repository of project issues,

centralized repository of quality standards, project reporting, information distribution, scheduling database, and project dictionary); (b) portfolio management services (including identification and categorization of portfolio components; evaluation and selection of components; prioritization, balancing, and allocation of resources; and portfolio reporting); and (c) project and program management services (including program management, project management, and project recovery). Global PMOs must support program and project managers through monitoring and health checks, coaching and mentoring, training, career path establishment, corporate project management methodology and good practices and standards, specific project management methodology and good practices and standards, global project management and good practices and standards, collaborative tools and techniques, project management tools and techniques, and project management maturity. Wagner and Barkley (2010) discussed the global emphasis of program management in the areas of strategies and risk management. Five categories of PMO functions are (a) practice management, (b) infrastructure management, (c) resource integration, (d) technical support, and (e) business alignment (Hill, 2008). Some of the main activities that the PMO staff should undertake are project resource management, financial management, vendor management, process management, quality management, project selection, knowledge management, communications management, customer management, and training management (Tjahjana et al., 2009).

The role of PMOs in modern and competitive organizations can be seen from the perspective of implementing different kinds of PMOs at different organizational levels (Do Valle, Silvia, & Soares, 2008). The study by Desouza and Evaristo (2006) described

the characteristics, archetypes, and critical success factors of PMOs. Another study based on leadership traits theory (Brown, 2008) described the following functions of the PMO as leader as follows: "presence, relationship building, consistency, effective questioning, decision making, and mentoring" (p. 34).

Twenty-seven important functions of the PMO can be grouped into several factors: monitoring and controlling project performance, development of project management competencies and methodologies, multiproject management, strategic management, and organizational learning (Hobbs & Aubry, 2007). Related to multiproject management and strategic management functions, the concepts of portfolio management (Jonas, 2010), multiproject organization (Canonico & Söderlund, 2010), and multiple project management practices (Patanakul & Milosevic, 2009) have been introduced. One of the important functions that the PMO can play is related to facilitating cross-project learning and continuous improvements due to the centralized nature of projects managed within its domain (Julian, 2008). This function is done by embedding accumulated knowledge from past project experiences into project management standards applied through current projects. The success factors the PMO must perform are as follows: establish an environment of trust, create clarity in communications, define processes and roles, communicate expectations, employ consistent processes, facilitate organizational support, and manage outcomes (Anantatmula, 2008). The primary function of the PMO is balancing demand versus capacity within the organization through the management of strategic, investment, and execution portfolios using the business

processes of operational planning, investment analysis, and work and resource management (Durbin & Doerscher, 2010).

Dvir and Shenhar (2011) conducted research that is supported by some of the PMO functions mentioned above, especially those related to leadership, in which one of the seven common characteristics of highly successful projects is the leadership provided by a highly qualified project leader with full support from executives. Leadership is within the top two of the 15 criteria of the project management critical competency index based on a study performed by Stevenson and Starkweather (2010). Durbin and Doerscher (2010) noted four types of portfolio management information that the PMO will need to manage: people (information about organization and resources), money (financial information), work (objectives, strategies, and investments), and deliverables (market and product information).

More innovative functions of the PMO. As highlighted in the previous subsection, one of the functions of the PMO relates to project portfolio management (PPM). Tan and Theodorou (2009) highlighted different types of PPM, including financial portfolio management, research and development portfolio management, new product development portfolio management, and IT portfolio management. The term *enterprise program management* is being used to describe a similar concept (Richardson, 2010). PPM is "the management of the project portfolio so as to maximize the contribution of projects to the overall welfare and success of the enterprise" (Rajegopal, McGuin, & Waller, 2007, p. 11). The PMO needs to assume strategic roles, such as project prioritization, performance management, and benefits realization, as well as

tactical roles, such as scope management, resource management, and cost management (Rajegopal et al., 2007).

The PMO function of managing portfolios of program and projects is important because these are vehicles for executing corporate strategy (Dinsmore & Cabanis-Brewin, 2011; Pennypacker & Retna, 2009). Dinsmore and Cabanis-Brewin (2011) noted, "73% of polled organizations said that they had a clearly articulated strategic direction, but only 44% of them communicated that strategy well to the employees who must implement it" (p. 281). Dinsmore and Cabanis-Brewin concluded there are two practices within the PMO function that lead to a strong performance in managing to bring corporate strategies to successful implementation: PPM and program/project management. A fit is needed between project management implementation and the strategic objectives of the organization (Cooke-Davies, Crawford, & Lechler, 2009; Meskendahl, 2010; Rajegopal et al., 2007). This particular PMO function of PPM will be even more important in the future because the following trends will have a more significant impact on organizations: more fluid organization, richer data, more outsourcing, deeper integration between systems, seamless data capture, anywhere access, and integration with personal task management (Moore, 2010). The areas focused on that relate to the PPM function of the PMO are (a) demand management, (b) strategic alignment, (c) transparency, (d) communication, and (e) monitoring processes (Moore, 2010).

The PMO leaders can play some unique roles within the context of the agile software development environment of GSD compared to traditional software

development (Krebs, 2009). Some of the characteristics of agile software development that need to be taken into consideration are the independent and self-organized approach of agile project teams, the empirical nature of the agile processes, and the milestones monitoring nature of traditional projects versus the iterative progress reporting nature of agile projects (Krebs, 2009). Fernandez and Fernandez (2009) described the following characteristics of agile projects: projects with a high level of complexity, uncertainties that require responsiveness, and adaptability. Agile projects can be defined using the term of *complex adaptive system* as: dynamic, uncertain, and ambiguous (Levardy & Browning, 2009). The main functions of the PMO, such as mentoring, status reporting, and capturing metrics, should still be applicable within the agile software development environment (Krebs, 2009). Some adaptations to the PMO might be needed compared to the traditional software development environment.

PMO maturity. The maturity of project management practices in general and PMOs at a more specific level will have an effect on the value that an organization can gain through the implementation of these project management practices (Shi, 2011). Project management maturity could be the proverbial missing link in explaining why projects fail (Wheatley, 2007). Several models in the existing body of knowledge provide insights into the PMO maturity level concept. Ten key aspects of a PMO can be measured to determine the overall PMO maturity level: program organization and governance, program planning and control, benefits management, stakeholder management, risk and issue management, program assurance and quality, configuration management, internal

communications, program accounting, and management of scope and change (Reiss, Chapman, Leigh, Pyne, & Rauner, 2006).

A widely used maturity level framework within software development is the capability maturity model integration (CMMI), which was introduced by the Software Engineering Institute and supported by Carnegie Mellon University. Persse (2007) described three different and distinct CMMIs: CMMI-DEV (for process management and improvement in development shops), CMMI-ACQ (for acquisitions of products or services), and CMMI-SVC (for organizations to deploy and manage services). The capability levels defined under CMMI are as follows: 0 is incomplete, 1 is performed/initial, 2 is managed, 3 is defined, 4 is quantitatively managed, and 5 is optimizing. CMMI-DEV consists of 22 process areas grouped into four categories: project management, process management, engineering, and support. Von Wangenheim, Da Silva, Buglione, Scheidt, and Prikladnicki (2010) proposed a framework of project management best practices that combines the features of CMMI-DEV and the process areas defined in the Project Management Body of Knowledge as defined by the Project Management Institute (PMI) (2004).

A framework of maturing program management culture involves moving from chaos toward clarity (Brown, 2008). The progression typically begins with a chaotic situation that involves little or no program management culture, characterized by confusion and disorder. The framework is that of a pyramid that starts with people accountability, process accountability, discipline, and integrity, ultimately leading to clarity. The organizational culture is important in relation to increasing project

management maturity effort (Yazici, 2009). An organizational culture change toward sharing, collaboration, and empowerment is a prerequisite to a better project management maturity (Yazici, 2009). Additionally, organizational leaders need to overcome many challenges to implement the PMO and also to increase its maturity level. Singh, Keil, and Kasi (2009) identified 34 unique challenges and further refined them to 13 challenges. The top three challenges were rigid corporate culture and failure to manage organizational resistance to change, lack of experienced project managers and PMO leadership, and lack of appropriate change management strategy.

Competencies, power, and influence. To be effective and successful, a PMO needs authority manifested in power and influence within an organization (Andersen et al., 2007; Simms, 2009). Including in the PMO model to be researched in this study are many PMO functions that require program managers to exert power and influence and also to show competencies. This subsection contains an exploration of the concept of power and influence used as part of the theoretical framework when researching an effective PMO model. The concept of power and influence is concerned with one person's ability to influence another. The cultural and social environment greatly influences the perception of power. Some basic aspects of power and influence might be applicable across different cultural and social environments.

Researchers often use the terms *power* and *influence* interchangeably. French and Raven (1968), who described several types of power, delineated one of the most widely accepted approaches to understanding sources of power. *Legitimate power* is based on one person holding a formal position and another person complying because of a belief in

the legitimacy of the power holder. *Reward power* is based on one person's access to rewards and another person's compliance because of the desire to receive rewards. *Coercive power* is based on one person's ability to punish and another person's compliance because of fear of punishment. *Expert power* is based on one person's expertise in a certain area and another person's compliance because of a belief in the power holder's knowledge. *Referent power* is based on one person's attractiveness to others and another person's compliance because of liking and respect for the power holder. The following outcomes provide a measure of the success of an attempt at exerting influence: commitment, where the target person internally agrees with the request and makes a great effort to carry out the request effectively; compliance, where the target person is willing to fulfill the request but is apathetic and makes only a minimal effort; and resistance, where the target person is opposed to the request (Yukl, 2002).

At the project level, many researchers have attempted to define the competencies of the project manager-leader. As can be seen from the following discussion, some competencies are applicable generically to all managers. Some specific competencies are needed by effective project manager-leaders. Many researchers have looked deeper into variations of leadership competencies, depending on certain factors including different leadership styles for different types of projects, and multiple phases of the projects (Shao & Muller, 2011).

Many researchers have suggested a more categorized description of project management *competency. Rad and Levin (2002) suggested the following high-level categorizations: things skills*—the quantitative side of project management, such as

developing Work Breakdown Structure (WBS), defining metrics, preparing Gantt charts, and conducting variance analysis, for example—and *people skills*—the qualitative management side of project management, such as conflict resolution, negotiation, mentoring, communications, and teamwork. Springer (2010) divided the competencies of the project-program manager into qualitative and quantitative competencies. Quantitative competencies would include specific knowledge of the project-program management domain. Qualitative competencies would include understanding of the global environment, leadership, team-related competencies, and decision making.

One model that would be useful for defining a project manager-leader is the six-looking model highlighted by Briner, Hastings, and Geddes (2001). In this model, Briner et al. (2001) suggested that a project leader must look in six different directions: (a) upward, to manage sponsors to achieve organizational commitment; (b) outward, to manage clients and external stakeholders to ensure the project meets their expectations; (c) forward, to plan, to ensure the team sets realistic targets and gets appropriate resources to achieve those targets; (d) backward, to monitor progress to ensure projects meet their targets and the team learns from its mistakes; (e) downward, to manage the team to maximize individual and collective performance; (f) inward, to manage the self by reviewing self-performance to ensure a positive contribution to the team has been made in terms of leadership.

PMO Model and Project Success Within GSD Environments

The failure rates of information technology (IT) projects have remained high despite numerous advancements and improvements in the field of project management

(Marchewka, 2006; Simon, 2010). GSD projects are even more risky because they involve additional factors such as distance, time zone, and national culture (Carmel & Tjia, 2005; Mohan, 2006; Reed & Knight, 2009). Of all project failures, 69% are related to either lack of project management methodologies or the ineffective implementation of the methodologies (Krebs, 2009). Beyond addressing project failures, the concept of project value goes beyond meeting traditional project constraints of scope, cost, and time to focus on delivering true business value for customers (Highsmith, 2010).

Establishing a PMO has been seen as a potential solution for addressing the problem regarding the high failure rates of IT projects (Center for Business Practices, 2007, 2010). The PMO itself is a relatively recent innovation and is still evolving, with many divergent perspectives existing regarding an effective PMO model (Aubry et al., 2009; Aubry et al., 2010; Hobbs & Aubry, 2007). Many authors have talked about PMO model/roles, as highlighted in the literature review section. The PMO roles as highlighted by Hobbs and Aubry (2007) were used as the framework for this study. The following six factors of the PMO model were the focus of the study: (a) monitoring and controlling performance, (b) development of project management competencies and methodologies, (c) multiproject management, (d) strategic management, (e) organizational learning, and (f) PMO organizational structure. This study examines the relationship between an effective PMO model and project success within the GSD environment.

Transition and Summary

This section contained the foundation of the study and includes the problem and purpose statement, research questions and hypotheses, and theoretical framework. The

literature review included discussions on the two main variables of the proposed study, GSD and PMO, from the theoretical perspective of the existing body of knowledge on those topics within the context of the problem statement. The following section will contain a more detailed discussion of the research project itself, a quantitative, descriptive, and associational study. The final section will contain the results of the study, applications to professional practice and implications for change.

Section 2: The Project

A PMO is a relatively recent innovation that is still evolving, with many divergent perspectives regarding how to build an effective PMO model (Aubry et al., 2009; Aubry et al., 2010). The central question addresses whether the six factors of the PMO model are statistically significant predictors of project success in the context of GSD environments. This section includes topics on how the research study will be conducted. The section starts with the purpose statement and then continues with details of the research study, including participants, research method and design, population and sampling, data collection, data analysis technique, reliability, and validity.

Purpose Statement

The purpose of this quantitative, descriptive research study was to examine the relationship between an effective PMO model and project success within the GSD environment. The independent variables were the six factors of the PMO model: (a) monitoring and controlling performance, (b) development of project management competencies and methodologies, (c) multi-project management, (d) strategic management, (e) organizational learning, and (f) the PMO organizational structure as highlighted by Hobbs and Aubry (2007); the dependent variable was project success. For a practical emphasis, the study was conducted at ABC Corporation. Specifically, personnel of the XYZ division at the ABC Corporation were invited to participate in the study. The researcher sent electronic surveys to the personnel in office locations of the XYZ division located mostly in the United States, India, and Argentina to capture the multicultural impacts of the GSD environments.

Role of the Researcher

The researcher was actively involved throughout every stage of the research process to include collecting, organizing, analyzing, and interpreting the data to anticipate and address any ethical dilemma that might occur. The researcher designed the survey questions and performed any required validations. An electronic survey instrument using third-party software, SurveyMonkey, was the tool used for data collection. To help analyze the data, the researcher used Statistical Package for the Social Sciences (SPSS) as a quantitative research tool.

The topic of the study and the data collected are related to PMOs within the GSD environment. The researcher has been part of the PMO organization of ABC Corporation for the past six years, and the researcher is familiar with the research topic based on more than 10 years of experience with PMOs at various capacities and more than 15 years of experience working professionally within GSD environments. Some of the research participants might know the researcher from involvement with past projects, but this did not affect the validity of the study because the electronic surveys were conducted anonymously.

Participants

The researcher selected participants from personnel of the XYZ division, one of several divisions within ABC Corporation. To gain access to the participants, the researcher requested names and e-mail addresses of the targeted research participants from the directors of the XYZ division, located in the United States, India, and Argentina, based on the permission obtained from the general manager of the XYZ division at ABC

Corporation. The sampling method used purposive sampling, targeting all the individual contributors and first-line managers of the XYZ division located in the United States, India, and Argentina. The researcher chose the purposive sampling method over other sampling methods, such as random or convenience, due to the focus of the study, which is the GSD environment, and also to ensure that the appropriate sample size could be obtained (Creswell, 2009). The researcher determined a representative sample size of 98 participants using the statistical software G*Power 3.1.0 (Faul, Erdfelder, Lang, & Buchner, 2007) using a medium effect size ($f^2 = .15$), with power = .80. The electronic surveys were sent to more than the targeted sample size to ensure the valid survey responses received would meet the minimum target sample size.

The consent form for participants, found in Appendix B, was sent as part of the electronic survey. The participants had to sign the consent form electronically before starting the survey. The consent was voluntary and without pressure of any kind. Participants could choose to withdraw at any time before sending the final submission by aborting the survey. Anonymity was ensured by not disclosing the name of the organization, division, or individuals involved in the study. The researcher secured and archived permission to conduct research within the XYZ division of the ABC Corporation. The letter of cooperation from the company is in Appendix C.

Research Method and Design

It can be difficult to determine the value that a PMO can bring to an organization due to the lack of related scholarly studies in the field of project management (Hurt & Thomas, 2009; J. Thomas & Mullaly, 2008). Divergent perspectives exist regarding an

effective PMO model (Aubry et al., 2010; Hobbs & Aubry, 2007). This study is focused on an effective PMO model for managing projects in GSD environments.

Determining the appropriate research method and design are an important part of the planning stage of a study (Black, 1999). The commonly used research methods are quantitative, qualitative, and mixed methods (Creswell, 2009). The options for the research design correspond to the research method chosen for the study. Based on the characteristics of the quantitative versus qualitative research methods, this study is a quantitative strategy of inquiry (Black, 1999; Vogt, 2007). The sections that follow will describe this chosen research method and design.

