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Abstract

Evaluating the Influence of Internal Project Management Communities of Practice on Project Management Performance

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Abstract

Organizations are recognizing the benefits of improved learning and knowledge sharing through informal groups of professionals called communities of practice (CoPs). Much has been written about CoPs in the areas of education and health care, but there is a significant gap in project management CoP research. The research problem in this study is the weak understanding of a CoP's influence on members' project management performance. Improving project management practices and success rates remain a goal for many firms. Hence, the purpose of this research was to determine whether internal project manager CoPs helped to improve (a) project management performance and (b) selected project success factors. The hypotheses tested included whether CoP membership was perceived to have value based on experience, tenure, and certification. CoP theory and the diffusion of innovation theory served as the theoretical framework. A mixed-method, instrumental case study approach was used in surveying and interviewing CoP members and managers of a mid-sized U.S. financial institution. A Spearman's rho correlation analysis of the survey responses ($N = 91$) was used to measure the relationships between CoP participation and project management performance, based on several variables. All correlations were statistically significant and positive. Implications for positive social change include improved project management skills of CoP members through knowledge sharing activities and the maturation of an organization's project management methodology as a result of diffusion of processes among its' employees.

Dedication

This dissertation is dedicated to my daughter Mei-Li. I hope you will read it someday and let it serve as an inspiration that with hard work and commitment, your dreams can be achieved. I would also like to thank all of my family and friends, whose encouragement served as my motivation over these past several years.

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I would like to thank all of my colleagues and management team that supported and participated in this study. Many of you have expressed great interest in my progress and your encouragement kept me motivated through this long journey. I would like to thank my mentor and dissertation chair, Dr. Abraham Meilich, for all of his feedback, advice, and guidance. I have the utmost respect for Dr. Meilich. My ability to conduct and present high quality research is a direct result of the high standards that he instills and for that, I am truly grateful. Lastly, I would also like to thank my committee member, Dr. Walter McCollum, for his expertise and feedback. I met Dr. McCollum at a residency years ago and it was because of his charisma and professionalism that I knew I wanted him to be a member of my committee.

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Chapter 1: Introduction

Introduction

In 1959, while faced with the challenges of the new decade, John F. Kennedy notably stated, "When written in Chinese the word 'crisis' is composed of two characters - one represents danger and the other represents opportunity" (Zimmer, 2007). At that time, the challenges he spoke of were the rapidly growing economy and population, the new frontiers of science and space, and expansion of automation in industry("John F. Kennedy", Encyclopedia Britannica, 2012). Corporations worldwide now face challenges and crises due to economic recession, changes in market conditions, organizational restructuring, technological advancements, social influences, and increased regulatory requirements (Yip & Hult, 2011). Consequently, organizations must quickly adapt to address these challenges or risk succumbing to their competitors. As a result, strategic initiatives are conducted by implementing projects swiftly. Thus, project management methodologies have become widely accepted by many organizations (Papa, 2009).

In the last few decades, the practice of project management has received much of its attention as a management discipline (Cleland & Ireland, 2007). It was not until the 1950s that companies began developing rigorous project scheduling models and cost estimating controls. Cleland and Ireland (2007) noted that project management practices continue to improve. In addition, techniques and software tools for better control of resources have been developed to achieve desired results. Resources, such as the Project Management Body of Knowledge (PMBOK), have become more clearly defined and adopted by organizations (PMI, 2009). Senior managers are more familiar with the

concepts behind project management and the effectiveness that it can bring in converting resources to new products, services, or organizational change (Cleland & Ireland, 2007). Furthermore, the level of interest in and advancement in project management methodologies are being recognized through the growth of professional associations and industry certifications (Cleland & Ireland, 2007). For instance, the Project Management Institute reported that its membership increased 31% from January 2008 through June 2009, and that the total number of PMP-certified professionals has grown to over 350,000 worldwide since the certification began in 1984 (PMI; 2009).

Social networks may explain the rise in popularity of the project management discipline. It is common for project managers of various industries or divisions to engage in social groups either within their own organizations or in local chapters (PMI, 2009). The use of these types of social networks help to develop common understanding of processes, techniques, and shared experiences. In addition, members of these social networks, sometimes known as communities of practice (CoP), can develop a strong camaraderie and an increased commitment to sharing knowledge (Delisle, 2004). The topic of this study is on a project management CoP formed by the employees of an organization and its influence on project management performance.

One rationale for examining CoPs and their potential benefits can be found in other studies. Smith (2008) studied organizations that leveraged their intellectual capital by supporting internal and informal CoPs. In that study, CoP members who were IT bank examiners played a key role in the creation, sharing, and use of intellectual capital and ensuring that repositories served community and organizational needs. Smith used

surveys, interviews, direct observations, and storytelling techniques to demonstrate causal relationships between CoP participants and perceived improvement in job performance. In general, the CoP sessions studied was viewed as an effective approach for employees to address unstructured problems, share knowledge, and build relationships among members.