Method

Creswell (2009) noted the four worldviews central to research: (a) postpositivism, (b) constructivism, (c) advocacy/participatory, and (d) pragmatism. The commonly used research methods to these worldviews are (a) quantitative for postpositivism worldview, (b) qualitative for constructivism and advocacy/participatory worldviews, and (c) mixed methods for pragmatism worldview. Orientations toward research (Neuman, 2011) include the nature of data (i.e., hard data for quantitative and soft data for qualitative), principles of the research process and assumptions about social life (i.e., positivist principles for quantitative and interpretive or critical social science for qualitative), and path of conducting research (i.e., linear path for quantitative and nonlinear path for qualitative). Further common differences between quantitative and qualitative research methods include a hypothetico-deductive approach for quantitative studies versus inductive approach for qualitative studies, seek objectivity for quantitative versus

interested in subjectivity for qualitative, and emphasis on prediction and explanation for quantitative versus emphasis on description, exploration, and search for meaning for qualitative (Rudestam & Newton, 2007).

A quantitative strategy of inquiry was chosen for this study based on the characteristics of the quantitative versus qualitative research methods, the nature of the central question, and fewer issues related to ethical and personal issues (Black, 1999; Creswell, 2009; Neuman, 2011; Rudestam & Newton, 2007; Vogt, 2007). The primary characteristics include instrument-based questions for quantitative versus open-ended questions for qualitative and statistical analysis and interpretation for quantitative versus text/image analysis and themes/patterns interpretation (Creswell, 2009). Several points described above (i.e., hard data, a linear path, and examining relationships among variables) indicated the quantitative research method would be more appropriate for the study (Neuman, 2011). The central question for the study involved examining the nature of the relationship among variables that fits perfectly with the descriptive and associational approach of the quantitative research method (Black, 1999; Vogt, 2007). Another consideration of choosing the quantitative research method was this type of research method has fewer issues related to ethical and personal issues than does the qualitative research method (Creswell, 2009).

The researcher also considered a mixed method because of the advantages over using a qualitative or quantitative method alone (Creswell & Clark, 2007). From the types of studies as outlined by Creswell and Clark (2007), a mixed method seems most appropriate for research that does not require either extensive, deep analysis of qualitative

data or multivariate analysis of quantitative data. The mixed method was not a preferred option because of the focus on the quantitative analysis for this study and also the mixed method would have required significantly more time and resources than the time and budget allowance provided for this study.

Research Design

The two most commonly used research designs within the quantitative research method are associational studies and experimental approaches (Black, 1999). The researcher used a descriptive and associational research design because no experiment was conducted and this research design aligned with the central purpose of the study to examine the association between PMO roles (independent variables) and project success (dependent variable) (Howell, 2010; Whitley, 2002). Another perspective of the research design described by Kumar (2011) was based on the number of contacts with the study population, the reference period of the study, and the nature of the investigation. The study includes a cross-sectional research design, which permits the researcher to examine a topic by taking a cross-section of the population at one time. The researcher used the retrospective research design instead of the prospective or the retrospective-prospective research designs because the correlation of the variables studied is based on the experiences of the research participants. Finally, the study comprised a descriptive and associational research design with no experiment conducted. This chosen research design aligns with the central purpose of the study.

Population and Sampling

The population is a group that shares the same characteristics that are relevant for the topic of a research study (Black, 1999). Typically, the entire population will be too large to study as a whole, so sampling is needed to obtain a small collection of units that can represent features of larger units (the population), as Neuman (2011) highlighted. The targeted population can be a company or business unit that can have the characteristics of GSD, where geographically and culturally diverse groups come together in GSD teams. For this study, the chosen population was a division of one of the largest software companies in the world known as ABC Corporation for this study. ABC Corporation exhibits strong characteristics of a GSD environment, with more than 20,000 software developers being part of the product development organization distributed in Asia, Europe, and the Americas. One division of ABC Corporation, with approximately 700 personnel, known as the XYZ division, comprised the targeted population for the study and the focus for the data collection. The XYZ division has software developers located mostly in the United States, India, and Argentina.

After identifying the target population, the next step was to have a sampling strategy to obtain a representative sample. The two main sampling techniques are probability sampling and nonprobability sampling (Neuman, 2011). More than a century of applied mathematics and thousands of science studies combined to build the probability sampling techniques, which are much more complex than the nonprobability sampling techniques (Neuman, 2011). Some examples of probability sampling techniques are cluster, simple random, stratified, and systematic (Neuman, 2011). Sometimes the

probability sampling is not practical, too costly, or time consuming (Neuman, 2011). The acceptable alternative would be the nonprobability sampling techniques, such as adaptive, convenience, deviant case, purposive, quota, sequential, snowball, or theoretical (Neuman, 2011). A third alternative for sampling is the mix of probability and nonprobability sampling, such as systematic sampling (Kumar, 2011).

The chosen sampling method was purposive sampling, which is one of the nonprobability sampling techniques. Researchers apply purposive sampling to use the identified criteria or characteristics to drive the selection of the sample (Black, 1999; Neuman, 2011). This sampling method is more appropriate than other sampling methods because of the focus of the study is very specific regarding the GSD environment and because this sampling method will ensure the appropriate sample sizes can be obtained (Creswell, 2009). The eligibility criterion for the selected sample was the software development personnel who are part of the GSD teams, consisting of geographically and culturally diverse groups. These characteristics and criteria are consistent with the GSD characteristics that were the focus of the study.

One way to choose an appropriate sample size for a study is to assess the sample size needed to achieve a particular level of statistical power. The researcher conducted an a priori power analysis on the most conservative (i.e., yielding the largest sample size) statistical approach to determine the number of participants required to detect a medium effect size ($f^2 = .15$), with power = .80, for a multiple regression with the following parameters: six predictors tested at $p = .05$. The power analysis, conducted by using the statistical software G*Power 3.1.0 (Faul et al., 2007), indicated that 98 individuals will be

needed to achieve a power of .80 given these parameters. The electronic surveys were sent to all identified personnel by upper management of the XYZ division consisting of the individual contributors and first-line managers of the XYZ division located geographically in the United States, India, and Argentina.

Ethical Research

An overall code of conduct guides the ethical aspects of all professions. The ethical guide would typically cover the code of conduct in performing research. For research studies, the main stakeholders would be the research participants and the researcher. Several ethical considerations would relate to each of these stakeholders. Some of the ethical issues related to the research participants are collecting information, seeking consent, providing incentives, seeking sensitive information, the possibility of causing harm to participants, and maintaining confidentiality (Kumar, 2011). Some of the critical issues that the researcher should consider are bias, inappropriate research methodology, incorrect reporting, and inappropriate use of information (Kumar, 2011). Researchers need to anticipate any ethical issues that might arise during a study and make all efforts possible to protect the research participants (Creswell, 2009). In the following discussions, the ethical considerations for the study will be discussed in more detail.

Ethical considerations in dealing with research participants were maintained as the study adhered to the following measures. Apart from the opportunity to learn new information related to the research topic and contribute to the general PMO body of knowledge, participants were be provided with any incentives. Further, the electronic survey included the consent form for participants, found in Appendix B. The participants

had to sign the consent form electronically before starting the survey. The consent was voluntary and without pressure of any kind. Participants could choose not to complete the survey at any time before sending the final submission. The researcher ensured anonymity by not disclosing the name of the organization, division, or individuals involved in the study. The researcher secured and archived permission to conduct research within the XYZ division of the ABC Corporation. Only the researcher has access to the data collected, which will be kept safely for five years, at which time the researcher will dispose of them by removing the data permanently from the researcher's personal computer using reliable third party data shredder software. The researcher took all possible measures to avoid bias and to avoid using inappropriate research methodology or incorrect reporting by following the research protocol as outlined by the Walden University. Within Walden University, the IRB and the doctoral study committee also played important roles in helping to avoid any potential ethical issues for this study by setting up research protocol and by reviewing all the steps taken during the research as outlined in the doctoral study.

Data Collection

This section contains information on the instruments and technique used for data collection, and data organization techniques. Within the subsections, the description of the instrumentation, the techniques used to collect the data and the process to be used to organize data will be covered.

Instruments

The two main methods of collecting data for a study are to collect data from primary sources or from secondary sources (Kumar, 2011). In terms of using primary sources to collect data, researchers can utilize several options: observation, interview, and questionnaire. The researcher used primary sources and selected a questionnaire as the instrumentation to collect data for this study. The researcher utilized an electronic questionnaire rather than mailed questionnaires, collective administration, or administration in public space. Using electronic questionnaires to collect data have several advantages, such as a relatively low cost of unit data collection, the potential for a quick return of questionnaires, and the many advantages of computer-assisted instruments (Fowler, 2009). The following is a detailed description regarding the data collection instrument called the *PMO model for GSD*. The instrument can be found in Appendix A.

The associations between the implemented PMO model and project success were the main concept measured using the electronic questionnaire (see Appendix A). The main part of the survey included more details of the main concept—associations between the selected attributes of the PMO model and project success. The independent variable of PMO model included (a) PMO roles/functions, (b) PMO organization structure, and (c) PMO maturity level. The dependent variable was the project success. Section 2 of the survey questions was related to the project success parts of research questions 1 to 7. Section 3 of the survey questions was related to the PMO roles/functions parts of research questions 1 to 6. Section 4 of the survey questions was related to the PMO organizational

structure part of research question 7. The other sections of the survey questions (sections 1, 5, and 6) established the background for GSD environments, PMO maturity level, and demographic information of the research participants.

The survey was cross-sectional, with data collected at one point in time, rather than longitudinal, with data collected over time (Kumar, 2011). The researcher used third-party online survey software, SurveyMonkey (SurveyMonkey, 2011). The researcher sent emails to survey participants with the uniform resource locator (URL) link to the survey questions including the consent form. After the participants completed the consent form, they were permitted to begin the survey. The survey should have taken between 15 and 30 minutes for the participants to complete. The participants had an option to opt out at anytime by aborting the survey or to complete the survey.

The researcher designed the questionnaire for the study utilizing several sources from the existing relevant body of knowledge as a reference rather than using an existing instrument. The major contents of the instrument were a cover letter and consent form, demographic questions, attitudinal items to capture the data for the research questions, and closing instructions. The study used a Likert-type scale to collect the data for the attitudinal items rather than other scales, such as Thurstone or Guttman scales. The researcher decided a Likert-type scale was appropriate because of the nature of the data collected, where the attitude measured can be classified into numerical categories with equal attitudinal values (Creswell, 2009; Kumar, 2011). A 5-point Likert-type scale that is three-directional was used. The 5-point Likert-type scale as opposed to other scales like the 7-point Likert scale was chosen because it can adequately capture the differences of

the scales without being too narrow or too wide (Kumar, 2011). The attitudinal scores were calculated based on the highest score assigned to the response with the highest intensity of the attitude (Kumar, 2011). Once the participants answered the survey questions, the researcher downloaded the raw data into SPSS for data analysis.

To help improve the reliability and validity of the data collection instrument, the researcher conducted a peer review. The peer review involved sending the draft questionnaire to PMO personnel who are considered subject matter experts within the ABC Corporation to solicit their feedback. These subject matter experts each have a minimum of 15 years of project management experience in a large GSD environment, and have been part of a PMO or other select organization. The researcher then incorporated feedback from the peer review into a revised version of the questionnaire, and sent the questionnaire to research participants. More detailed discussions of the applicable reliability and validity factors for data collection appear later in this section.

Data Collection Technique

A survey of the targeted participants collected data using an electronic questionnaire administered by third-party online survey software, such as SurveyMonkey (SurveyMonkey, 2011). Participants then completed and submitted the survey online, and then the third-party online survey software sent the collected data to the researcher. The data obtained from the third-party online survey company is stored in electronic media and on the researcher's personal computer. The personal computer is password protected for security. The data collected will be kept safely for 5 years. Afterwards, the researcher will dispose of the data by removing the data permanently from the researcher's personal

computer using reliable third party data shredder software. The study obtained data collected from research participants anonymously, and only the researcher has access to the data. The consent form is in Appendix B and the letter of cooperation from the company is in Appendix C.

Related to the preparation for the third-party online survey software, the first step was to create an appropriate account for this study with the third-party online survey company. Then, a new survey was created using the tools available from the third-party online survey company. The questions included in the survey are listed in Appendix A. Once the electronic survey was created, the next step was to set up the entire collection settings properly, based on the general data collection guidelines as outlined by the Walden University IRB. Walden University's IRB approval number for this study is 03-29-12-0169495, and it expires on March 28, 2013. Some of these settings included the following actions: allow multiple responses, allow responses to be edited, save IP address in results, display survey results, and have cutoff date and time, among other functions.

To ensure the anonymity of the research participants and to ensure the highest possible number of responses, the e-mail collector was used instead of other types of collectors, such as web link, share on Facebook, and so on. The e-mail collection method enabled the author to create an e-mail distribution list, customize the invitation message, schedule the delivery, and manage/track the survey respondents. Once the survey was sent out to the targeted participants, the third-party online survey software allowed the author to track the response rate from the respondents. If a follow-up were needed, the e-mail message could be resent to those respondents in an existing e-mail collector who had

either not answered the survey or had only partially answered it. From the survey participants' perspective, they received an e-mail from the researcher with the URL to access the survey, including the consent form. The participants could then start the survey. The survey should have taken between 15 and 30 minutes for the participants to complete the entire survey. The participants had an option to opt out by aborting the survey or to complete the survey. Once the participants completed the survey, the data will be saved in third-party survey company database, which the researcher then downloaded into SPSS for data analysis.

Data Organization Techniques

The survey was designed as a single-stage sampling procedure. SurveyMonkey, a third-party online survey tool, sent the survey questions simultaneously to all targeted research participants and captured participants' responses electronically in one wave of data collection. The researcher then forwarded the data collected to a Microsoft Excel spreadsheet and SPSS. The researcher stored the data electronically on the personal computer of the researcher for further data analysis. The researcher will keep the data safely for five years, in accordance with the IRB requirements, at which time the researcher will destroy the data permanently using reliable third party data shredder software.

Data Analysis Technique

The collected data consisted of two main groups of data. The first group of data was the demographic data determined from the questions asked at the beginning of the survey. Demographic data provides a summary of the research participants. The

researcher used descriptive statistical analysis to analyze the demographic data to obtain the basic quantitative characteristics of the participants (Green & Salkind, 2008). For the main part of the collected data, a descriptive and associational analysis was used to answer the central question of the study to establish whether an association exists between the implemented PMO model and project success.

The associations between the implemented PMO model and project success was the main concept measured. Due to the length of the survey instrument, each question is not provided here but is included in Appendix A. The main part of the survey included more details of the main concept—associations between the selected attributes of the PMO model and project success. Section 2 of the survey questions was related to the project success parts of research questions 1 to 7. Section 3 of the survey questions was related to the PMO roles/functions parts of research questions 1 to 6. Section 4 of the survey questions was related to the PMO organizational structure part of research question 7.

The researcher entered the data into SPSS to help with the statistical calculations. Data analyses proceeded in two stages. First, descriptive statistics were calculated on all research variables. Means and standard deviations were calculated for variables on a ratio or interval scale. Frequencies and percentages were provided for nominal- or ordinal-scaled variables. The second stage of the analyses included the inferential statistics used to test the research hypotheses. The researcher conducted a multiple regression analysis to address the research questions (Stevens, 2009). Multiple regression analysis is a method of data analysis that can be used when a quantitative variable is examined in

relationship to any other factors. The six factors were the predictors, and the project success was the criterion. The researcher screened the data for outliers prior to analysis and used the participants' standardized residuals to identify outliers in the data. Furthermore, the researcher used variance inflation factors and tolerance levels to assess the effect of multicollinearity on the model, and a plot of standardized residuals to assess model homoscedasticity (Stevens, 2009). A table of model descriptive statistics and a table of regression coefficients will also be displayed in section 3.

The researcher examined associations between the selected attributes of the PMO model (PMO roles/functions, PMO organization structure, and PMO maturity level) and project success. These PMO roles/functions in leading and managing projects, programs, and portfolios, and many other functions related to mentoring and developing processes and standards tie back to the theoretical framework of *trait leadership theory* (Binder, 2007).

Reliability and Validity

Achieving perfect reliability and validity is the goal of all researchers but is almost impossible to achieve (Neuman, 2011). The general concepts of reliability and validity are covered in the following discussion. The particular techniques selected for the study are also included in the discussion.

Reliability

The general concept of reliability is to focus on the dependability and consistency of instruments (Weathington et al., 2010). The two main types of reliability are stability reliability, or stability across time, and representative reliability, or stability across groups

(Neuman, 2011). Kumar (2011) outlined some of the main causes that impact the reliability of research instruments, including the wording of the questions, physical setting, respondent's mood, nature of interactions, and regression effect of an instrument. Based on suggestions by Neuman (2011), several factors helped to improve the reliability of the present study. The first was to have a clearly conceptualized construct because reliability increases when the measurement involves only one concept. The case focused on the concept of a PMO model. The second related to using the level of measurement of the instrument by having more detailed questions to cover the attributes of the PMO model (PMO roles/functions, PMO organization structure, and PMO maturity level) and then using several questions to measure each attribute using appropriate scaling. Last, a peer review using PMO personnel served to obtain feedback on the research instruments.

Validity

Validity is related to measuring the fitness of the empirical indicator and the conceptual definition of the construct (Neuman, 2011). Some measurements of validity are face validity, content validity, concurrent and predictive criterion validity, and convergent and discriminant construct validity (Neuman, 2011). Related to face and content validity, the researcher scrutinized the instrument through a peer review to maximize the logical links between the questions and research objective and to ensure the coverage of the topics researched is balanced. In terms of criterion validity, the researcher compared the instrument to other relevant existing studies to increase the concurrent and predictive validity of the study. Internal and external threats to validity existed (Creswell, 2009). Internal threats include history, maturation, regression, selection, mortality,

diffusion of treatment, compensatory demoralization, compensation rivalry, testing, and instrumentation (Creswell, 2009). For this study, selection was the only internal threat that might be relevant. Making sure the targeted participants satisfied the selection criteria for the study mitigated the selection threat. Creswell (2009) and Kumar (2011) highlighted the external threats to validity that relate to the ability to generalize the study results. To mitigate this external threat, the researcher selected the population for the study based on the characteristics of the GSD environments to ensure that the study results could at least be generalized within similar settings or companies within GSD environments.

Transition and Summary

This section contained a description of the research project in terms of how the research will be conducted. This section included topics related to research method and design, data collection and analysis, and other related topics, such as ethical research, reliability, and validity. The next section will contain the results of the data analysis of the study.

Section 3: Application to Professional Practice and Implications for Change

The purpose of this quantitative, descriptive research study was to examine the relationship between an effective PMO model and project success within the GSD environment. The independent variables were the six factors of the PMO model that included (a) monitoring and controlling performance, (b) development of project management competencies and methodologies, (c) multi-project management, (d) strategic management, (e) organizational learning, and (f) the PMO organizational structure as highlighted by Hobbs and Aubry (2007); the dependent variable was project success.

This section includes discussions related to the overview of the study, presentation of the findings, the applicability of the findings to the professional practice, and social change. The recommendations for action based on the study results and how the results might be disseminated, are also addressed in this section. Finally, the recommendations for further study, reflections by the author, and a summary and conclusions for the study are addressed.

Overview of Study

The general failure rates of IT projects still remain relatively high, with project success rates as low as 16% in 1994 and 28% in 2004 (Marchewka, 2006; Simon, 2010; Standish Group, 2009). The dominant root cause of these failures is poor implementation of project management processes and principles, which leads to a general disarray of the organization (Al-Ahmad et al., 2009; Highsmith, 2010; Krebs, 2009). Establishing a PMO is a potential solution for addressing the problem regarding the high failure rates of

IT projects because the PMO provides structure and organization (Center for Business Practices, 2007, 2010). However, the PMO itself is a relatively recent innovation and is still evolving (Aubry et al., 2009). As such, divergent perspectives exist regarding an effective PMO model, including how it should be structured and the functions and roles the PMO should play, and the perceived values it should bring to organizations (Aubry et al., 2010; Hobbs & Aubry, 2007).

The focus of the study is to examine an effective PMO model in GSD environments that can contribute to increasing the success rates of IT projects and to delivering higher project success. This is done through an examination of the relationship between six factors of PMO model (Curlee, 2008; Hobbs & Aubry, 2007) and project success within the GSD environment.

The following research questions served as the guiding elements of this study:

1. To what extent, if any, is there a relationship between the PMO roles of monitoring and controlling performance and project success?
2. To what extent, if any, is there a relationship between the PMO roles of developing project management competencies and methodologies and project success?
3. To what extent, if any, is there a relationship between the PMO roles of managing multiple projects and project success?
4. To what extent, if any, is there a relationship between the PMO roles of strategic management and project success?

5. To what extent, if any, is there a relationship between the PMO roles of organizational learning and project success?
6. To what extent, if any, is there a relationship between the PMO organizational structures and project success?

The study was conducted at ABC Corporation. The researcher invited personnel of the XYZ division at the ABC Corporation to participate in the study. The researcher sent electronic surveys to 489 personnel in office locations of the XYZ division located mostly in the United States, India, and Argentina to capture the multicultural impacts of the GSD environments. From the study results, it was concluded that together the PMO model accounted for a significant amount of variation in the project success. The coefficients failed to reveal any significant predictors within this model. However, the model did reveal two trend effects related to the PMO roles of managing multiple projects and developing project management competencies and methodologies. This means that project success increased with increasing development of project management competencies and methodologies and the decreased with increasing numbers of projects to be managed within this model. The remaining predictors were not significant within this model.

Presentation of the Findings

Out of 489 personnel who participated in the study, 129 individuals started the survey and 107 individuals completed the survey. The survey questions consisted of the two groups. The first group is the main sections (sections 2-4) where the research questions are addressed. The second group is the background and demographic sections

(sections 1, 5 and 6) where the background for GSD environments, PMO maturity level, and demographic information of the research participants are covered. The raw data results of the survey are listed in Appendix E.

Background and Demographic Questions

The background and demographic questions are not directly related to the research questions or the model being studied. However, the answers to these questions will be useful in providing a better context in the analysis of the study results. The questions include topics such as education level, work experience, project roles, and team size. The descriptive statistics for the participants' demographics are listed in Table 1. The participants' education was reported as follows: seven (6.5%) some college or technical school, 44 (41.1%) college graduates, 11 (10.3%) some graduate work, 42 (39.3%) masters or professional degree, and 3 (2.8%) some advanced graduate/doctorate work. There was a wide range in the number of years of full-time experience in their current position and current company. More than 50% (54.2%) of the respondents had 10 or more years of full-time work experience in their current position, and several (23, 21.5%) had 20 or more years of experience. Approximately 50% (52, 48.6%) reported 10 or more years of full-time work experience with their current company. A majority of the participants worked in the United States (54, 50.5%), India (38, 35.5%), or Argentina (13, 12.1%). The participants were asked to indicate the individual role that best described the project(s) they considered for this study. Among the 10 listed roles, the most common were development-individual contributor (34, 31.8%), development-lead manager (32, 29.9%), and quality assurance-individual contributor (18, 16.8%). The size of the average

work team varied greatly. The average number of people working in the team project(s) was reported as follows: 21 (19.6%) less than 5, 59 (55.1%) 5 – 10, 20 (18.7%) 11 – 20, 5 (4.7%) 21 – 50, and 2 (1.9%) more than 100 people.

Table 1

Descriptive Statistics for Participant Demographics

Variable	*n*	%
Education		
Some college of technical school	7	6.5
College graduate (4-year degree)	44	41.1
Some graduate work	11	10.3
Completed master's or professional degree	42	39.3
Some advanced graduate/doctorate work	3	2.8
Years full-time experience in current position		
< 5	24	22.4
5 to 9	25	23.4
10 – 14	22	20.6
15 – 19	13	12.1
≥ 20	23	21.5
Years full-time experience in current company		
< 5	24	22.4
5 to 9	31	29.0
10 – 14	28	26.2
15 – 19	16	15.0
≥ 20	8	7.5
Geographic location of workplace		
United States (HQ or other U.S. locations)	54	50.5
Asia-India	38	35.5
Latin American-Argentina	13	12.1
Latin-America-other countries	1	0.9
Europe	1	0.9
Individual role in project(s)		
Development-lead/manager	32	29.9
Development-individual contributor	34	31.8
Information development-lead/manager	6	5.6
Information development-individual contributor	2	1.9
Quality assurance-lead/manager	8	7.5
Quality assurance-individual contributor	18	16.8
Strategy- lead/manager	2	1.9
Strategy-individual contributor	1	0.9
Support-individual contributor	3	2.8
Other	1	0.9
Average number of people in project(s)		
< 5	21	19.6
5 – 10	59	55.1
11 – 20	20	18.7
21 – 50	5	4.7
> 100	2	1.9

Participants were asked to describe their work team(s) by responding to nine characteristics. Respondents indicated whether or not each of the nine characteristics applied to their team(s) in their current company within the last five years. The descriptive statistics are listed in Table 2. The data indicate the participants worked in functionally and culturally diverse team environments in which team members were interchanged regularly. A majority (68, 63.6%) of the participants worked in teams that allowed members to transition on and off the team, and most (90, 84.1%) contained members from more than one function. Work teams were culturally diverse with 84 (78.5%) reporting teams comprised of multi-national cultures and members with different native languages (69, 64.5%). The cultural diversity was also apparent in the time constraints members must resolve. Most (79, 73.8%) of the respondents indicated working in teams with members dispersed up to 8–12 hours apart, or dispersed over more than three contiguous time zones (62, 57.9%).

Table 2

Descriptive Statistics for Global Software Development (GSD) Environment Complexity

Characteristic	Yes		No	
	n	*%*	*n*	*%*
Members may be from more than one organization	54	50.5	53	49.5
Members may be from more than one function	90	84.1	17	15.9
Members may transition on and off the team	68	63.6	17	15.9
Members may be dispersed over more than three contiguous time zones	62	57.9	45	42.1
Members may be dispersed so that some team members are 8–12 hours apart	79	73.8	28	26.2
Members may be from more than two national cultures	84	78.5	23	21.5
Members may have a native language that is different from the majority of team members	69	64.5	38	35.5
Members may not have equal access to electronic communication and collaboration technology	12	11.2	95	88.8
Members may not formally be assigned to the team	27	25.2	80	74.8

Respondents also indicated the current roles/functions that the existing PMO performed in the current company within the past five years. The descriptive statistics are listed in Table 3. The ratings were relatively consistent across the different roles/functions. Respondents (17.8% to 27.1%) indicated having insufficient information to rate the roles/functions. When applicable most PMOs were rated as performing adequately or well for each role/function. Relatively few respondents rated the existing PMO negatively.

Table 3

Descriptive Statistics for Existing Project Management Office Roles/Functions

PMO roles/functions	*n*	%
Monitoring and controlling performance		
I do not have sufficient information to rate.	19	17.8
Not a duty of the PMO	2	1.9
PMO duty, performed extremely poorly	0	0.0
PMO duty, performed poorly	3	2.8
PMO duty, performed adequately	29	27.1
PMO duty, performed well	42	39.3
PMO duty, performed extremely well	12	11.2
Development of project management competencies & methodologies		
I do not have sufficient information to rate.	19	17.8
Not a duty of the PMO	11	10.3
PMO duty, performed extremely poorly	4	3.7
PMO duty, performed poorly	12	11.2
PMO duty, performed adequately	36	33.6
PMO duty, performed well	22	20.6
PMO duty, performed extremely well	3	2.8
Multi-Project management		
I do not have sufficient information to rate.	24	22.4
Not a duty of the PMO	9	8.4
PMO duty, performed extremely poorly	1	0.9
PMO duty, performed poorly	6	5.6
PMO duty, performed adequately	31	29.0
PMO duty, performed well	31	29.0
PMO duty, performed extremely well	5	4.7
Strategic management		
I do not have sufficient information to rate.	29	27.1
Not a duty of the PMO	6	5.6
PMO duty, performed extremely poorly	2	1.9
PMO duty, performed poorly	4	3.7
PMO duty, performed adequately	35	32.7
PMO duty, performed well	28	26.2
PMO duty, performed extremely well	3	2.8
Organizational learning		
I do not have sufficient information to rate.	21	19.6
Not a duty of the PMO	12	11.2
PMO duty, performed extremely poorly	2	1.9
PMO duty, performed poorly	14	13.1
PMO duty, performed adequately	33	30.8
PMO duty, performed well	23	21.5
PMO duty, performed extremely well	2	1.9

Respondents indicated the current maturity level of the existing PMO that the existing PMO performed within the past five years. The descriptive statistics are listed in Table 4. The PMO maturity levels were reported as follows: 7 (6.5%) Level 1-Project office, 16 (15.0%) Level 2-Basic PMO, 54 (50.5%) Level 3-Standard PMO, 20 (18.7%) Level 4-Advanced PMO and 10 (9.3%) Level 5-Center of excellence.

Table 4

Descriptive Statistics for Project Management Office Maturity Level

Maturity Level	*n*	%
1. Project office	7	6.5
2. Basic	16	15.0
3. Standard	54	50.5
4. Advanced	20	18.7
5. Center of excellence	10	9.3

Introduction to the Main Section

In the main section of the survey, the associations between the selected attributes of the PMO model and project success were covered. The PMO model is the independent variable and the project success is the dependent variable. A multiple regression was conducted to determine if the PMO roles and organizational structures were statistically significant predictors of project success. The PMO roles were the predictors, and project success was the criterion.

The descriptive statistics for the individual survey items for the criterion are listed in Table 5. The project success was reported with mean between average and above average (between 3.86 and 3.89) for the three levels of project success. This indicates a

relatively strong performance of the existing PMO across the whole spectrum of the project success within the XYZ division of the ABC Corporation.

Table 5

Descriptive Statistics for Project Success Items

Item	*n*	*Min.*	*Max.*	*M*	*SD*
Level 1-project management success	107	2.00	5.00	3.86	0.76
Level 2-project success	107	1.00	5.00	3.89	0.80
Level 3-consistent project success	107	2.00	5.00	3.66	0.81

Note. 1 = extremely poor, 2 = below average, 3 = average, 4 = above average, 5 = excellent.

To ensure the accuracy of the data analysis, the data were screened for outliers prior to analysis. The participants' residuals were standardized, and the resulting scores were utilized to identify outliers in the data. A participant was considered an outlier if |standardized residual| was greater than 3. This process did not reveal any outliers in the data. The variance inflation factors and tolerance levels did not indicate multicollinearity in the model. This indicates that the correlations among the dependent variables did not have an undue impact on the model's standard error. A plot of standardized residuals (Figure 1) indicated a linear model; however, the plot also revealed some evidence of model heteroscedasticity.

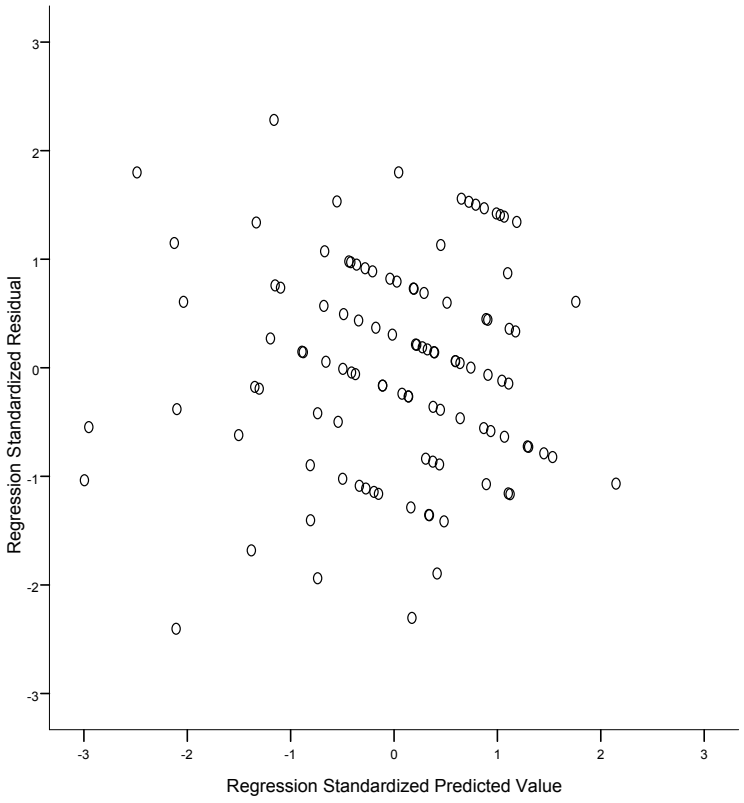

Figure 1. Residual plot for project success.

This suggests that the size of the errors were inconsistent across levels of the criterion. In this case, the model demonstrated smaller errors at high levels of the criterion compared to the size of the errors at lower levels of the criterion. In other words, the model was a better predictor (i.e., lower error) for those who rated project success high compared to those who rated project success low. The omnibus model was a significant predictor of project success, F (6, 100) = 2.83, p = .014, R^2 = .15. This indicates that together the predictors accounted for a significant amount of variation in the criterion. The model regression coefficients and descriptive statistics are listed in Tables 6 and Table 7 consecutively.

Table 6

Regression Coefficients for Project Success

Predictor	*B*	*SE*	*β*	*t*	*Sig.*
Monitoring and controlling performance	-0.03	0.12	-0.03	-0.26	.799
Developing project management competencies & methodologies	0.23	0.13	0.28	1.77	.079
Managing multiple projects	-0.24	0.13	-0.27	-1.95	.054
Strategic management	0.19	0.13	0.21	1.44	.152
Organizational learning	0.09	0.14	0.11	0.64	.524
Project management office organizational structures	0.03	0.06	0.05	0.50	.619

From the descriptive statistics for the regression model (Table 7), it can be seen that the mean values are relatively close to each other with the exception of PMO organizational structures. The similar results can also be seen from the regression coefficients (Table 6).

Table 7

Descriptive Statistics for Regression Model

Variable	*n*	*M*	*SD*
Project success	107	3.80	0.69
Monitoring and controlling performance	107	4.21	0.80
Developing project management competencies and methodologies	107	4.00	0.84
Managing multiple projects	107	4.10	0.76
Strategic management	107	3.98	0.75
Organizational learning	107	3.88	0.86
Project management office organizational structures	107	2.62	1.10

Research Question 1

Research question 1 was to what extent, if any, is there a relationship between the PMO roles of monitoring and controlling performance and project success? The descriptive statistics for research question 1 are listed in Table 8 including the four sub-PMO roles of monitoring and controlling performance. It can be seen from Table 8 that the sub-PMO role of develop and maintain a project scoreboard has the lowest mean value.