Another rationale for examining CoPs and their potential benefits in project management is threefold: CoPs can benefit the organization, the project management community, and finally, the individual project manager. For the company, CoPs can help in quickly solving problems, diffusing organizational practices, and recruiting and retaining talented employees (Saint-Onge & Wallace, 2003). These benefits are significant because policy issues and delays in problem solving are examples of organizational factors that contribute to project failures (Kerzner, 2005a). For the community of project managers, CoPs allow experts across the company to share experiences and common practices (i.e., lessons learned). This is important because the tools and techniques used by project managers are most effective when the organization adopts a common language, and common processes and controls for managing projects (i.e., a methodology; Kerzner, 2005a). Lastly, individual members can benefit from mentoring, networking, and participating in any ongoing training to improve their skills and competencies (Saint-Onge & Wallace, 2003). Mentoring and training between CoP members may help to address some of commonly cited the results of poor project management skills, such as scope creep, inaccurate estimates, poor scheduling (Al-Ahmed et al., 2009; Dong & Chuah, 2004; Kerzner, 2004; Milosevic & Patanakul, 2005).

The diagram in Figure 1 details the benefits of CoPs that may ultimately improve the chances of project success. Conversely, a similar diagram outlining project failures is presented in Chapter 2.

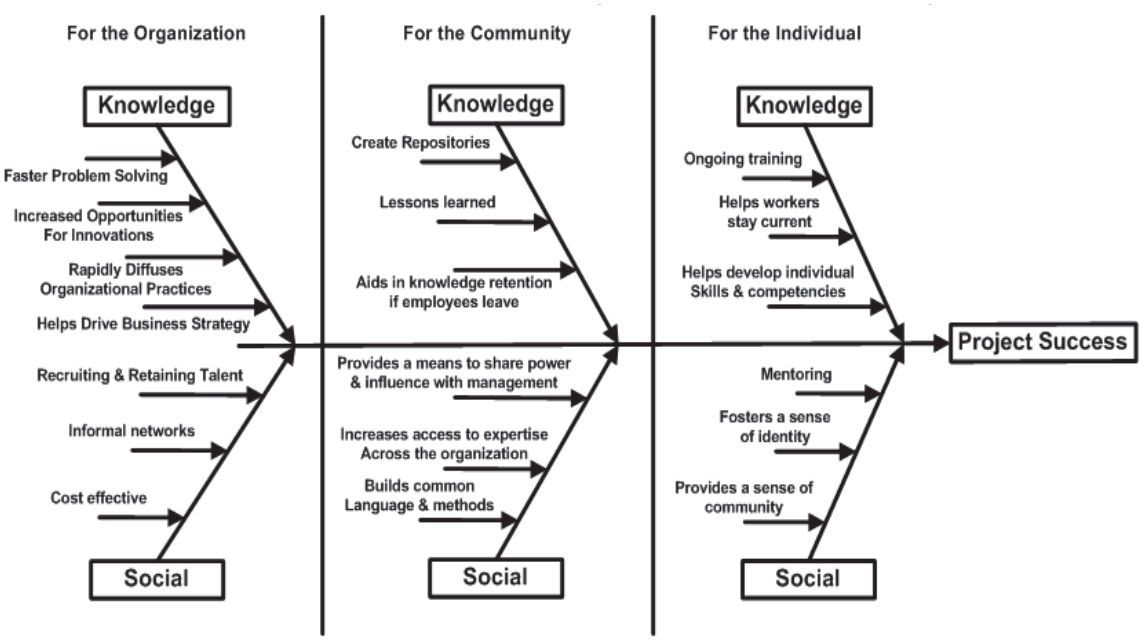


Figure 1. A cause-and-effect diagram of the potential benefits of CoPs and project success (Adapted from Saint-Onge & Wallace, 2003).

Adkins (2008) explored knowledge-sharing relationships within the New York State Project Management Community of Practice. This CoP consisted of project managers from over 65 state-governed agencies. The objective was to identify whether the association was a true CoP by definition and to provide a set of measurements for the community and its participants. By studying project managers from various agencies, Adkins was able to rectify a sampling limitation of Smith's (2008) study. Smith examined a community of just IT bank examiners and not project managers. However, a limitation of both Smith's and Adkin's studies was the small sample size (only 8 and 20,

respectively). For case studies, Creswell (2007) recommended using larger sample sizes in order to represent diverse perspectives. For these reasons, this study used a sample of 91project managers within a single, nongovernmental organization.

Statement of the Problem

Certified project managers may find it difficult to manage projects when their organizations have not adopted a project management methodology. Without a project management methodology, an organization can lack consistency and structure in how it manages projects. And yet, organizations that have adopted a methodology or created a project management office (PMO) often struggle to successfully complete projects on time, within budget, and at the appropriate quality (PMI, 2009). The Standish Group (2009), a U.S. research firm, found a decrease in project success rates in over 400 organizations. Of the 10,000 projects that were part of the survey, participants rated 32% of them as being successful, 24% as cancelled due to failure or lack of interest, and the remaining 44% completing late, over budget, or not meeting specification.