Table 8

Descriptive Statistics for Research Question 1

Item	*n*	*Min.*	*Max.*	*M*	*SD*
Report project status to upper management	107	1.00	5.00	4.38	0.96
Monitoring and control of project performance	107	1.00	5.00	4.43	0.90
Implement and operate a project information system	107	1.00	5.00	4.20	0.93
Develop and maintain a project scoreboard	107	1.00	5.00	3.82	1.00

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Compare to the remaining five predictors, as can be seen from Table 7, the descriptive statistics for this predictor has the highest mean = 4.21 (with SD = 0.80). Related to the regression coefficient (Table 6), the predictor of monitoring and controlling performance has a t =-0.26, β = -0.03, p = .799. This predictor is not significant and the null hypothesis ($H1_0$) could not be rejected. This result is an indication that although together all the predictors accounted for a significant amount of variation in the criterion, the predictor of monitoring and controlling performance (H1) on its own is not a significant predictor.

Research Question 2

Research question 2 was to what extent, if any, is there a relationship between the PMO roles of developing project management competencies and methodologies and project success? The descriptive statistics for research question 2 are listed in Table 9 including the five sub-PMO roles of developing project management competencies and

methodologies. Table 9 shows the sub-PMO role of develop and implement a standard methodology is considered to be the most significant.

Table 9

Descriptive Statistics for Research Question 2

Item	*n*	*Min.*	*Max.*	*M*	*SD*
Develop and implement a standard methodology	107	1.00	5.00	4.27	0.93
Promote project management within the organization	107	1.00	5.00	4.11	1.01
Develop competency of personnel, including training	107	1.00	5.00	4.10	1.12
Provide mentoring for project managers	107	1.00	5.00	3.92	1.05
Provide a set of tools without an effort to standardize	107	1.00	5.00	3.60	1.04

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Compare to the remaining five predictors, as can be seen from Table 7, the descriptive statistics for this predictor has the third highest mean of 4.00 (with SD = 0.84). Related to the regression coefficient (Table 6), the predictor of developing project management competencies and methodologies has a t =1.77, β = 0.28, p = .079. This means that this predictor is not significant and the null hypothesis ($H2_0$) could not be rejected. However, this predictor is very close to be significant and can be considered as having trend effects (i.e., p-value between .050 to .099). Developing project management competencies and methodologies (H2) revealed a positive trend to indicate that project

success increased with increasing development of project management competencies and methodologies within this model.

Research Question 3

Research question 3 was to what extent, if any, is there a relationship between the PMO roles of managing multiple projects and project success? The descriptive statistics for research question 3 are listed in Table 10 including the five sub-PMO roles of managing multiple projects. Table 10 shows that the sub-PMO role of coordinate between projects is considered to be the most significant.

Table 10

Descriptive Statistics for Research Question 3

Item	*n*	*Min.*	*Max.*	*M*	*SD*
Coordinate between projects	107	1.00	5.00	4.36	0.91
Identify, select, and prioritize new projects	107	1.00	5.00	4.28	1.04
Manage one or more programs	107	1.00	5.00	3.94	0.89
Manage one or more portfolios	107	1.00	5.00	3.85	0.93
Allocate resources between projects	107	1.00	5.00	4.08	1.12

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Compared to the remaining five predictors, as can be seen in Table 7, the descriptive statistics for this predictor has the second highest mean of 4.10 (with SD = 0.76). Related to the regression coefficient (Table 6), the predictor of managing multiple projects has a t =1.44, β = -0.27, p = .054. This predictor is not significant and the null hypothesis ($H3_0$) could not be rejected. However, the predictor is very close to be significant and can be considered as having trend effects (i.e., p-value between .050 to

.099). Managing multiple projects (*H*3) indicated a negative trend, but it just failed to reach conventional levels of statistical significance, β = -0.27, *p* = .054. Project success decreased with increasing numbers of projects to be managed within this model.

Research Question 4

Research question 4 was to what extent, if any, is there a relationship between the PMO roles of strategic management and project success? The descriptive statistics for research question 4 are listed in Table 11 including the four sub-PMO roles of strategic management. Table 11 shows that the sub-PMO role of participate in strategic planning is considered to be the most significant sub-role of strategic management.

Table 11

Descriptive Statistics for Research Question 4

Item	*n*	*Min.*	*Max.*	*M*	*SD*
Provide advice to upper management	107	1.00	5.00	4.08	0.95
Participate in strategic planning	107	1.00	5.00	4.18	0.94
Benefits management	107	1.00	5.00	3.66	0.97
Network and provide environmental planning to keep abreast of current developments	107	1.00	5.00	3.99	0.90

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Compare to the remaining five predictors, as can be seen in Table 7, the descriptive statistics for this predictor has the fourth highest mean of 3.98 (with SD = 0.75). Related to the regression coefficient (Table 6), the predictor of strategic management has a *t* =1.44, β = 0.21, *p* = .152. This predictor is not significant and the

null hypothesis ($H4_0$) could not be rejected. The result is an indication that although together all the predictors accounted for a significant amount of variation in the criterion, the predictor of strategic management (H4) on its own is not a significant predictor.

Research Question 5

Research question 5 was to what extent, if any, is there a relationship between the PMO roles of organizational learning and project success? The descriptive statistics for research question 5 are listed in Table 12, including the six sub-PMO roles of strategic management. Table 12 shows the sub-PMO role of conduct post project reviews was considered to be the most significant.

Table 12

Descriptive Statistics for Research Question 5

Item	*n*	*Min.*	*Max.*	*M*	*SD*
Monitor and control the performance of the PMO	107	1.00	5.00	3.91	0.85
Manage archives of project documentation	107	1.00	5.00	3.93	1.06
Conduct post project reviews	107	1.00	5.00	4.17	0.94
Conduct project audits	107	1.00	5.00	3.83	1.08
Implement and manage a database of lessons learned	107	1.00	5.00	3.73	1.16
ıent and manage a risk database	107	1.00	5.00	3.69	1.16

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Compare to the remaining five predictors, as can be seen from Table 7, the descriptive statistics for this predictor has the second lowest Mean of 3.88 (with SD =

0.86). Related to the regression coefficient (Table 6), the predictor of organizational learning has a t =0.64, β = 0.11, p = .524. This predictor is not significant and the null hypothesis ($H5_0$) could not be rejected. This result is an indication that although together all the predictors accounted for a significant amount of variation in the criterion, the predictor of organizational learning (H5) on its own is not a significant predictor.

Research Question 6

Research question 6 was to what extent, if any, is there a relationship between the PMO organizational structures and project success? The descriptive statistics for research question 6 are listed in Table 13. Table 13 shows the PMO organizational structure has a mean value of between somewhat important and neutral (M = 2.62). This is the lowest mean value compare to all other factors of the PMO model.

Table 13

Descriptive Statistics for Research Question 6

Item	*n*	*Min.*	*Max.*	*M*	*SD*
PMO organizational structures	107	1.00	5.00	2.62	1.10

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Compare to the remaining five predictors, as can be seen from Table 7, the descriptive statistics for this predictor has the lowest mean of 2.62 (with SD = 1.1). Related to the regression coefficient (Table 6), the predictor of PMO organizational structures has a t =0.50, β = 0.05, p = .619. This predictor is not significant and the null hypothesis ($H6_0$) could not be rejected. The result is an indication that although together

all the predictors accounted for a significant amount of variation in the criterion, the predictor of PMO organizational structures (H6) on its own is not a significant predictor.

Context of Findings

Related to PMO roles, the researcher highlighted different results compared to the larger study done by Hobbs and Aubry (2007) with responses received from 500 survey responses in geographical locations from Canada, United States, and Europe of industries ranging from IT, financial services and telecommunications industries. In contrast to the study results as highlighted in Table 7, the groups of PMO roles that scored the highest to the lowest in the study by Hobbs and Aubry (2007) are as follows: *Monitoring and Controlling Project Performance* (3.82), *Development of Project Management Competencies and Methodologies* (3.54), *Multi-Project Management* (3.23), *Strategic Management* (3.06), and *Organizational Learning* (3.00). The study results indicates that based on the feedback from the ABC Corporation, for GSD environments, the two most significant PMO roles to the project success are *Managing Multiple Projects* and *Developing Project Management Competencies & Methodologies*.

The top five scored factors of PMO roles significant to the project success as highlighted in Table 5 are *Monitoring and control of project performance*; *Report project status to upper management*; *Coordinate between projects, Identify, select, and prioritize new projects*; *Develop and implement a standard methodology*; and *Implement and operate a project information system*. To tie the study findings to the theoretical framework, Turner (1999) suggested the following six traits of effective project managers similar to the trait approach of the leadership theory: problem-solving ability and results

orientation, energy and initiative, self-assuredness, perspective, communication, and negotiating ability. Many of these traits are important to be the foundation of performing the important PMO roles as highlighted from the study results.

Another body of literature that can be related to the study findings is within the area of community of practice and knowledge management in general. PMO roles of developing project management competencies and methodologies (research question 2) and PMO roles of organizational learning (research question 5) are especially relevant for this topic. The term *Community of Practice* (CoPs) was first introduced by Jean Lave and Etienne Wenger in the early 1990s. They described a community of practice as "a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice" (Lave & Wenger, 1991, p. 98). Another more practical definition of the CoPs is "communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p. 4).

In another book, Wenger (1998) presented an argument that learning is more than just an individual process that is separated from the rest of our daily activities. A social theory of learning may include integrated components to characterize social participation as a process of learning. Wenger suggested that everyone belong to communities of practice. Communities of practice are an integral part of daily living. It is part of our participation in our communities and organizations. Wenger used the term *community of practice* as a broader conceptual framework that integrates the following components: (a)

meaning (learning as experience), (b) practice (learning as doing), (c) community (learning as belonging), and (d) identity (learning as becoming). The following characteristics can be seen across all CoPs to a certain degree (Saint-Onge & Wallace, 2003): (a) utilize productive inquiry; (b) self-manage through a governance structure, principles and conventions, the shared leadership of members, and some form of facilitation; (c) self-govern on the basis of agreed-upon conventions; (d) assume accountability for supporting one another; and (e) collaborate via multiple channels; receive support from their organizations.

Conway and Sligar (2002) suggested the following categorization of communities of practice based on the business strategy addressed: (a) product or technology communities; (b) role or function communities (c) industry or market segment communities (c) special interest groups (SIGs). From the organization involvement perspective, Saint-Onge and Wallace (2003) suggested a typology of different CoPs that could be described as a continuum: (a) informal CoPs at one end of the continuum; (b) supported CoPs at the middle of the continuum; (c) structured CoPs at the other end of the continuum. Based on the above CoPs typologies, an organization could play varying roles in facilitating CoPs depending on where on the spectrum the CoPs are. Wenger et al. (2002) suggested that the organization's role is neither to generate knowledge nor to dictate the structure or processes to be adopted by CoPs. The more important roles that an organization could play are to provide leadership and resources necessary for knowledge to be identified, created, and accessed by the people who need it (Wenger et al., 2002).

PMO leaders can play actively roles in providing the leadership and resources necessary to cultivate healthy environments for the CoPs to be developed.

Applications to Professional Practice

The topic of the study involves an examination of effective PMO model within the context of a GSD environment. The study involves a practical emphasis by using ABC Corporation to represent one of the largest GSD environments in the world as a case study. The study results may be used to improve the PMO model that can be implemented within ABC Corporation in the continuous efforts to improve the project success. Outside the ABC Corporation, the study findings may be used to improve the PMO model that can be implemented by other companies with GSD environments in the efforts to reduce the failure rates of IT projects.

Members of the practitioner community are looking for standards or guidelines to help establish and maintain effective PMOs, while the academic community is looking for theoretical bases that can be used to expand the body of knowledge related to the PMO (Aubry et al., 2010). The findings from this study may help in reducing these gaps by offering practical perspectives that can be implemented in professional practice by the executives and project or program managers in various GSD environments who want to use the PMO model to help maximize project success in managing their projects and portfolios. The academic community, who has an interest in either the PMO or the GSD environment, will be able to use the study findings as a practical point of reference for further studies. By helping to reduce these gaps especially with the emphasis on the

practical perspective, this study may be of value to help improve the business practice within the project management discipline.

Implications for Social Change

Project failure is likely to trigger negative emotional impacts within the project team, which can result in a lack of organizational morale (Shepherd & Cardon, 2009). The negative emotional impacts can translate to attitudes and behaviors that decrease trust in and commitments to the organization and to increased turnovers and lower productivity, which will also negatively affect the organization (Shepherd & Cardon, 2009). At a higher level, IT project failures have significant economic impacts to the society that result in billions of dollars per year (Charette, 2005). Also, software has become ubiquitous, handling many important daily and critical functions within modern society. Software project failure on some of these critical functions can cause fatalities (Charette, 2005). Anything that can help to reduce the rates of project failures should have some positive social change for the organization and the community.

In this study, factors regarding an effective PMO model in GSD environments that can contribute to increasing the success rates of IT projects and to delivering higher project success was examined. The study findings may be used to improve the PMO model that can be implemented within ABC Corporation and other companies within GSD environments in the continuous efforts to reduce the failure rates of IT projects. The PMO leaders may also facilitate the leadership and resources necessary to cultivate healthy environments for the CoPs to be developed by allowing knowledge to be identified, created, and accessed by the people who need it (Wenger et al., 2002).

Furthermore, the academic community, who has an interest in either the PMO or the GSD environment, should be able to use the study findings as a practical point of reference for further studies.

Recommendations for Action

Immediate impacts as a result of this research will be realized in the projects and portfolio currently being managed within the XYZ division as the findings will be presented to upper management. This will be very important feedback for the PMO model of XYZ division since this is the first study of this kind ever conducted within the division. Future implications for the XYZ division of ABC Corporation will include a better theoretical and practical understanding of the topic. Examples of the recommended actions include focusing PMO leaders to roles related to development of project management competencies and methodologies. PMO leaders within the XYZ division of ABC Corporation are also to pay more attention to additional risks in managing multiple projects and to design strategy in increasing the PMO maturity level. As per the study results of the PMO model, focusing on these two groups of PMO roles will likely increase the project success within the company. Outside the ABC Corporation, the study findings may be used to improve the PMO model that can be implemented by other companies with GSD environments in the continuous efforts to reduce the failure rates of IT projects. Knowledge sharing will occur in the industry by establishing a community of practice (CoP) that will specialize in practices and procedures that can help build PMO offices in similar types of organizations. The academic community, who has an interest in

either the PMO or the GSD environment, may also pay attention to the study findings as a practical point of reference for further studies.

The study findings may also be disseminated to add to the body of knowledge regarding the topic, as tested against a real-world practical business situation. The forums for disseminating the findings can include local, national, and global congresses and symposia related to project management and through the submission of articles to peer-reviewed journals, such as the *International Journal of Project Management*, the *International Journal of Managing Projects in Business*, and *Project Management Journal*. Another venue to disseminate the study findings is through the facilitation of the CoPs either within the boundary of the organization or to the CoPs within the project management communities in general.

Recommendations for Further Study

The researcher examined the six factors of the PMO model related to PMO roles and PMO Organizational Structure in terms of how they contribute to delivering higher project success. As indicated previously, all of the six factors of PMO model together are significant predictors of project success. However, with $R^2 = .15$; there seems to be many other factors that are affecting project success not included in the current PMO model. These other factors or covariates for the regression model could be explored in future studies. The main goal for adding other potential covariates for the regression model is to reduce error in the model. For this reason, the covariate should be related to the dependent variable. These other potential covariates for the regression model can be related to either PMO or other potential control variables. Examples for other covariates

that are related to PMO are PMO attributes including team size, age, technology; PMO level of influence within the organization; and so forth. Examples for other covariates not directly related to PMO are project management maturity within the organization, attributes of project stakeholders including age, years of experience, gender, and so forth.

Within the construct of PMO roles and PMO organizational structures as per the current model used for this study, there are several other frameworks that could be used as the basis of the PMO model and then can be compared to the framework used for this study. Examples of these frameworks are EPMO (Williams & Parr, 2004), global PMO (Binder, 2007), PPM (Tan & Theodorou, 2009), and so forth. Related to the environmental context for the study, this study was done within the context of the GSD environments. Other similar studies can be done within the context to other environments or industries such as manufacturing, finance, healthcare, and other representative industries. The results from these future studies could then be contrasted to this study or other similar studies.

Other statistical models could also be explored for future studies. Hierarchical stepwise regressions may be explored for models with covariates. Forward stepwise regressions may be explored to reduce the size of the model by coming up with the best prediction. Larger sample size could also be explored and the results could then be contrasted to this study or other similar studies.

Reflections

At an overall level, the researcher had a deeper theoretical knowledge of the topic and a better understanding of how to apply the knowledge in a business setting after

conducting the study and completing the literature review on the topic. From going through the research process, the researcher had a firsthand exposure on various techniques and processes involved in conducting scientific research with practical emphasis. The researcher benefited from this exposure by being able to do similar research in the future in order to continuously expanding the learning horizon and contribute to the academic and professional practice communities.

The following is the researcher's reflections from the research process. Kumar (2011) highlighted the eight-step model of a research process grouped into five steps in planning a research study and three steps in conducting the study. The first step is formulating a research problem. The researcher experienced quite a challenge on this first step. The general research problem was quite clear to the researcher. However, the specific problem statement including the identification of research variables and construction of hypothesis had been a challenging experience. There have been many iterations and revisions during the formulation of problem statements. The research supervisor and the use of DBA rubric had been very helpful in getting through this first step. The second step of the research process is conceptualizing a research design. To complete this step, the researcher used many references available on the theories and the corresponding implementation guidelines of research design. The chosen research design was driven primarily from the nature of the research problem. The third step is constructing instrument for data collection. For this step, the researcher used the literature review as the source of finding the existing instruments on the study topic that can be used as the foundation for the data collection instruments for this study. The next step of

the research process is selecting a sample. For this step, the researcher used the company that the researcher has been part of and proceeded with getting a formal approval from the upper management of the company. The last step in planning a research study is writing a research proposal. This step has been very time consuming since the approval process for a doctoral study proposal at Walden University has quality emphasis that includes several approvers that need to review and provide approvals on the research proposal. This approach is a linear process with every revision requires iteration back to the first approver and each approver has a certain waiting period.