While recent economic conditions may be partly to blame for these project cancellations, they do not explain why the success rate was not much higher prior to the 2007 recession (PMI, 2009). Industry specific research from PMI identified frequently cited causes of project failures, such as scope creep, inadequate resources, poorly defined requirements, inaccurate estimates, poor risk management, and lack of other project management skills (PMI, 2009). These shortcomings can be the result of an organization's project management methodology or of an individual project manager. Yet another challenge may be how the organization documents and communicates its

methodology, best practices, techniques, and personal experiences to its project managers.

To address these challenges, some organizations are recognizing the benefits of improved learning and knowledge sharing through informal groups of professionals called communities of practice (CoPs). Wenger, McDermontt, and Snyder, (2002) described a CoP as a group of practitioners that interacts regularly with a shared concern, a set of problems, or passion for something they do and are committed to improving it through knowledge-sharing activities. Since then, much has been written about CoPs, largely in the areas of education and health care. Unfortunately, there is a significant gap in research on CoPs in project management. Therefore, the problem in this study is the limited understanding of whether a CoP influences members' project management performance. This mixed-methods, case study identifies and explores elements of CoPs that are useful to a project manager and can help resolve the problems of project management.

Nature of the Study

This research, which used a mixed-method, instrumental case study approach, allowed the researcher to select a case that would to support an issue or demonstrate a particular situation (Stake, 2005; Yin, 2009). This approach was preferred because there could be countless causal reasons for project success or failure within an organization and it would be difficult to quantify the knowledge-sharing aspect. In addition, it was important to capture the perceived value and benefits that the community members obtain from their CoP. While case study research has been criticized for lacking scientific rigor,

its strengths in applying a holistic viewpoint have been useful for business and technology subjects (Mohd-Noor, 2008). A holistic viewpoint is important to consider in project management because of the multiple factors interacting, such as project managers, project teams, customers, senior management, and the organization as a whole. Mohd-Noor (2008) added that the strength of the case study is that it allows a researcher to study a condition or series of events and provide a holistic view because of the multiple sources of evidence used. Another strength of a case study is the ability to capture the "emergent and immanent properties of life within organizations and the ebb and flow of organizational activity, especially where it is changing very fast" (Mohd-Noor, 2008, p. 1603). Moreover, as this was a mixed-method case study, this approach was a better fit for its the use of quantitative and qualitative instruments (i.e. triangulation), which strengthened the results.

Because the objective of this study was to determine whether there was a positive relationship between the independent variables (membership in a CoP, project manager experience, and tenure of employment) and the dependent variable (project management performance), a quantitative correlation study was also considered (Simon, 2006). I also used correlation analysis to measure the relationships between the independent variables and five project success factors described in the next section. A mixed-methods approach strengthened the results through triangulation. Chapter 3 provides a detailed description of the research methodology, the design, survey instrument (including the steps taken to ensure their reliability and validity), and the data collection and analysis procedures.

Research Questions and Hypotheses

The purpose of this study was to explore characteristics of CoPs and whether they influence project management performance. This study evaluated the factors that make CoPs valuable to organizations and their project success rates. Thus, the following primary research question was addressed: Do project management CoPs help organizations and individuals improve their project management performance?

In order to help address this question, the following secondary questions were asked:

1. Which project success/failure factors are most important for project management CoPs to address?
2. How do CoPs improve members' project management skills?
3. How do CoPs improve members' understanding of technical or complex issues?
4. In what ways do CoPs improve members' understanding of organizational processes or policies?
5. How do CoPs gain senior management support?
6. In what ways do CoPs improve members' human relationship (social networking and people management) skills?
7. What are members' perceived benefits for participating in a CoP?
8. What are the perceived benefits to the organization for supporting a CoP?

The secondary research questions stem from five factors commonly identified in project failures: project management skills, senior management commitment, complexity (technology) issues, organizational factors (e.g., process, policies, resources) and human

relationship factors (Ahmad et al., 2009). In Chapter 2 these five factors are examined in connection with CoPs. The assumption is that if project management communities can address some or all of these factors among their members, project management performance will improve.

In addition to identifying those factors that contribute to project success, in this study I wanted to determine whether a CoP conferred benefits, specifically, was there a correlation between CoP membership and perceived project management performance. New members may join in hopes of learning from their more experienced colleagues: and there are benefits for experienced project managers in remaining actively involved as well. Experienced project managers benefit from networking, recommending best practices, and obtaining credits for continued certification. Storm, Savelsbergh, and Kuipers (2010) studied the correlation between team performance and team learning and posited "good performance drives the desire to learn" (p. 2). In order to do so, the following hypotheses are presented:

$H1_0$: There is no relationship between project management performance and membership within a community of practice.

$H1_1$: There is a positive relationship between project management performance and membership within a community of practice.

$H2_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H2_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H3_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H3_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H4_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's tenure with the organization.

$H4_1$: There is a significant difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

Purpose of the Study

The purpose of this research was to determine whether internal project management CoPs improve project management performance. First, the root causes of project failures were identified. Then, CoP research in other professions was examined where the tasks or conditions are similar to those of project management (e.g., finance or project budgeting; human resources or project team building). The intent was to find studies that involved cases in which CoPs resolved problems or improved conditions in other firms. Ultimately, the similarities between those cases were examined and conclusions were drawn on how they could apply to resolving some causes of project failures.

Thus, the objective of this mixed-method case study was to examine a company undergoing multiple changes to its project management structure. The selected case was a mid-sized financial institution with both an organizational project management methodology and an active project management CoP. Additionally, this organization had undergone other changes, such as reorganizing business and technical areas, outsourcing, weathering an economic recession, rapidly advancing its project management office (PMO), and introducing several process improvement initiatives (e.g., ITIL, Agile, Lean, Six Sigma). By studying a company experiencing significant internal and external challenges, this may demonstrate whether its CoP helped improve factors other than project management.

In summation, the intent of this study was not just to address a lack of existing research on whether CoPs help to improve project performance. The study also sought to identify and explore elements of a CoP that provide value to a project manager and whether a CoP can contend with the problems of project management performance. The intent was not to show that CoPs are any better than alternatives, such as centers of excellence (CoE) or communities of interest (CoI). Rather, since each organization differs in size, industry, culture, maturity, and project management methodology, the intent was to show whether there are benefit of CoPs in mid- and large-sized companies, where project management experience varies significantly and the membership extends across multiple departments or locations.

Theoretical Framework

Two major theories are explained in this study. First, CoPs are introduced as a theory in knowledge management (Lave & Wenger, 1991). Originally identified in apprenticeship learning, the study of CoPs has spread into practical applications within government, education, business, health care, and other fields. CoPs add value to the organizations or industries that they serve, in the way they transfer knowledge among members or address challenges collectively. For example, engineers working on an automotive component (e.g., brakes, electronics) across various divisions (e.g., cars, trucks) form a CoP in order to exchange ideas, innovations, and experiences that may help the entire group. Wenger et al. (2002) listed some of benefits that CoPs offer organizations, such as: a forum for problem-solving, improved decision quality, more perspectives on problems, increased retention of talent, ability to foresee new technological advances, development of new strategic options, and coordination, standardization, and synergies across units. CoPs offer similar benefits for its members, including help with challenges, access to expertise, a sense of belonging, a sense of professional identity, increased marketability, and a forum for expanding skills and networking (Wenger et al., 2002).

The second major theory explained in this study is Rogers' (2003) diffusion of innovation theory, which serves as a background for examining project management CoPs. While CoP theory examines groups of practitioners and their knowledge-sharing process, similarly diffusion of innovation theory seeks to explain how, why, and how quickly ideas, practices, and technologies are adopted within certain social settings.

Diffusion theory addresses the attributes of innovations that make them more likely to be adopted. The diffusion of innovations and CoP theories complement each other since they generally relate to the manner that knowledge sharing and influence can occur within an organization.

The terms *knowledge* and *innovation* are similar in nature. Knowledge is a skill or familiarity with something learned through education, experience, or an association with others ("Knowledge", Merriam-Webster's Collegiate Dictionary, 2010). Rogers (2003) defined innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 475). Essentially, knowledge is what has already come to be known and used, while innovation is something newly learned or adopted. Therefore, the diffusion of innovation theory should explain as to why and how new ideas and practices are shared and adopted among CoP members.

I am interested in expanding the body of knowledge on CoP theory into the field of project management. Therefore, the CoP theory and diffusion of innovation theory are meant to serve as the conceptual framework for the assumptions and research questions of this study. My intent is not to prove or disprove these theories; instead, the goal is to observe relationships or associations in this case study research and determine what these theories may suggest.

Using the case study methodology in both a qualitative and quantitative capacity, this research examines the influence of CoPs on the individual project manager's performance. In addition, literature on the CoPs as a knowledge management approach in various other professions is used (Lave & Wenger, 1991; Wenger, 1998, 2004; Wenger &

Snyder, 1999). This key literature is used to compare and contrast findings from the target case study. This dissertation also draws upon other organizational, systems, management, and project management perspectives from researchers, such as Schein (2004), Rogers (2003), and Kerzner (2003).

Definition of Terms

Community of Practice (CoP): a group of practitioners that interacts regularly with a shared concern, a set of problems, or passion for something that they do and are committed to improving through knowledge sharing activities (Wenger et al., 2002).

Diffusion: Rogers (2003) defined it as "the process in which an innovation is communicated through certain channels over time among the members of a social system" (p. 5).

Diffusion of innovations: a theory designed to explain how, why, and at what rate ideas, practices, and technologies are adopted within certain social settings (Rogers, 2003). The theory addresses three main areas: the types of innovation decisions, the various stages of the adoption process, and the characteristics of innovations.

Innovation: Rogers (2003) defined innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 475).

Knowledge: has several definitions. According to Merriam-Webster (2010), knowledge is a skill, expertise, or familiarity of something usually obtained through education or experience. Knowledge also refers to the collective facts and information known about a particular field or topic.

Project management: "the application of knowledge, skills, tools and techniques to project activities to meet the project requirements" (PMI, 2008, p. 442). Project management also refers to the profession.

Project Management Body of Knowledge (*PMBOK guide*): the foundational reference guide for defining and understanding project management, its processes, concepts, and best practices for influencing project success (Project Management Institute (PMI), 2008).