Once the research proposal is approved, the study can be conducted. The first step was to perform a peer review to help improve the reliability and validity of the data collection instrument. The peer review involved sending the draft questionnaire to PMO personnel who are considered subject matter experts within the ABC Corporation to solicit their feedback. Once the data collection instrument has been fine-tuned, the data collection activities done through electronic survey was started. The researcher was expecting a higher response rate. Out of 489 personnel where the electronic survey was sent out to, 129 started the survey and 107 individuals completed the survey. This response rate is beyond the required sample size calculated through power analysis. However, the response rate of 21.88% is lower compare to the average response rate level from the study by Baruch and Holtom (2008) based on 1,607 studies that covered more than 100,000 organizations and 400,000 individual respondents. From this study, it was concluded that the average response rate for studies that utilized data collected from individuals was 52.7% with a standard deviation of 20.4, while the average response rate

for studies that utilized data collected from organizations was 35.7% with a standard deviation of 18.8 (Baruch & Holtom, 2008).

The processing and the presentation of the data were done using the tools and protocols as outlined in the research design proposal. The researcher expected the study results to be close to the study results from the theoretical frameworks used for this study. However, there are some differences found from this study especially related to which PMO roles to be focused on in order to maximize project success. The survey that has been completed should at least increase the awareness of the survey participants on the topic of PMO since this is the first survey of its kind that has been done within the XYZ division of ABC Corporation. The researcher now also has a different perspective of how complex the issues related to the PMO model as it relates to the project success.

Summary and Study Conclusions

The failure rates of general IT projects still remain relatively high (Marchewka, 2006; Simon, 2010; Standish Group, 2009), and the negative impacts of project failures spread from the project teams and project stakeholders impacting society based upon economic perspectives of stakeholders. This study involves an examination of effective PMO model within the context of a GSD environment to increase project success rates. There are several recommended actions suggested based on the study results at a more specific level to the XYZ Division of ABC Corporation as well as at a more generic level to the professional practices within the GSD environments. Examples of the recommended actions includes focusing PMO to roles related to development of project management competencies and methodologies, PMO to pay more attention to additional

risks in managing multiple projects, and also to design strategy in increasing the PMO maturity level. The positive effects, in terms of social change, include the increased morale of the project teams due to increased project success rates resulting from increased organization with the introduction of and the potential facilitation from the PMO leaders of establishing community of practices (CoPs) both inside and outside the boundary of ABC Corporation. However, as highlighted before this topic a very complex topic, and there are other factors either related or not related to the PMO that have impacts to project success that can be done as future studies.

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Appendix A: Survey Questionnaire

Notes: In responding to the questions about your past project(s) in section 1 and section 2, please respond based on the projects done in the current company within the past five years that you have been part of.

Section 1—Background

1. Which of the following best describes your individual role in the past project(s) about which you are responding?
    - Development—Lead/Manager
    - Development—Individual Contributor
    - Quality Assurance—Lead/Manager
    - Quality Assurance—Individual Contributor
    - Strategy—Lead/Manager
    - Strategy—Individual Contributor
    - Support—Lead/Manager
    - Support—Individual Contributor
    - Other role—Please specify _____

2. What is the highest level of education you have completed?
    - High school or less (Grades 1–12)
    - College 1 year to 3 years (some college or technical school)
    - College 4 years (college graduate)
    - Some graduate work
    - Completed master's or professional degree
    - Some advanced graduate/doctorate work
    - Completed doctorate degree

3. Where is the geographic location of your place of work?
    - United States (HQ or other U.S. locations)
    - Other North American locations
    - Asia—India
    - Asia—Other countries
    - Latin America—Argentina
    - Latin America—Other countries
    - Europe
    - Australia and Pacific Islands
    - Other—Please specify _____

4. How many years of full-time work experience are relevant to your current position?
    - <5
    - 5– <10
    - 10–<15

- 15–<20
- >20

5. How many years of full-time experience do you have working for your current company?
   - <5
   - 5– <10
   - 10–<15
   - 15–<20
   - >20

6. What is the average number of people in the team of the past project(s) about which you are responding?
   - <5
   - 5–10
   - 11–20
   - 21–50
   - 51–100
   - >100

Section 2—Project Success

1. Based on your past project(s), please indicate the performance of the existing PMO in contributing to the project success related to the "**Level 1**—Project Management Success," which can be characterized by the question, "Was the project done right?" Typical criteria for success at this level are related to success from the perspective of time, scope, cost, quality, and technical performance.
   - 1—Extremely Poor
   - 2—Below Average
   - 3—Average
   - 4—Above Average
   - 5—Excellent

2. Based on your past project(s), please indicate the performance of the existing PMO in contributing to the project success related to the "**Level 2**—Project Success," which can be characterized by the question, "Was the right project done?" Typical criteria for success at this level are related to success from the benefits realized and stakeholder satisfaction.
   - 1—Extremely Poor
   - 2—Below Average
   - 3—Average
   - 4—Above Average
   - 5—Excellent

3. Based on your past project(s), please indicate the performance of the existing PMO in contributing to the project success related to the "**Level 3**—Consistent Project Success," which can be characterized by the question, "Are the right projects done right, time after time?" Typical criteria for success at this level are related to overall success of all projects undertaken, overall level of project management success, productivity of key corporate resources, and effectiveness in implementing business strategy.
    - 1—Extremely Poor
    - 2—Below Average
    - 3—Average
    - 4—Above Average
    - 5—Excellent

Notes: These survey questions are based on the *project success* concept mentioned in the article by Cooke-Davies, T. (Morris & Pinto, 2007b).

Section 3—PMO Roles/Functions:
Part A—Based on your past projects, please indicate the importance of the PMO roles/functions described below in contributing to any of the three levels of project success, as indicated in section 2.

1. **Group 1—Monitoring and Controlling Performance Roles/Functions:**

Report project status to upper management	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Monitoring and control of project performance	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Implement and operate a project information system	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Develop and maintain a project scoreboard	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important

2. **Group 2—Development of Project Management Competencies and Methodologies Roles/Functions:**

Develop and implement a standard methodology	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Promote project management within the organization	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Develop competency of personnel, including training	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Provide mentoring for project managers	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Provide a set of tools without an effort to standardize	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important

3. **Group 3—Multiproject Management Roles/Functions:**

Coordinate between projects	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Identify, select, and prioritize new projects	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Manage one or more programs	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Manage one or more portfolios	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Allocate resources between	1 – Very Unimportant; 2 – Somewhat

projects	Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important

4. **Group 4—Strategic Management Roles/Functions:**

Provide advice to upper management	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Participate in strategic planning	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Benefits management	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Network and provide environmental planning to keep abreast of current developments	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important

5. **Group 5—Organizational Learning Roles/Functions:**

Monitor and control the performance of the PMO	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Manage archives of project documentation	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Conduct postproject reviews	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Conduct project audits	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important
Implement and manage a database of lessons learned	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or

	Unimportant; 4 – Somewhat Important; 5 – Very Important
Implement and manage a risk database	1 – Very Unimportant; 2 – Somewhat Unimportant; 3 – Neither Important or Unimportant; 4 – Somewhat Important; 5 – Very Important

Part B—Please indicate based on your past projects the current roles/functions that the existing PMO performs.

6. **Monitoring and Controlling Performance Roles/Functions:** This group of roles/functions includes the following: Report project status to upper management; Monitor and control of project performance; Implement and operate a project information system; Develop and maintain a project scoreboard.
    - I do not have sufficient information to rate.
    - Not a duty of the PMO
    - PMO Duty, Performed Extremely Poorly
    - PMO Duty, Performed Poorly
    - PMO Duty, Performed Adequately
    - PMO Duty, Performed Well
    - PMO Duty, Performed Extremely Well

7. **Development of Project Management Competencies and Methodologies Roles/Functions:** This group of roles/functions includes the following: Develop and implement a standard methodology; Promote project management within the organization; Develop competency of personnel, including training; Provide mentoring for project managers; Provide a set of tools without an effort to standardize.
    - I do not have sufficient information to rate.
    - Not a duty of the PMO
    - PMO Duty, Performed Extremely Poorly
    - PMO Duty, Performed Poorly
    - PMO Duty, Performed Adequately
    - PMO Duty, Performed Well
    - PMO Duty, Performed Extremely Well

8. **Multiproject Management Roles/Functions:** This group of roles/functions includes the following: Coordinate between projects; Identify, select, and

prioritize new projects; Manage one or more programs; Manage one or more portfolios; Allocate resources between projects.
    - I do not have sufficient information to rate.
    - Not a duty of the PMO
    - PMO Duty, Performed Extremely Poorly
    - PMO Duty, Performed Poorly
    - PMO Duty, Performed Adequately
    - PMO Duty, Performed Well
    - PMO Duty, Performed Extremely Well

9. **Strategic Management Roles/Functions:** This group of roles/functions includes the following roles/functions: Provide advice to upper management; Participate in strategic planning; Benefits management; Network and provide environmental planning to keep abreast of current developments.
    - I do not have sufficient information to rate.
    - Not a duty of the PMO
    - PMO Duty, Performed Extremely Poorly
    - PMO Duty, Performed Poorly
    - PMO Duty, Performed Adequately
    - PMO Duty, Performed Well
    - PMO Duty, Performed Extremely Well

10. **Organizational Learning Roles/Functions:** This group of roles/functions includes the following: Monitor and control the performance of the PMO; Manage archives of project documentation; Conduct post-project reviews; Conduct project audits; Implement and manage a database of lessons learned; Implement and manage a risk database.
    - I do not have sufficient information to rate.
    - Not a duty of the PMO
    - PMO Duty, Performed Extremely Poorly
    - PMO Duty, Performed Poorly
    - PMO Duty, Performed Adequately
    - PMO Duty, Performed Well
    - PMO Duty, Performed Extremely Well

Notes: These survey questions are based on PMO functions (Hobbs & Aubry, 2007).

Section 4—PMO Organizational Structures:

Part A—Based on your past projects, please indicate the importance of PMO organizational structure in contributing to any of the three levels of project success, as indicated in section 2.

1. **Centralized PMO Organizational Structure:**

   Definition of a centralized PMO, by Curlee (2008):

   > The organizational structure is designed as such that the project managers, project coordinators, and other personnel performing project activities report to an administrative chain of command within the PMO. The project personnel are assigned to projects by the administrative chain of command. The centralized PMO is responsible for project management training, project management organizational processes, and technology used and implemented for project managers (p. 84).

   - 1 – Very Unimportant
   - 2 – Somewhat Unimportant
   - 3 – Neither Important or Unimportant
   - 4 – Somewhat Important
   - 5 – Very Important

2. **Decentralized PMO Organizational Structure:**

   Definition of a decentralized PMO, by Curlee (2008):

   > This small corporate or business unit organization is responsible for maintaining project management methods and/or training and best practices. This type of PMO does not have central decision-making authority. Authority may be delegated or collaborative depending on the project (p. 84).

   - 1 – Very Unimportant
   - 2 – Somewhat Unimportant
   - 3 – Neither Important or Unimportant
   - 4 – Somewhat Important
   - 5 – Very Important

Part B—Based on the definitions of a "centralized" and a "decentralized" PMO, given above, which structure would closely describe the existing PMO organizational structure?

- 1 – Highly Centralized
- 2 – Somewhat Centralized
- 3 – Equally Centralized and Decentralized
- 4 – Somewhat Decentralized

- 5 – Highly Decentralized

Notes: These survey questions are based on the concept of centralized/decentralized PMO (Curlee, 2008).

Section 5—PMO Maturity Level:

Based on your past projects, which one of the five PMO maturity levels best describes the current maturity level of the existing PMO (see the figure below for a detailed description of each level).

- Level 1 – Project Office
- Level 2 – Basic PMO
- Level 3 – Standard PMO
- Level 4 – Advanced PMO
- Level 5 – Center of Excellence

PMO Maturity Level	PMO Main Objectives	Typical PMO Staffing and Projects
Stage 1 - Project Office	Project Oversight - Achieve project deliverables and objectives for cost, schedule and resource utilization	- 1 or more Projects - 1 Project Manager
Stage 2 - Basic PMO	Process Control - Provide a standard and repeatable projecr management methodology for use across projects	- Multiple Projects - Multiple Project Managers - Program Manager - Part-time PMO Support Staff
Stage 3 - Standard PMO	Process Support - Establish capability and infrastructure to support and govern a cohesive project environment	- Multiple Projects - Multiple Project Managers - Program Managers - Director/Senior Program Managers
Stage 4 - Advanced PMO	Business Maturity - Apply an integrated and comprehensive project management capability to achieve business objectives	- Multiple Projects - Multiple Project Managers - Program Managers - PMO Director - Dedicated PMO Technical and Support
Stage 5 - Center of Excellence	Strategic Alignment - Manage continous improvement and cross-department collaboration to achieve strategic business goals	- Multiple Programs - Vice President or Director of PMO - Dedicated PMO Technical Staff - Enterprise-wide Support Staff

Notes: This survey question is based on the PMO maturity concept (Hill, 2008).

Section 6—GSD Environment Complexity:

Based on your past projects, please check as many of the following that apply related to the project team(s):

- Members may be from more than one organization

- Members may be from more than one function
- Members may transition on and off the team
- Members may be dispersed over more than three contiguous time zones
- Members may be dispersed so that some team members are 8–12 hours apart
- Members may be from more than two national cultures
- Members may have a native language that is different from the majority of team members
- Members may not have equal access to electronic communication and collaboration technology
- Members may not formally be assigned to the team

Notes: This survey question is based on the characteristics of virtual teams (Duarte & Synder, 2006).

Appendix B: Consent Form

You are invited to take part in a research study to examine an effective project management office (PMO) model for global software development (GSD) environments. You were chosen for the study because of your interactions with the PMO and your participation in a GSD environment. This form is part of a process called informed consent to allow you to understand this study before deciding whether to take part.

This study is being conducted by Jonathan Lim, who is a doctoral student at Walden University. Jonathan Lim is currently a Senior Principal Program Manager for ABC Corporation. However, this study is separate from this role.

Background Information:
The purpose of this study is to examine the relationship between an effective PMO model and project success within the GSD environment.

Procedures:
If you agree to be in this study, you will be asked to answer an electronic questionnaire, with a total expected duration of 15–30 minutes.

Voluntary Nature of the Study:
Your participation in this study is voluntary. This means that everyone will respect your decision of whether or not you want to be in the study. No one at your current workplace will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during the study. If you feel stressed during the study, you may stop at any time. You may skip any questions that you feel are too personal.

Risks and Benefits of Being in the Study:
One of the benefits of being in the study is to be able to provide feedback to improve the current project management practices within your current workplace. You will also get an opportunity to have exposure to a part of the existing body of knowledge within the area of PMO and GSD. There is no risk involved with being in the study because the study is only asking the research participants to answer questions based on their past exposure to PMO practices within the current workplace. Anonymity of the participants and information provided will be enforced as part of the study protocol.

Compensation:
No financial compensation will be offered for participating in this study.

Confidentiality:
Any information you provide will be kept anonymous at all times. The researcher will not use your information for any purposes outside of this research project. In addition, the

researcher will not include your name or anything else that could identify you in any reports of the study.

Contacts and Questions:
You may ask any questions you have now, or, if you have questions later, you may contact the researcher via phone at 303-334-6007 or e-mail at jonathan.lim@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is 03-29-12-0169495, and it expires on March 28, 2013.

Implied Consent:
In order to protect your privacy, signature is not being collected. If you decide to participate, please complete the enclosed survey. Your return of this survey is implied consent.

Appendix C: Letter of Cooperation

ABC Corporation

March 21, 2012

Dear Jonathan Lim,

Based on my review of your research proposal, I give permission for you to conduct the study titled "Examining an Effective Project Management Office Model for Global Software Development Environments" within ABC Corporation. As part of this study, I authorize you to recruit research participants from within this division, send out the electronic questionnaires to the selected research participants, and collect data from the completed electronic questionnaires. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities include allowing time for the selected research participants to answer the electronic questionnaires in its entirety. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

<Ink Signature>

Authorization Official
Contact Information

Appendix D: Literature Review Matrix

Reference Type	Recent References (within the last 5 years)	Older than 5 Years References	Total References	Percentage of Recent References
Books	42	22	**64**	65.63%
Peer-Reviewed Articles	89	5	**94**	94.68%
Web Pages	1	2	**3**	33.33%
Other Resources	1		**1**	100.00%
Total	**133**	**29**	**162**	**82.10%**

Appendix E: Survey Raw Data

Table E1

Q1. Which of the following best describes your individual role in the project(s) about which you are responding?

Answer Options	Response Percent	Response Count
Development—Lead/Manager	28.7%	37
Development—Individual Contributor	31.0%	40
Information Development-Lead/Manager	5.4%	7
Information Development-Individual Contributor	3.9%	5
Quality Assurance—Lead/Manager	6.2%	8
Quality Assurance—Individual Contributor	15.5%	20
Strategy—Lead/Manager	1.6%	2
Strategy—Individual Contributor	2.3%	3
Support—Lead/Manager	0.8%	1
Support—Individual Contributor	3.9%	5
Other	0.8%	1
Comments		2

Table E2

Q2. What is the highest level of education you have completed?

Answer Options	Response Percent	Response Count
High school or less (Grades 1–12)	0.0%	0
College 1 year to 3 years (some college or technical school)	7.0%	9
College 4 years (college graduate)	43.4%	56
Some graduate work	10.1%	13
Completed master's or professional degree	37.2%	48
Some advanced graduate/doctorate work	2.3%	3
Completed doctorate degree	0.0%	0

Table E3

Q3. Where is the geographic location of your place of work?

Answer Options	Response Percent	Response Count
United States (HQ or other U.S. locations)	54.3%	70
Other North American locations	0.8%	1
Asia—India	31.8%	41
Asia—Other countries	0.0%	0
Latin America—Argentina	11.6%	15
Latin America—Other countries	0.8%	1
Europe	0.8%	1
Australia and Pacific Islands	0.0%	0
Other	0.0%	0
Comments		0

Table E4

Q4. How many years of full-time work experience are relevant to your current position?

Answer Options	Response Percent	Response Count
Less than 5	20.9%	27
5 to less than 10	24.0%	31
10 to less than 15	20.2%	26
15 to less than 20	13.2%	17
20 or more	21.7%	28

Table E5

Q5. How many years of full-time experience do you have working for your current company?

Answer Options	Response Percent	Response Count
Less than 5	24.0%	31
5 to less than 10	25.6%	33
10 to less than 15	28.7%	37
15 to less than 20	14.7%	19
20 or more	7.0%	9

Table E6

Q6. What is the average number of people in the team of the project(s) about which you are responding?

Answer Options	Response Percent	Response Count
Less than 5	19.4%	25
5–10	55.8%	72
11–20	19.4%	25
21–50	3.9%	5
51–100	0.0%	0
More than 100	1.6%	2

Table E7

Q7. Based on your past project(s), please indicate the project success related to the "Level 1—Project Management Success," which can be characterized by the question, "Was the project done right?" Typical criteria for success at this level are related to success from the perspective of time, scope, cost, quality, and technical performance.

Answer Options	Response Percent	Response Count
Extremely Poor	0.0%	0
Below Average	4.0%	5
Average	22.6%	28
Above Average	55.6%	69
Excellent	17.7%	22
Extremely Poor	0.0%	0

Table E8

Q8. Based on your past project(s), please indicate the project success related to the "Level 2—Project Success," which can be characterized by the question, "Was the right project done?" Typical criteria for success at this level are related to success from the benefits realized and stakeholder satisfaction.

Answer Options	Response Percent	Response Count
Extremely Poor	0.8%	1
Below Average	2.4%	3
Average	25.0%	31
Above Average	49.2%	61
Excellent	22.6%	28
Extremely Poor	0.8%	1

Table E9

Q9. Based on your past project(s), please indicate the project success related to the "Level 3—Consistent Project Success," which can be characterized by the question, "Are the right projects done right, time after time?" Typical criteria for success at this level are related to overall success of all projects undertaken, overall level of project management success, productivity of key corporate resources, and effectiveness in implementing business strategy.

Answer Options	Response Percent	Response Count
Extremely Poor	0.0%	0
Below Average	6.5%	8
Average	31.5%	39
Above Average	46.8%	58
Excellent	15.3%	19
Extremely Poor	0.0%	0

Table E10

Q10. Group 1—Monitoring and Controlling Performance Roles/Functions

Answer Options	1	2	3	4	5	Response Count
Report project status to upper management	3	4	9	32	69	117
Monitoring and control of project performance	2	2	13	26	74	117
Implement and operate a project information system	2	5	15	42	53	117
Develop and maintain a project scoreboard	3	10	27	43	34	117

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Table E11

Q11. Group 2—Development of Project Management Competencies and Methodologies Roles/Functions

Answer Options	1	2	3	4	5	Response Count
Develop and implement a standard methodology	1	7	9	41	59	117
Promote project management within the organization	4	5	15	46	47	117
Develop competency of personnel, including training	5	6	16	34	56	117
Provide mentoring for project managers	4	5	27	40	41	117
Provide a set of tools without an effort to standardize	3	10	45	31	28	117

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Table E12

Q12. Group 3—Multiproject Management Roles/Functions

Answer Options	1	2	3	4	5	Response Count
Coordinate between projects	1	5	13	32	66	117
Identify, select, and prioritize new projects	2	7	16	25	67	117
Manage one or more programs	1	4	32	47	33	117
Manage one or more portfolios	1	6	37	42	31	117
Allocate resources between projects	3	9	22	28	55	117

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Table E13

Q13. Group 4—Strategic Management Roles/Functions

Answer Options	1	2	3	4	5	Response Count
Provide advice to upper management	3	1	25	40	48	117
Participate in strategic planning	2	4	17	42	52	117
Benefits management	3	5	44	40	25	117
Network and provide environmental planning to keep abreast of current developments	3	2	26	49	37	117

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Table E14

Q14. Group 5—Organizational Learning Roles/Functions

Answer Options	1	2	3	4	5	Response Count
Monitor and control the performance of the PMO	2	2	31	54	28	117
Manage archives of project documentation	5	5	21	47	39	117
Conduct post-project reviews	2	5	14	48	48	117
Conduct project audits	4	11	21	47	34	117
Implement and manage a database of lessons learned	5	13	29	32	38	117
Implement and manage a risk database	5	15	27	34	36	117

Note. 1 = very unimportant, 2 = somewhat important, 3 = neutral, 4 = somewhat important, 5 = very important.

Table E15

Q15. Current PMO Performance: Monitoring and Controlling Performance Roles/Functions

Answer Options	Response Percent	Response Count
I do not have sufficient information to rate.	19.5%	22
Not a duty of the PMO	1.8%	2
PMO Duty, Performed Extremely Poorly	0.0%	0
PMO Duty, Performed Poorly	2.7%	3
PMO Duty, Performed Adequately	27.4%	31
PMO Duty, Performed Well	38.1%	43
PMO Duty, Performed Extremely Well	10.6%	12

Table E16

Q16. Current PMO Performance: Development of Project Management Competencies and Methodologies Roles/Functions

Answer Options	Response Percent	Response Count
I do not have sufficient information to rate.	19.5%	22
Not a duty of the PMO	9.7%	11
PMO Duty, Performed Extremely Poorly	3.5%	4
PMO Duty, Performed Poorly	10.6%	12
PMO Duty, Performed Adequately	34.5%	39
PMO Duty, Performed Well	19.5%	22
PMO Duty, Performed Extremely Well	2.7%	3

Table E17

Q17. Current PMO Performance: Multiproject Management Roles/Functions

Answer Options	Response Percent	Response Count
I do not have sufficient information to rate.	24.8%	28
Not a duty of the PMO	8.0%	9
PMO Duty, Performed Extremely Poorly	0.9%	1
PMO Duty, Performed Poorly	5.3%	6
PMO Duty, Performed Adequately	29.2%	33
PMO Duty, Performed Well	27.4%	31
PMO Duty, Performed Extremely Well	4.4%	5

Table E18

Q18. Current PMO Performance: Strategic Management Roles/Functions

Answer Options	Response Percent	Response Count
I do not have sufficient information to rate.	29.2%	33
Not a duty of the PMO	6.2%	7
PMO Duty, Performed Extremely Poorly	1.8%	2
PMO Duty, Performed Poorly	3.5%	4
PMO Duty, Performed Adequately	31.9%	36
PMO Duty, Performed Well	24.8%	28
PMO Duty, Performed Extremely Well	2.7%	3

Table E19

Q19. Current PMO Performance: Organizational Learning Roles/Functions

Answer Options	Response Percent	Response Count
I do not have sufficient information to rate.	22.1%	25
Not a duty of the PMO	11.5%	13
PMO Duty, Performed Extremely Poorly	1.8%	2
PMO Duty, Performed Poorly	12.4%	14
PMO Duty, Performed Adequately	30.1%	34
PMO Duty, Performed Well	20.4%	23
PMO Duty, Performed Extremely Well	1.8%	2

Table E20

Q20. Based on your past projects, please indicate the importance of a "centralized" PMO organizational structure in contributing to any of the three levels of project success, as indicated in section 2.

Answer Options	Response Percent	Response Count
Very Unimportant	4.7%	5
Somewhat Unimportant	9.3%	10
Neutral	27.1%	29
Somewhat Important	35.5%	38
Very Important	23.4%	25

Table E21

Q21. Based on your past projects, please indicate the importance of a "decentralized" PMO organizational structure in contributing to any of the three levels of project success, as indicated in section 2.

Answer Options	Response Percent	Response Count
Very Unimportant	3.7%	4
Somewhat Unimportant	10.3%	11
Neutral	41.1%	44
Somewhat Important	30.8%	33
Very Important	14.0%	15

Table E22

Q22. Based on the definitions of a "centralized" and a "decentralized" PMO, given above, which structure would closely describe the existing PMO organizational structure?

Answer Options	Response Percent	Response Count
Highly Centralized	14.0%	15
Somewhat Centralized	38.3%	41
Equally Centralized and Decentralized	25.2%	27
Somewhat Decentralized	16.8%	18
Highly Decentralized	5.6%	6

Table E23

Q23. Based on your past projects, which one of the five PMO maturity levels best describes the current maturity level of the existing PMO (see the figure above for a detailed description of each level).

Answer Options	Response Percent	Response Count
Level 1 – Project Office	6.5%	7
Level 2 – Basic PMO	15.0%	16
Level 3 – Standard PMO	50.5%	54
Level 4 – Advanced PMO	18.7%	20
Level 5 – Center of Excellence	9.3%	10

Table E24

Q24. Based on your past projects, please check as many of the following that apply related to the project team(s).

Answer Options	Response Percent	Response Count
Members may be from more than one organization	50.9%	54
Members may be from more than one function	84.9%	90
Members may transition on and off the team	64.2%	68
Members may be dispersed over more than three contiguous time zones	58.5%	62
Members may be dispersed so that some team members are 8–12 hours apart	74.5%	79
Members may be from more than two national cultures	79.2%	84
Members may have a native language that is different from the majority of team members	65.1%	69
Members may not have equal access to electronic communication and collaboration technology	11.3%	12
Members may not formally be assigned to the team	25.5%	27

Table E25

Raw Data for Survey Questions 1–9

Respondent ID	1	2	3	4	5	6	7	8	9
1806788442	2	3	1	5	5	2	4	4	3
1805928399	6	5	3	2	2	2	4	5	4
1805655886	5	5	3	2	2	2	4	4	3
1804707359	1	6	5	3	3	3	5	4	4
1804682734	5	5	5	2	2	1	3	3	4
1804122757	6	3	3	2	1	1	4	5	4
1803950089	6	3	3	2	2	2	5	4	4
1803948695	6	3	3	1	1	2	4	4	4
1803932821	6	5	3	2	2	2	4	4	4
1803928177	6	3	3	1	1	2	5	5	5
1803925889	6	3	3	1	1	1	4	4	3
1803925052	6	3	3	1	1	2	4	4	5
1803924010	6	5	3	1	1	2	5	5	5
1803920283	6	3	3	1	1	1	4	5	4
1803919503	6	5	3	1	1	2	4	4	3
1803912291	6	3	3	1	1	3	4	4	4
1803909677	6	5	3	1	1	3	4	4	4
1803907770	5	5	3	2	2	4	4	3	3
1803905437	6	3	3	3	2	2	4	4	5
1803904502	5	5	3	2	1	2	5	4	4
1803884240	6	5	3	1	1	2	3	4	3
1803881513	6	3	3	1	1	2	4	5	4
1803877213	5	5	3	2	2	2	4	4	4
1802628531	2	2	1	5	2	1	4	3	3
1802043658	2	5	3	2	2	1	4	4	4
1801896412	1	5	3	2	2	2	5	5	5
1801452622	2	5	1	3	3	2	3	3	3
1801450541	1	3	1	5	5	2	3	2	3
1801446517	2	5	1	3	3	2	4	3	3
1801322504	2	3	1	4	4	2	5	4	4
1801299366	1	5	1	2	2	2			
1801084511	2	3	1	4	4	2	3	4	4
1800074234	2	3	3	3	2	1	3	4	4
1798532412	1	5	3	1	2	2	5	5	5

Respondent ID	1	2	3	4	5	6	7	8	9
1798462600	2	3	3	1	1	2	3	4	2
1798394349	2	3	3	1	2	3	3	3	3
1798382978	10	3	3	1	1	1	3	3	3
1798382706	2	5	3	1	1	2	4	4	4
1798382475	2	3	3	1	1	3	4	4	4
1797596146	1	5	3	3	2	3	4	4	3
1796740218	1	3	1	4	3	3	4	3	2
1796597775	2	4	5	2	1	2	3	3	3
1796596069	2	3	1	3	3	2	4	3	4
1796466110	2	5	1	5	4	1	4	4	3
1796443593	2	4	6	1	1	2	4	4	3
1796443350	2	3	5	1	1	3	4	4	4
1796396911	2	3	5	2	2	3	3	3	4
1796332113	2	3	5	3	2	2	3	2	2
1796325591	1	5	5	3	2	1	4	3	3
1796319175	1	3	1	3	3	2	5	5	5
1796274694	1	5	1	5	4	2	4	5	5
1796242901	2	5	5	1	1	3	4	3	4
1796224129	2	5	5	1	1	2	4	4	4
1796223029	2	5	5	1	1	4	3	3	3
1796222682	1	5	1	5	2	2	2	3	3
1796215114	1	5	5	2	1	2	4	3	3
1796193341	1	5	3	2	2	2	5	5	5
1796191912	1	5	1	3	4	6	4	4	3
1796143707	3	2	1	4	3	3	5	5	5
1795230184	1	4	1	4	5	3	4	4	4
1794236924	4	3	3	2	1	1	4	5	5
1794130893	1	5	3	3	2	2	5	5	5
1793358513	5	3	1	5	5	1	4	4	4
1791990955	7	4	1	3	4	3	5	4	4
1791369376	2	6	7	3	3	1	3	4	3
1789955831	1	3	1	5	3	2	5	5	5
1789890032	4	5	1	4	4	3	4	4	4
1789236978	7	3	1	4	4	6	4	4	2
1788324341	6	2	1	3	3	2	4	4	3
1788022009	10	2	1	4	3	3	4	5	4
1788009687	3	6	1	5	2	3	4	5	4

Respondent ID	1	2	3	4	5	6	7	8	9
1787861209	8	3	1	5	3	4	5	5	5
1787837635	2	5	1	4	4	2	5	4	4
1787815319	3	2	1	2	5	3	3	3	3
1787808713	3	3	1	3	3	2			
1787798602	4	4	1	5	3	3	4	4	4
1787277926	1	3	1	5	5	1	4	4	3
1787206073	8	3	1	3	3	1	4	4	4
1787185235	1	3	1	1	3	2	3	5	3
1786943633	10	3	1	4	1	2			
1786883730	2	2	1	5	4	2	5	5	5
1786767138	2	5	1	2	2	2	4	5	4
1786756525	1	5	1	2	3	2	2	1	2
1786657288	1	3	1	3	3	2	4	3	3
1786493998	2	2	1	5	5	2	4	4	4
1786257855	1	5	3	2	3	2	4	4	4
1786176404	2	3	3	1	1	3	4	5	4
1785751429	1	5	1	5	5	2	5	5	5
1785682337	5	5	1	2	2	2	5	4	4
1785546336	11	4	1	2	3	2	2	3	2
1785535979	2	3	1	4	3	4	5	4	5
1785534627	2	3	1	5	4	1	4	5	4
1785503936	10	3	1	3	3	2	3	3	4
1785460948	6	4	1	3	3	1	3	3	3
1785403935	4	4	1	3	4	4	4	3	4
1785376309	9	3	1	2	3	3	3	3	3
1785343806	8	3	1	5	1	1	4	4	4
1785299169	10	5	1	3	3	2	5	5	5
1785298648	2	3	1	4	4	2	5	5	4
1785281349	1	5	1	5	4	2	4	4	3
1785269766	2	3	1	5	5	2	4	4	4
1785246977	2	4	1	3	3	2	2	3	2
1785220676	2	3	1	5	3	2			
1785181106	1	5	1	5	4	2	3	3	3
1785170620	3	3	1	4	4	2	4	4	4
1785155853	2	5	1	5	4	1	3	2	2
1785153199	1	4	1	4	3	2	3	3	3
1785107299	2	3	1	5	3	1	4	4	3

Respondent ID	1	2	3	4	5	6	7	8	9
1785085072	2	3	1	5	4	1	4	4	4
1785069874	1	3	1	3	2	3	4	3	4
1785052175	5	4	1	3	3	2	4	4	3
1785024827	3	5	1	1	3	2	3	3	3
1785016826	2	3	1	5	3	1	3	4	4
1785008974	3	4	1	4	3	2	4	4	3
1784978341	1	5	5	1	2	2	4	5	4
1784976756	2	3	1	5	3	2	4	4	4
1784944437	1	3	1	5	3	3	4	4	4
1784936172	6	5	5	4	2	2	4	4	4
1784836949	1	3	1	4	3	1	3	4	4
1784799648	1	5	5	3	2	2	4	3	4
1784796179	4	5	5	2	1	3	4	4	4
1784744768	1	2	1	5	4	2	3	4	4
1784570729	6	3	3	2	1	2	3	3	3
1784559442	1	3	3	1	2	2	4	4	3
1784553773	1	3	3	2	2	1	4	4	4
1784549963	2	4	3	2	1	3	4	5	5
1784545622	1	5	3	2	2	2	2	3	3
1784509539	1	5	3	2	2	1	3	4	4
1783884614	1	2	2	2	3	3			