Project Management Institute (PMI): the world's largest non-profit association for the project management profession. It provides the industry with standards that describe good practices, credentials that verify knowledge and experience, and resources for professional development, networking and community (PMI, 2008).

Project Management Methodology: the set of guidelines, principles, or rules for how projects will be managed. In other similar contexts, it refers to a set of processes and procedures for managing and prioritizing projects established by an organization or part of its governing body.

Project Management Office (PMO): "An organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of a project." (PMI, 2008, p. 443).

Assumptions

The focus of this research was to determine whether internal project management CoPs improve project management performance. With that in mind, there were two main assumptions for this study. The first assumption is that the findings would provide useful and valid results because the targeted case study organization was selected based on its CoP maturity level, population, diversity of experience, and importance to the organization's strategic goals. The second assumption is that the participants understood the survey and answered it truthfully and accurately.

Scope and Delimitations

The scope of this study was limited to 150 members of a CoP within an organization. There were 91 members from this group that participated. Participation in the current study was voluntary. The participant selection for this study was confined to current active members in the organization's project management CoP.

A strictly quantitative approach could be used to study the members' perceived value of the community. However, surveying only the CoP members could introduce a level of personal bias. Therefore, in addition to surveys, this study relied on direct interviews with key CoP leaders, senior managers, and other internal stakeholders. By doing so, triangulation was achieved through qualitative analysis of participants' perceptions, opinions, and experience as well as quantitative analysis of their survey results. Participants were categorized accordingly.

Conversely, this study could have been confined to a primarily qualitative approach. However, as with most qualitative studies, researcher bias is a concern. It

would be of particular concern in this case because the researcher is a participating member of the project management CoP for the target organization. Being a participant-observer, I had access to the CoP's knowledge repositories, membership lists, and participation in various forums with CoP members, managers, and senior executives. In order to minimize the potential for researcher bias, it was crucial that I understood and remained committed to the role of researcher and knew when to step out of the role of community member. More importantly, I used a triangulation strategy for mitigating systematic bias by using multiple sources of data. First, survey responses from the participants underwent a quantitative analysis. Second, survey responses to open-ended questions and separate interviews with non-members went through a qualitative analysis (coding for common themes). Also, a review of relevant company documents (project scorecards) served to add validity to the findings of this study as to whether project success rates improved within the target organization. Other efforts to reduce biases are covered in Chapter 3.

Another delimitation served to confine this case study. The three commonly noted project constraints (i.e., time, cost, and scope) as well as the nine knowledge areas in the PMBOK guide are treated as fundamental principles of project management. To focus on each component would be akin to studying a classroom of math students and analyzing results based on their individual addition, subtraction, multiplication, and division scores as opposed to their mathematic skills in general. Thus, the objective of this study was not to determine a correlation between a CoP and the members' performance on each constraint or success factor. Instead, I focused on exploring the characteristics of CoPs as

to whether they influenced project management skill sets, methodologies, and performance in general. Lastly, the study will not differentiate between types of projects, like information technology, business, or construction, which could affect individual opinions about the effectiveness of CoPs.

Limitations

There were several limitations in this study. First, as is the case with any organization, there are rapidly changing events (e.g., formation and disbandment of groups, reorganization, or new policies) that could affect the original intent of the research. In the event that this occurred, the survey and interview instruments would be modified so that participants respond based only on the period of time that the CoP was in existence or that they were an active member. Second, the survey instrument for this study is a self-assessment of the respondents' performance and not a true measure of actual performance. For this reason, it was important to get senior management's assessment and the company's project scorecards to compare the assessments and results. Another limitation was the examination of responses based upon the length or levels of project management experience of the participants as opposed to personal characteristics, such as gender and age.

Significance

Expanding the body of knowledge for project management and CoPs is valuable for (a) academic and practitioner purposes and (b) the implications for positive social change. Improved project management processes and decision-making can save organizations millions of dollars in costs and time, as well as identify better opportunity

costs. If evidence from this study shows that CoPs increase learning and adoption of successful project management practices, then organizations may be willing to invest more resources in establishing their own CoPs. This is not to say that a lack of CoPs is detrimental to project management performance, but that the lack of measures of their effectiveness may be due to the lack of investment in them. Additionally, if certain CoP activities are demonstrated as more effective for knowledge transfer, then these may be recommended as best practices for project management processes. The results of this study may suggest ways to improve the operational effectiveness and financial strength of an organization.

The current economic recession (starting in December 2007 and continuing into June 2009) offers a timely opportunity to study whether CoPs benefited organizations through improved project management and operational processes. If evidence shows that the knowledge-sharing activities of CoPs increased during periods of organizational change, then these firms may wish to support them and encourage participation in them. Again, this would be valuable for future organizational decision-making.

Summary

This chapter introduced the problem of decreasing project success rates that many organizations are experiencing with project management. This problem may be due to the maturity level of the project management methodology within that organization. Improving project management practices and success rates remain a goal for many firms. Organizations in the early stages of instituting a project management methodology may encounter challenges in documenting or communicating their processes, techniques, and

personal experiences among employees. To address this problem, the purpose of this study is to determine whether internal project management CoPs help to improve (a) project management performance and (b) selected project success factors. If evidence can be shown that CoPs increase learning and adoption of successful project management practices through knowledge-sharing activities, organizations may be willing to invest more resources on establishing their own communities. For that reason, I sought to answer the question: How do project management communities of practice help organizations and individuals improve their project management performance?

Chapter 2 examines the literature on communities of practice theory and project management as well as diffusion of innovations theory to determine if there are any interdisciplinary commonalities that support project management knowledge sharing methods. More importantly, the goal of this chapter is to demonstrate how past literature relates to addressing the research questions of this study. Lastly, Chapter 2 examines the literature related to the research methodology for this study.

Chapter 3 presents a mixed-methods, case study approach to examine the target organization and its project management CoP. Chapter 4 presents the results of the data collected for this study and an analysis of the findings. Finally, Chapter 5 presents a summary of the study, interpretations and conclusions, and recommendations.

Chapter 2: Literature Review

Introduction

As stated earlier, the purpose of this mixed-methods case study was to determine whether internal project management CoPs were influential in improving project management performance in a midsized financial institution.

This chapter, the literature review, of the three major concepts presented in this study: project management, CoPs, and the diffusion of innovations theory. An overview of project management concepts is presented in order to explain the environment of the professionals being studied and to establish a set of project failure criteria. Next, the community of practice theory is examined for its contribution to knowledge management and organizational learning. Lastly, the diffusion of innovations theory is examined to help explain the adoption of practices within social groups. Diffusion theory serves as an appropriate framework behind this study. The reason being is that while CoP theory deals with how, why, and for what purpose CoPs are formed, diffusion theory can address how and why innovations are adopted or rejected within those groups. At present, the amount of CoP and diffusion of innovation literature specific to project management remains limited.

The peer-reviewed articles and dissertations in this literature review were identified using the following academic and industry databases: EBSCO, ProQuest, ABI/INFORM Global, Academic Search Premier, Business Source Premier, Gartner, and PMI. Searches on keywords included “communities of practice”, “diffusion of innovation”, and “project management.” The purpose was to obtain relevant works on the

selected topics, present readers with a history of previous work, and identify gaps in that research.

Project Management Concepts

Project management in its basic form (i.e., planning, organizing, directing, and controlling) has been around for centuries (Cleland & Ireland, 2007). But it was not until the 1950s when formal project management practices, such as Project Evaluation and Review Technique (PERT) and Critical Path Method (CPM), began to emerge (Stackpole & Parth, 2007; Verzuh, 2003). The origins of these traditional project management methods grew out of the increasingly complex projects within the defense, aeronautical, and construction industries. By the 1970s and 1980s, project management techniques had progressed: they now included various cost and schedule controls, work breakdown schedules (WBSs), project life cycles, and performance management scoring tools (Pinto et al., 2003). Project management was adopted by other corporate sectors, in part, due to changing economic conditions and the growing need for companies to get products to the marketplace quicker and cheaper (Kerzner, 2004). By the 1990s, the trend in project management research moved toward issues such as leadership development, team building, and motivation (Pinto et al., 2003).

Today, organizations face increasing challenges, such as changes in market conditions, globalization, technology advancements, social influences, and increased regulatory requirements (Cleland & Ireland, 2007). The ability to respond and adapt quickly remains critical to avoid succumbing to competitors. For that reason, many organizations recognize the importance of effectively implementing projects that respond

to these challenges. As such, the use of project management methodologies by many organizations has become widely accepted (Papa, 2009).

The *Project Management Body of Knowledge* (4th ed., 2008) remains the foundational reference for defining and understanding project management, its processes, concepts, and best practices for influencing project success (Project Management Institute [PMI], 2008). The Project Management Body of Knowledge (PMBOK) guide defines project management as "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (PMI, 2008, p.6). By applying these tools and techniques, this can help project managers become more effective in coordinating the multiple activities by their teams and ensuring that the delivered product meets the stakeholder's expectations.

While project management refers to the process of planning and coordinating activities to meet the project's goals, two other important concepts -- program and project portfolio management -- help organizations to meet enterprise objectives. PMI (2008) defined a program as "a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually" (p. 9). Grouping projects together can offer economic benefits due to efficiencies from various aspects, such as staffing, managing, and purchasing project related work (Schwalbe, 2010). Similarly, a project portfolio refers to "a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives" (PMI, 2008, p.8). For example, a program might consist of a large organization upgrading all of its employee's workstations, across multiple

divisions, to a new operating system version. Projects under this program may include design of a phased approach, application testing, procurement of resources, and implementation by location.

Project portfolios are strategic and typically have multiple projects that are related in nature, such as a line of business (e.g., retail, online, and commercial sales), information technology, or legal requirements. The projects and programs are managed within a portfolio as a group of investments designed to align projects with the firm's organizational goals (Cleland & Ireland, 2007). Project management is meant to meet tactical short-term goals, whereas program and portfolio management focuses on meeting strategic long-term goals (Schwalbe, 2010).