Table E26

Raw Data for Survey Questions 10–11

Respondent ID	10.1	10.2	10.3	10.4	11.1	11.2	11.3	11.4	11.5
1806788442	5	4	4	3	5	3	4	3	3
1805928399	5	5	4	3	4	4	4	3	2
1805655886	5	5	5	5	5	5	4	4	4
1804707359	5	5	5	5	5	5	5	5	5
1804682734	5	5	4	4	5	4	4	4	3
1804122757	5	5	5	4	5	5	5	4	3
1803950089	5	5	4	4	4	5	4	3	4
1803948695	2	2	2	2	4	4	4	4	4
1803932821	5	5	5	4	4	5	5	5	5
1803928177	5	5	5	4	4	4	5	4	4
1803925889	3	3	3	3	3	3	3	3	3
1803925052	3	5	5	4	4	4	5	5	2
1803924010	5	5	5	5	4	4	5	5	5
1803920283	5	5	5	5	5	5	5	5	5
1803919503	5	4	4	3	5	4	5	4	4
1803912291	5	5	4	4	5	4	5	4	5
1803909677	5	5	4	4	5	4	3	4	3
1803907770	5	5	5	5	5	3	5	3	3
1803905437	5	5	5	5	5	5	4	4	4
1803904502	5	5	5	4	5	5	4	4	4
1803884240	4	3	4	3	5	5	4	4	4
1803881513	4	4	4	4	5	5	5	3	5
1803877213	5	5	5	4	5	5	5	5	5
1802628531	4	3	4	3	4	3	4	5	2
1802043658	5	5	5	5	5	3	3	3	3
1801896412	5	5	5	5	5	5	5	5	5
1801452622	4	4	3	4	3	4	4	4	4
1801450541	5	5	5	4	2	3	3	4	4
1801446517	3	3	4	3	2	2	2	2	2
1801322504	4	5	4	4	4	3	4	3	3
1801084511	4	4	5	4	5	4	4	4	3
1800074234	4	5	5	2	4	4	5	5	5
1798532412	5	5	5	5	4	4	4	4	2
1798462600	4	5	5	4	3	2	5	3	5

Respondent ID	10.1	10.2	10.3	10.4	11.1	11.2	11.3	11.4	11.5
1798394349	4	4	4	4	4	4	4	4	4
1798382978	4	5	5	4	4	4	4	3	3
1798382706	5	5	5	5	5	5	5	5	5
1798382475	5	5	5	4	5	5	5	5	5
1797596146	5	5	5	5	5	5	5	5	4
1796740218	5	5	5	5	5	5	4	4	4
1796597775	3	3	3	3	5	4	4	3	2
1796466110	3	3	3	2	4	4	5	4	4
1796443593	4	5	5	4	5	4	5	4	3
1796443350	3	4	4	4	4	4	4	4	3
1796396911	5	5	5	5	5	5	5	5	5
1796332113	1	5	4	2	4	5	1	1	2
1796325591	5	5	4	5	5	5	5	5	4
1796319175	4	5	4	3	4	4	5	5	3
1796274694	4	4	3	2	4	4	4	4	3
1796242901	5	5	4	4	4	5	5	4	3
1796224129	4	4	4	4	4	4	4	4	4
1796223029	4	4	3	3	2	3	2	4	2
1796222682	1	1	1	1	1	1	1	1	1
1796215114	5	5	5	5	5	5	5	5	5
1796193341	5	5	4	4	5	5	5	5	4
1796191912	5	5	5	5	3	4	3	3	3
1796143707	5	4	5	5	5	5	5	5	4
1795230184	5	4	4	3	4	4	3	4	3
1794236924	4	5	5	5	5	5	5	5	5
1794130893	5	5	5	5	5	5	5	5	5
1793358513	5	5	5	4	5	5	5	5	5
1791990955	5	5	5	5	5	4	2	2	3
1791369376	4	5	5	4	4	3	4	3	3
1789955831	4	3	3	3	4	5	5	5	4
1789236978	5	5	5	4	5	5	4	3	3
1788324341	4	4	5	5	5	5	5	5	5
1788022009	3	3	3	3	3	3	3	3	3
1788009687	5	3	5	5	4	3	3	3	3
1787861209	5	5	4	4	5	5	5	5	3
1787837635	1	2	2	1	2	2	1	1	1
1787815319	5	4	4	3	4	5	5	5	5

Respondent ID	10.1	10.2	10.3	10.4	11.1	11.2	11.3	11.4	11.5
1787798602	5	5	5	3	5	4	5	5	3
1787277926	5	5	4	4	4	5	4	5	5
1787185235	5	5	3	3	5	5	5	5	5
1786767138	5	5	3	2	4	3	3	3	3
1786756525	5	5	4	3	4	1	2	5	5
1786657288	5	4	4	4	5	4	4	4	4
1786493998	4	4	4	4	5	5	5	4	4
1786257855	5	5	5	4	5	4	5	5	4
1786176404	5	5	3	4	5	5	5	3	4
1785751429	3	4	2	1	4	2	5	4	3
1785682337	5	5	5	3	4	4	2	3	3
1785546336	5	5	4	4	4	4	3	2	3
1785535979	3	3	3	3	3	3	3	3	3
1785534627	4	4	4	3	5	5	4	4	3
1785460948	5	4	3	3	3	5	5	5	5
1785403935	5	5	4	3	4	4	5	5	4
1785376309	5	5	4	5	5	4	3	3	4
1785299169	4	5	5	4	5	4	5	4	5
1785298648	4	4	4	2	5	5	5	5	5
1785281349	4	4	4	4	4	4	4	4	3
1785269766	5	4	4	3	5	5	5	4	3
1785246977	5	5	2	5	2	1	1	1	1
1785181106	5	4	4	4	5	4	4	5	4
1785170620	4	4	3	3	4	4	2	2	3
1785155853	5	5	5	2	5	5	5	5	2
1785107299	4	5	4	3	4	5	5	5	4
1785085072	4	5	4	5	4	4	4	4	3
1785069874	2	1	1	2	2	1	1	3	2
1785052175	5	5	5	5	4	5	4	3	3
1785024827	5	5	4	4	3	4	3	3	3
1785016826	2	3	2	2	2	2	3	3	3
1785008974	4	5	5	5	5	5	5	4	3
1784978341	5	5	4	4	5	5	5	4	4
1784976756	4	4	4	3	5	3	5	3	3
1784944437	5	4	5	5	5	5	4	4	5
1784936172	4	5	5	5	5	4	5	4	4
1784836949	5	3	4	4	5	4	5	5	3

Respondent ID	10.1	10.2	10.3	10.4	11.1	11.2	11.3	11.4	11.5
1784799648	5	5	5	5	5	5	5	5	5
1784796179	4	5	5	4	4	3	4	3	3
1784744768	4	5	5	4	4	4	5	4	4
1784570729	2	5	4	4	4	4	5	5	3
1784559442	5	5	3	3	5	5	3	4	3
1784553773	5	3	5	5	3	4	3	2	3
1784549963	5	5	5	5	5	4	5	4	4
1784545622	5	5	5	5	4	4	4	5	5
1784509539	5	5	5	5	5	4	4	5	3
1783884614	5	5	5	5	5	4	4	5	3

Table E27

Raw Data for Survey Questions 12–13

Respondent ID	12.1	12.2	12.3	12.4	12.5	13.1	13.2	13.3	13.4
1806788442	4	4	4	3	4	3	3	3	4
1805928399	3	3	3	3	3	3	3	3	3
1805655886	5	5	5	5	4	4	4	3	4
1804707359	5	5	5	5	5	5	5	5	5
1804682734	5	5	2	2	5	4	5	4	5
1804122757	5	5	4	4	5	3	4	3	4
1803950089	4	4	4	4	5	3	4	4	4
1803948695	4	4	4	4	4	4	4	4	4
1803932821	4	5	4	5	4	3	5	5	4
1803928177	5	5	5	5	4	4	5	5	5
1803925889	3	3	3	3	3	3	3	3	3
1803925052	5	5	4	4	5	5	5	5	4
1803924010	4	5	4	4	4	4	5	5	5
1803920283	5	5	5	4	5	5	5	4	5
1803919503	4	5	4	4	4	3	3	3	4
1803912291	5	5	4	4	5	5	5	5	3
1803909677	3	5	4	4	5	3	4	3	2
1803907770	3	3	3	3	5	5	3	4	3
1803905437	5	5	4	4	5	5	4	4	4
1803904502	4	5	5	5	5	4	5	4	4
1803884240	4	5	4	4	4	4	4	4	5
1803881513	5	5	5	5	5	4	5	4	5
1803877213	5	5	5	5	5	5	5	5	5
1802628531	4	5	4	4	4	4	4	3	3
1802043658	5	5	5	5	5	3	5	5	5
1801896412	5	5	5	5	5	5	5	5	5
1801452622	5	4	4	4	3	3	3	3	3
1801450541	5	5	5	5	2	5	5	3	4
1801446517	2	2	2	3	2	3	2	3	3
1801322504	4	5	3	3	4	5	4	3	3
1801299366	5	5	5	5	5	4	4	5	3
1801084511	4	4	3	3	3	5	5	4	5
1800074234	5	5	3	3	4	4	3	3	3
1798532412	5	5	5	5	5	3	5	4	4

Respondent ID	12.1	12.2	12.3	12.4	12.5	13.1	13.2	13.3	13.4
1798462600	5	5	4	3	5	3	5	3	5
1798394349	5	5	4	4	4	4	4	4	4
1798382978	4	4	4	4	5	4	4	4	4
1798382706	5	5	5	5	5	5	5	5	5
1798382475	5	4	4	4	5	5	5	4	4
1797596146	5	5	5	4	4	5	5	5	4
1796740218	5	4	4	4	2	5	5	2	5
1796597775	3	3	4	3	3	3	3	3	3
1796596069	5	5	5	5	5	4	4	5	3
1796466110	5	5	3	3	4	5	4	4	4
1796443593	4	5	4	4	5	4	4	5	4
1796443350	4	4	4	4	4	5	4	4	4
1796396911	5	5	4	4	5	5	5	4	5
1796332113	1	1	3	3	1	4	1	1	3
1796325591	5	5	4	4	5	5	4	3	4
1796319175	4	3	3	3	4	5	5	3	5
1796274694	4	3	4	3	4	4	4	4	4
1796242901	3	5	4	4	3	4	5	4	4
1796224129	4	4	4	4	4	4	4	4	4
1796223029	3	4	3	3	5	3	2	2	3
1796222682	5	1	1	1	1	1	1	1	1
1796215114	5	5	4	4	4	5	5	4	4
1796193341	5	5	4	4	5	5	5	5	5
1796191912	4	2	3	2	1	3	3	1	4
1796143707	5	5	5	5	5	5	5	5	5
1795230184	5	3	4	4	2	4	4	3	3
1794236924	5	5	5	5	3	5	4	4	5
1794130893	5	5	5	5	5	5	5	5	5
1793358513	5	5	5	5	4	5	5	4	4
1791990955	5	2	5	5	3	2	4	4	5
1791369376	4	5	4	4	4	4	4	3	4
1789955831	5	3	4	4	3	4	4	4	4
1789890032	5	5	5	5	5	4	4	5	3
1789236978	5	5	5	4	5	3	3	3	4
1788324341	5	5	3	3	5	5	5	3	4
1788022009	3	3	3	3	3	3	3	3	3
1788009687	4	3	4	2	2	4	3	3	3

Respondent ID	12.1	12.2	12.3	12.4	12.5	13.1	13.2	13.3	13.4
1787861209	5	2	4	4	5	5	5	5	5
1787837635	2	4	2	2	2	1	4	2	1
1787815319	5	5	5	5	5	5	5	4	4
1787808713	5	5	5	5	5	4	4	5	3
1787798602	5	5	3	3	5	4	4	4	4
1787277926	5	4	5	5	3	5	5	3	4
1787206073	5	5	5	5	5	4	4	5	3
1787185235	4	5	3	3	3	5	5	3	5
1786943633	5	5	5	5	5	4	4	5	3
1786883730	5	5	5	5	5	4	4	5	3
1786767138	5	3	4	3	3	3	3	3	4
1786756525	5	5	5	5	5	5	5	2	3
1786657288	3	3	3	3	3	4	4	3	4
1786493998	5	4	4	4	5	3	4	3	3
1786257855	5	5	4	4	5	3	3	3	4
1786176404	5	5	3	3	3	4	5	3	5
1785751429	4	4	3	3	5	4	4	3	1
1785682337	5	2	5	5	2	4	4	5	3
1785546336	5	5	3	3	5	5	4	3	4
1785535979	3	3	3	3	3	3	3	3	3
1785534627	5	4	4	4	5	4	4	4	5
1785503936	5	5	5	5	5	4	4	5	3
1785460948	5	5	5	5	5	5	5	4	5
1785403935	5	5	4	4	5	5	4	5	5
1785376309	3	3	3	3	3	5	5	4	4
1785343806	5	5	5	5	5	4	4	5	3
1785299169	5	4	2	2	5	5	5	2	4
1785298648	4	3	3	3	4	4	4	3	5
1785281349	4	4	3	3	4	5	4	4	3
1785269766	4	5	3	3	5	4	5	3	4
1785246977	5	5	5	5	5	5	5	5	5
1785220676	5	5	5	5	5	4	4	5	3
1785181106	4	4	5	4	5	4	4	4	4
1785170620	4	4	4	3	3	4	4	4	4
1785155853	5	5	4	5	5	5	5	4	5
1785153199	5	5	5	5	5	4	4	5	3
1785107299	5	5	3	3	4	5	5	5	4

Respondent ID	12.1	12.2	12.3	12.4	12.5	13.1	13.2	13.3	13.4
1785085072	5	5	5	5	5	3	2	3	3
1785069874	2	2	3	2	2	1	2	3	2
1785052175	5	5	5	5	4	5	5	3	3
1785024827	3	4	4	5	3	3	4	3	3
1785016826	4	4	3	3	4	4	4	3	4
1785008974	5	5	5	5	5	5	5	4	3
1784978341	5	5	4	4	4	5	5	5	4
1784976756	2	5	3	3	3	4	4	3	5
1784944437	5	5	4	4	5	4	5	3	3
1784936172	5	5	5	4	5	4	5	4	4
1784836949	5	5	5	5	5	5	4	4	5
1784799648	5	5	5	5	5	5	5	5	5
1784796179	4	4	3	3	4	4	5	5	5
1784744768	3	3	3	3	3	4	5	3	5
1784570729	4	5	3	3	5	4	4	3	3
1784559442	5	5	3	3	2	4	4	5	5
1784553773	2	2	4	4	3	4	3	4	4
1784549963	4	4	4	4	5	5	5	5	5
1784545622	4	4	4	4	5	3	4	4	4
1784509539	5	5	5	5	5	5	3	4	4
1783884614	5	5	5	5	5	4	4	5	3

Table E28

Raw Data for Survey Questions 14–17

Respondent ID	14.1	14.2	14.3	14.4	14.5	14.6	15	16	17
1806788442	4	4	4	4	3	2	5	5	5
1805928399	3	5	4	4	4	2	6	6	1
1805655886	5	5	5	5	5	5	5	4	5
1804707359	5	5	5	5	3	3	7	7	7
1804682734	2	5	4	3	4	2	6	5	6
1804122757	4	5	5	5	5	5	5	5	1
1803950089	4	5	4	4	5	5	6	5	6
1803948695	4	4	4	4	4	4	6	6	6
1803932821	5	5	5	4	5	4	6	3	6
1803928177	4	4	5	4	5	5	6	6	1
1803925889	3	3	3	3	3	3	1	1	1
1803925052	5	5	5	5	5	5	1	5	5
1803924010	5	5	4	5	5	5			
1803920283	4	5	5	5	5	5	1	1	6
1803919503	5	4	4	4	4	4	5	5	5
1803912291	5	5	5	4	5	4	1	5	5
1803909677	3	3	4	4	4	4	6	5	6
1803907770	5	3	5	5	3	3	1	1	1
1803905437	5	4	4	4	5	4	6	6	6
1803904502	4	4	5	5	5	5	1	1	1
1803884240	4	5	5	5	5	5	6	5	5
1803881513	3	5	5	5	4	4	6	6	5
1803877213	4	4	5	5	5	5	6	6	6
1802628531	4	4	5	4	3	4	1	1	1
1802043658	5	5	5	5	3	3	5	5	5
1801896412	5	5	5	5	5	5	6	6	6
1801452622	4	3	4	3	2	3	5	5	5
1801450541	3	4	4	4	5	5	6	2	2
1801446517	3	3	2	2	2	2	1	1	1
1801322504	3	4	5	4	4	4	7	6	1
1801299366	5	5	5	5	5	4	4	5	3
1801084511	4	4	5	4	4	4			
1800074234	3	4	4	4	5	3	5	4	4
1798532412	3	4	5	4	4	4	1	6	1