Kerzner (2005) considered project management to be a system of processes meant to achieve project objectives through the expertise of resources within an organization. The role of the project manager is to develop plans, coordinate tasks, allocate resources, monitor progress, communicate statuses, facilitate alternatives, and motivate team members in an effort to achieve the project objectives. The tools and techniques used by the project manager are most effective when the organization strategically adopts a project management methodology (Kerzner, 2005a). This is because project management methodologies help establish a common language, and common processes and controls for managing projects within the organization. Although, the adoption of a project management methodology is not a guarantee for project success.

Project Constraints

Projects may be constrained in numerous ways. The three most noted project limitations of scope, time, and cost are commonly known as the *triple constraint* (Schwalbe, 2010). This is also referred as a project management triangle since a change in one of these competing factors affects the others. Project managers must often balance these constraints in part to ensure project success. The project scope refers to the work that needs to be performed as part of the project. The project constraints of time and cost relate to how long it should take to complete the project and how much will it cost. While scope, time, and cost are the commonly noted project constraints, PMI (2008) added that competing constraints also include, but are not limited to, quality and risk factors. If a project manager considers the triple constraints as the only indicators of project success, then they could be ignoring the expectations of the project stakeholders and team. The project manager should work with the project sponsor to identify what are the constraints and to communicate throughout the project to ensure that expectations are being met (Schwalbe).

The Project Management Body of Knowledge (2008) guide addressed managing scope, time, cost, and other constraints through various methods and techniques detailed in nine knowledge areas. The nine knowledge areas are scope management, time management, cost management, quality management, risk management, human resource management, communications management, integration management, and procurement management (PMI, 2008). Examples of tools and techniques within the scope management section presented in the PMBOK guide include scope statements, work

breakdown structures, statements of work, requirements analyses, scope management plans, scope verification techniques, and scope change controls. In order to address time constraints, the PMBOK also presented time management tools, such as Gantt charts, project network diagrams, critical-path analyses, and schedule compression methods (e.g., crashing and fast tracking). Lastly, the cost management section covers the use of earned value management, cost estimating, forecasting, activity cost estimating, reserve analysis, and cost or schedule variance measurements (PMI, 2008). Regardless of the numerous tools and techniques provided, there remains no guarantee that using them will result in a project's success.

Project Success Factors

In order to determine any correlation between CoPs and project success, it is important to first define project success. Project success is commonly measured by whether the project met the cost, schedule, and objectives as planned (Cleland & Ireland, 2007). Nevertheless, achieving the desired results for these three factors does not define whether a project was successful or not (Cleland & Ireland, 2007; Srivannaboon & Milosevic, 2004). Instead, those involved define the success or failure of a project subjectively. For instance, projects that run over budget or past schedule still may be viewed as successful by management if the overall benefits of the project were realized. On the contrary, a project for a new system may have successfully met the three factors, but could be considered a project failure by the clients that fail to adopt it. Equally, a project team member may consider the project successful from the perspective of the technical integration or valuable learning experience achieved. In summary, project

success can be defined as the degree of satisfaction in a project outcome and the manner or process in which it was achieved (Cooke-Davies, 2004; Storm et al., 2010).

Project failure can be equally as difficult to define as project success. Kerzner (2005a) loosely defined failure as "when the final results are not what were expected, even though the original expectations may or may not have been reasonable" (p. 157) or as "unmet expectations" (p. 157). Unmet expectations are the result of planning failures.

The causes for project failures are numerous. Quantitative factors behind project failure can be attributed to ineffective planning and scheduling, erroneous estimating, and inadequate cost controls (Kerzner, 2005a). In addition, projects have increased in complexity not only from a technical and global management perspective, but also in the human relationship factors and organizational environment. Accordingly, qualitative factors behind project failure can be attributed to poor morale or human relations, ineffective leadership (Thamhain, 2004; Turner & Muller, 2005), lack of commitment (by employees or functional areas), conflicting priorities, policy issues, or delays in problem solving (Kerzner, 2005a). These reactions are important because they suggest that social skills and organizational environment play key elements to project success and failure.

The failure of a project is a blend of subjective and demanding conditions. Furthermore, many of the reasons given for project failure overlap with one another. Studies have provided over 50 different reasons for project failure (Al-Ahmad et al., 2009). Those are the most common reasons reported in the literature (e.g., Al-Ahmed et al., 2009; Black, 1996; Dong & Chuah, 2004; Kerzner, 2004; and Milosevic & Patanakul, 2005). The reasons for project failure include:

1. Poorly defined requirements (e.g., scope creep, lack of change management)
2. Poorly defined deliverables
3. Poor communications
4. Inadequate resources
5. Inaccurate estimates (poor planning, over optimism)
6. Lack of project management (poor planning or scheduling) skills
7. Poor relationship management (human relationship skills)
8. Lack of senior management support (or ineffective leadership)
9. Lack of stakeholder (or user) involvement or commitment
10. Lack of risk management (poor contingency planning)
11. Unrealistic expectations or unclear goals

IT projects can offer additional causes for failure of their own. Common reasons for failure have included hidden complexities or over-ambitious projects, lack of understanding of new technologies, difficulty in overcoming existing processes, and a lack of lessons learned (Al-Ahmad et al., 2009). Al-Ahmad et al. grouped all of these commonly identified root causes into six categories: project management, senior management, technology, organizational, complexity, and process factors. Each of these could be further divided into subcategories which will likely have commonalities that extend into one or more of the other categories. Nonetheless, the categories identified by Al-Ahmad et al. were meant primarily for IT projects. Therefore, I took a similar approach and grouped the majority of causes into the following root cause categories:

project management (skills) factors, senior management factors, complexity (technology) factors, organizational factors (e.g., process, resources), and human relationship factors. Subsequently, since CoP literature is limited on project management, this study examines CoP literature from other professions to determine if parallels can be drawn.