Respondent ID	14.1	14.2	14.3	14.4	14.5	14.6	15	16	17
1798462600	5	3	4	4	4	5	5	4	5
1798394349	4	4	4	4	4	4	5	5	5
1798382978	5	4	4	4	4	4	1	1	6
1798382706	5	5	5	5	5	5	1	1	1
1798382475	4	5	5	4	5	4	5	5	5
1797596146	4	5	5	5	5	5	5	5	1
1796740218	5	3	3	3	3	3	7	6	6
1796597775	3	3	3	3	3	3	1	1	1
1796596069	5	5	5	5	5	4	4	5	3
1796466110	4	3	4	2	2	2	6	5	6
1796443593	4	4	4	5	5	4	1	1	3
1796443350	3	4	4	4	4	4	1	1	1
1796396911	4	5	5	5	5	5	7	7	6
1796332113	3	2	5	1	3	1	4	3	1
1796325591	4	4	5	5	5	4	6	4	5
1796319175	3	4	4	4	3	3	6	2	2
1796274694	4	4	4	3	3	3	5	5	5
1796242901	5	5	4	4	4	3	6	2	6
1796224129	4	4	4	4	4	4	5	5	5
1796223029	3	3	4	1	2	3	6	5	1
1796222682	1	1	1	1	1	1	1	2	2
1796215114	4	5	4	4	4	5	5	5	5
1796193341	4	5	5	5	5	5	5	4	6
1796191912	4	2	4	3	3	3	6	2	2
1796143707	4	5	5	5	5	5	6	6	6
1795230184	4	3	3	2	2	2	6	2	2
1794236924	5	5	5	5	5	5	1	1	1
1794130893	5	5	5	5	5	5	6	6	6
1793358513	4	4	4	4	4	4	6	6	6
1791990955	3	3	4	4	2	2	7	1	2
1791369376	4	4	4	3	4	4	5	5	5
1789955831	4	3	3	3	3	5	6	5	1
1789890032	5	5	5	5	5	4	4	5	3
1789236978	4	3	4	3	3	2	6	4	6
1788324341	4	5	5	5	5	5	6	4	5
1788022009	3	3	3	3	3	3	2	2	2
1788009687	3	1	4	3	3	3	6	1	5

Respondent ID	14.1	14.2	14.3	14.4	14.5	14.6	15	16	17
1787861209	3	4	5	2	4	4	7	7	7
1787837635	1	1	1	1	1	1	5	5	5
1787815319	4	4	5	5	5	5	6	6	6
1787808713	5	5	5	5	5	4	4	5	3
1787798602	3	4	4	4	4	4	6	5	5
1787277926	4	4	4	4	4	4	7	2	1
1787206073	5	5	5	5	5	4	4	5	3
1787185235	5	5	5	5	5	5	1	1	1
1786943633	5	5	5	5	5	4	4	5	3
1786883730	5	5	5	5	5	4	4	5	3
1786767138	4	3	4	3	4	3	5	5	1
1786756525	4	1	5	2	2	2	4	3	4
1786657288	4	4	4	4	4	4	6	5	2
1786493998	4	4	4	4	4	4	6	6	6
1786257855	3	5	5	5	5	5	5	5	5
1786176404	5	5	5	5	5	5	5	5	5
1785751429	3	4	4	2	1	1			
1785682337	4	3	4	3	2	2	7	6	7
1785546336	3	2	3	2	2	2	6	5	5
1785535979	3	3	3	3	3	3	1	1	1
1785534627	4	4	4	3	3	3	7	6	7
1785503936	5	5	5	5	5	4	4	5	3
1785460948	3	4	5	4	3	3	6	4	5
1785403935	5	4	5	5	4	5	5	5	1
1785376309	3	3	3	3	3	3			
1785343806	5	5	5	5	5	4	4	5	3
1785299169	5	4	2	4	4	2	1	2	2
1785298648	3	4	4	4	4	4	5	4	6
1785281349	4	4	3	3	3	3	6	5	4
1785269766	3	4	5	3	3	3	1	1	1
1785246977	5	1	4	4	2	2	5	4	5
1785220676	5	5	5	5	5	4	4	5	3
1785181106	4	4	5	4	4	4	7	6	6
1785170620	4	4	2	2	1	4	6	2	6
1785155853	4	5	4	4	3	3	5	5	4
1785153199	5	5	5	5	5	4	4	5	3
1785107299	4	5	5	5	4	4	5	1	4

Respondent ID	14.1	14.2	14.3	14.4	14.5	14.6	15	16	17
1785085072	4	4	5	4	2	2	6	6	6
1785069874	2	2	2	3	1	1	5	1	5
1785052175	4	3	3	3	3	3	2	2	1
1785024827	4	3	2	2	2	2	4	3	5
1785016826	3	4	3	2	2	3	5	4	4
1785008974	4	5	4	4	3	4	7	6	7
1784978341	5	5	4	4	5	4	7	6	6
1784976756	3	4	3	4	3	3	5	5	5
1784944437	4	4	5	4	3	3	6	5	6
1784936172	5	5	4	4	4	5	6	6	6
1784836949	4	4	4	4	3	5	1	1	1
1784799648	4	5	5	5	5	5	6	5	5
1784796179	4	4	3	4	4	4	6	5	6
1784744768	5	5	5	5	5	5	6	5	1
1784570729	3	2	4	2	3	4	5	4	5
1784559442	3	5	5	5	5	5	5	5	6
1784553773	4	4	4	4	4	4	6	5	5
1784549963	4	4	5	5	5	5	1	1	1
1784545622	5	5	5	5	5	5	5	5	6
1784509539	5	5	4	4	5	5	6	1	5
1783884614									

Table E29

Raw Data for Survey Questions 18–23

Respondent ID	18	19	20	21	22	23
1806788442	5	5	5	1	1	5
1805928399	1	5	4	3	2	2
1805655886	4	5	1	3	1	3
1804707359	7	1	4	4	3	4
1804682734	1	4	5	4	2	3
1804122757	5	5	5	2	2	2
1803950089	5	5	4	3	3	3
1803948695	6	6	4	4	2	3
1803932821	3	6	4	5	2	3
1803928177	6	6	4	4	1	3
1803925889	1	1	5	2	2	2
1803925052	5	5	2	5	3	1
1803924010	5	6	3	2	4	3
1803920283	1	1	3	3	4	5
1803919503	4	5	4	4	3	3
1803912291	1	5	3	2	2	3
1803909677	5	4	4	3	2	4
1803907770	1	1	3	3	3	3
1803905437	5	5	4	2	3	3
1803904502	1	1	2	3	2	3
1803884240	6	6	4	3	3	4
1803881513	6	5	3	3	3	1
1803877213	6	6	5	3	2	4
1802628531	1	1	4	3	2	3
1802043658	6	6	1	3	1	3
1801896412	6	6	4	3	2	1
1801452622	5	6	3	2	4	3
1801450541	5	2	4	2	2	3
1801446517	1	1	3	3	2	1
1801322504	6	6	3	4	4	5
1801299366	6	6	5	3	2	4
1801084511	6	6	5	3	2	4
1800074234	5	4	4	2	3	3
1798532412	1	6	3	1	3	4

Respondent ID	18	19	20	21	22	23
1798462600	6	4	4	3	3	3
1798394349	5	5	5	5	3	3
1798382978	6	1	4	3	4	5
1798382706	1	1	4	4	3	3
1798382475	5	5	5	3	2	1
1797596146	5	2	4	3	3	5
1796740218	7	5	5	5	2	5
1796597775	1	1	3	3	3	4
1796596069	6	6	5	3	2	4
1796466110	4	2	3	5	4	4
1796443593	1	2	4	4	2	2
1796443350	1	1	4	3	3	3
1796396911	7	6	5	5	2	3
1796332113	3	3	4	2	2	3
1796325591	1	4	4	3	3	2
1796319175	6	2	2	3	2	2
1796274694	5	5	4	4	4	3
1796242901	6	6	5	4	2	3
1796224129	5	5	3	3	3	2
1796223029	1	1	3	3	3	3
1796222682	5	1	2	3	5	3
1796215114	5	5	4	3	3	3
1796193341	5	2	5	4	2	5
1796191912	2	5	3	4	2	3
1796143707	6	5	5	4	2	2
1795230184	6	6	4	3	2	4
1794236924	1	1	4	3	3	3
1794130893	6	6	5	4	1	3
1793358513	6	6	5	3	1	4
1791990955	2	2	4	2	1	2
1791369376	5	5	3	4	5	2
1789955831	6	2	4	3	2	3
1789890032	2	6	5	4	1	5
1789236978	6	4	4	4	4	3
1788324341	5	4	4	4	3	3
1788022009	5	2	3	3	3	2
1788009687	2	1	4	5	4	3

Respondent ID	18	19	20	21	22	23
1787861209	2	6	5	4	1	5
1787837635	5	2	1	4	5	3
1787815319	6	6	5	4	1	4
1787808713	2	6	5	4	1	5
1787798602	1	1				
1787277926	1	6	5	3	2	3
1787206073	2	6	5	4	1	5
1787185235	1	1	5	3	3	3
1786943633	2	6	5	4	1	5
1786883730	2	6	5	4	1	5
1786767138	2	2				
1786756525	5	4	2	5	1	3
1786657288	2	4	2	4	3	3
1786493998	6	6	4	4	3	3
1786257855	5	5	3	3	2	3
1786176404	5	5	3	1	2	1
1785751429	2	6	5	4	1	5
1785682337	6	5	3	5	5	4
1785546336	5	4	4	3	2	3
1785535979	1	1	2	4	4	4
1785534627	6	5	3	4	4	2
1785503936	2	6	5	4	1	5
1785460948	4	5	3	4	2	1
1785403935	1	1	5	5	4	3
1785376309	6	6	5	4	1	4
1785343806	6	6	5	4	1	4
1785299169	2	2	4	5	1	5
1785298648	6	5	1	3	4	2
1785281349	5	3	4	3	2	4
1785269766	1	1	3	4	5	3
1785246977	5	4	1	2	1	3
1785220676	6	6	5	4	1	4
1785181106	6	5	3	4	4	4
1785085072	1	6	5	3	2	4
1785069874	5	1	4	2	2	3
1785052175	1	2	3	3	2	3
1785024827	1	4	5	3	2	3

Respondent ID	18	19	20	21	22	23
1785016826	1	1	3	5	4	2
1785008974	6	7	5	3	1	4
1784978341	1	5	5	3	2	3
1784976756	5	5	3	3	3	3
1784944437	1	5	2	4	4	2
1784936172	5	6	3	5	4	3
1784836949	1	1	5	3	2	3
1784799648	5	5	4	4	2	3
1784796179	6	5	4	5	2	4
1784744768	5	7	5	3	1	2
1784570729	1	1	3	3	3	3
1784559442	5	6	3	5	4	2
1784553773	6	6	3	4	5	4
1784549963	1	1	4	1	2	4
1784545622	5	5	4	3	3	3
1784509539	1	5	5	2	1	5
1783884614	5	6	3	5	4	2

Table E30

Raw Data for Survey Question 24

Respondent ID	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9
1806788442	1	2	3	4	5	6			
1805928399	1	2		4		6	7		
1805655886		2	3	4	5	6	7		
1804707359		2			5	6	7		
1804682734	1	2		4	5	6	7		
1804122757		2	3		5	6	7		
1803950089		2		4	5	6	7		
1803948695		2	3						
1803932821		2	3	4	5	6	7	8	
1803928177		2	3	4	5	6			
1803925889									
1803925052		2	3	4	5	6	7		
1803924010									
1803920283		2	3	4		6	7		
1803919503	1	2		4		6			
1803912291	1								
1803909677	1				5	6	7		9
1803907770		2	3			6	7	8	9
1803905437	1	2	3						
1803904502	1		3				7		
1803884240	1	2	3	4	5	6	7		9
1803881513	1	2	3	4	5	6	7	8	9
1803877213			3		5	6			
1802628531	1	2	3	4	5	6	7		
1802043658			3						
1801896412		2	3	4	5	6	7	8	9
1801452622	1	2	3	4	5	6	7		
1801450541	1	2	3	4	5	6			9
1801446517	1	2	3	4	5	6	7		9
1801322504	1	2	3		5	6			
1801299366									
1801084511									
1800074234		2	3		5	6		8	9
1798532412		2			5				

Respondent ID	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9
1798462600		2	3	4	5	6	7		
1798394349				4	5	6	7	8	
1798382978		2				6			
1798382706	1	2							
1798382475		2	3						
1797596146		2							
1796740218	1	2	3	4	5	6	7		9
1796597775			3			6	7		
1796596069									
1796466110	1	2			5				
1796443593	1		3			6		8	
1796443350									
1796396911		2	3		5	6			
1796332113		2	3	4					9
1796325591	1	2		4	5	6	7		
1796319175	1	2	3	4	5	6	7		
1796274694	1	2	3	4	5	6			9
1796242901		2	3	4		6	7		
1796224129					5		7		
1796223029			3		5	6	7		
1796222682		2	3		5	6	7		9
1796215114									
1796193341		2	3	4	5	6	7		9
1796191912	1	2	3	4	5	6	7		9
1796143707		2		4	5	6	7		
1795230184	1	2	3	4	5	6	7	8	9
1794236924									
1794130893		2							
1793358513	1	2	3						
1791990955	1	2	3	4	5	6	7		
1791369376		2	3	4	5	6	7		
1789955831	1	2	3	4	5				
1789890032									
1789236978		2	3	4	5	6	7		9
1788324341		2		4	5	6	7		
1788022009						6			
1788009687	1	2		4	5	6	7		

Respondent ID	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9
1787861209	1	2	3	4	5	6	7		9
1787837635	1	2							9
1787815319	1	2							
1787808713									
1787798602									
1787277926	1	2	3		5	6	7		9
1787206073									
1787185235	1	2		4	5	6	7		
1786943633									
1786883730									
1786767138									
1786756525	1	2	3	4	5	6	7	8	9
1786657288		2	3						
1786493998			3	4		6	7		
1786257855		2				6	7		9
1786176404		2		4	5	6			
1785751429									
1785682337	1	2	3	4	5	6	7		
1785546336	1	2	3	4	5	6	7		9
1785535979	1	2			5	6	7		
1785534627		2	3						
1785503936									
1785460948	1	2		4					
1785403935		2	3	4	5	6	7		
1785376309									
1785343806									
1785299169									
1785298648			3	4	5	6	7		
1785281349	1	2	3	4	5	6	7		
1785269766	1	2		4	5	6	7		9
1785246977	1	2	3	4	5	6	7		9
1785220676									
1785181106		2	3	4	5	6	7	8	
1785170620	1	2	3	4	5	6	7		
1785155853	1	2		4	5	6	7	8	
1785153199									
1785107299			3	4	5	6	7		

Respondent ID	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9
1785085072					5	6	7		
1785069874	1	2	3	4	5	6	7		
1785052175	1	2	3	4	5	6	7		
1785024827	1	2		4	5	6	7		
1785016826		2			5				
1785008974	1	2	3	4	5	6	7		9
1784978341	1	2	3	4	5	6	7		
1784976756		2			5	6			
1784944437	1	2			5				
1784936172		2			5	6			
1784836949	1	2	3		5	6	7		9
1784799648	1				5	6	7		
1784796179	1	2	3		5	6	7		
1784744768		2	3	4	5	6	7		
1784570729		2	3	4	5	6	7		
1784559442		2	3		5	6	7		
1784553773	1	2		4	5	6	7		
1784549963		2			5	6			
1784545622	1	2	3	4	5	6	7	8	9
1784509539		2	3	4	5	6			
1783884614									

Curriculum Vitae

JONATHAN LIM

Insightful Senior Principal Program Manager with 16+ years of experience delivering cutting-edge global IT projects for world-class companies including Fortune 500 companies. Instrumental to the success of onshore and offshore enterprise programs. Cultivate vital relationships with clients, team members, and executives. Possess breadth of technical/business skills with MBA and MS degrees, PMP and PMI-ACP certifications. Skills include consulting projects, software solutions, productivity improvements, Agile Development, Enterprise Resource Planning (ERP), Project Management Office (PMO), and Project Management Lifecycle (PMLC). Recognized as a strategic thinker with excellent global insight and an impeccable work ethic.

PROFESSIONAL EXPERIENCE

ABC CORPORATION, Denver, Colorado • 1999 to Present
Senior Principal Program Manager

COMPUTEC INTERNATIONAL, Glendale, California • 1998 to 1999
Staffing firm serving clients including consulting firm Greenbrier & Russel (G&R).
Project Manager (Client: Greenbrier & Russel)

STATE STREET AUSTRALIA, Sydney, Australia • 1997 to 1998
Project Manager

EDS AUSTRALIA, Sydney, Australia • 1996 to 1997
System Engineer

Note: Experience also includes roles as Project Leader with CARLSON MARKETING GROUP, Analyst/ Programmer with COMPUTILITY AUSTRALIA, and Staff Consultant with ANDERSEN CONSULTING.

FORMAL EDUCATION

Candidate for Doctor of Business Administration
Walden University, USA

Graduate Certificate in Finance
University of Technology Sydney, Sydney, NSW, Australia

Master of Business Administration, International Business

University of Western Sydney, Sydney, NSW, Australia

Master of Engineering Science, Information Science
University of New South Wales, Sydney, NSW, Australia

Bachelor of Science, Computer Science
STIKI, Malang, East Java Indonesia

PROFESSIONAL CERTIFICATIONS

PMI Agile Certified Practitioner (PMI-ACP), Project Management Institute
Project Management Professional (PMP) Certification, Project Management Institute
Online Certified Outsourcing Professional Master Classes, Syracuse University
Microsoft Project 2003 Certification Series: Orange Belt, Blue Belt and Black Belt