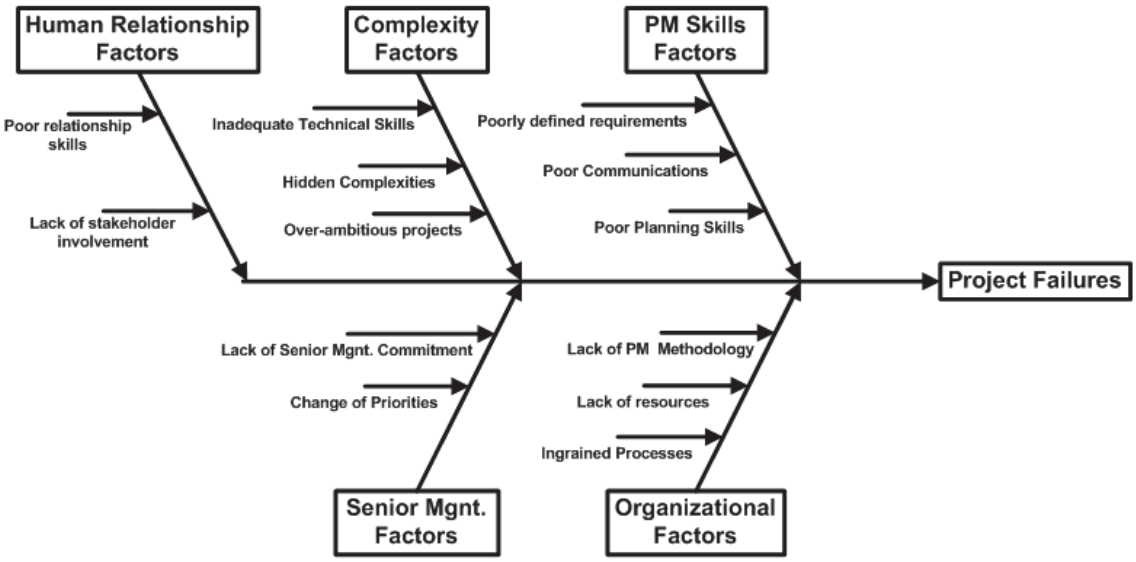


Figure 2. Cause and effect diagram of project failures.

Project Management Skills and Competencies

Effectively managing projects requires a certain set of skills and competencies. There are six categories of competencies frequently mentioned: planning, budgeting, resourcing, scheduling, monitoring, and controlling (Kloppenborg et al., 2003). Although, most project management skills and competencies can fall into one of three areas: technical knowledge, personal attributes, and business / leadership skills. Technical knowledge, in this case, refers to the project manager's understanding of the technology involved in the project as well as the nine project management knowledge areas detailed

in the PMBOK (2008). Personal attributes involves the manager's ability to effectively work with and influence others through their own attitudes, personality, or behaviors (Cleland & Ireland, 2007; PMI, 2008). Lastly, the business and leadership capabilities involve having the business acumen, organizational savvy, and the enterprise-wide view to understand problems, evaluate alternatives, make decisions (Cleland & Ireland, 2007), and guide the project through the river of process.

Project management skills are commonly categorized as "hard" or "soft." *Hard skills* refer to the specific techniques and practices that can easily be taught. Examples of hard skills might include project plans, work breakdown structures, and earned value calculations. Conversely, *soft skills* such as leadership, teamwork, and communication are tacit in nature and not as easily taught. The PMBOK guide also identified empathy, influence, creativity, and group facilitation as valuable project management soft skills (PMI, 2008). Many researchers agree that soft skills play more of an important role in project success (Alam et al., 2010; Hebert, 2002; Muzio et al., 2007). The reason being that projects are mainly about managing people toward a particular goal and as a result, the use of relationship and human skills are more critical (Alam et al., 2010). For example, project managers must motivate and influence project team members, communicate effectively to senior managers and stakeholders, and occasionally negotiate resources. Belzer (2001) posited that project management is still more of an art than a science also identified communication, organizational effectiveness, leadership, problem solving, teambuilding, flexibility, creativity and trustworthiness as key soft skills necessary for managing projects successfully.

Project Management Methodologies

While project management is a shared competency for applying the tools and techniques (i.e., planning, organizing, and managing activities and resources) for meeting project objectives, a project management methodology is typically a set of guidelines, principles, or rules for how projects will be managed (Kerzner, 2005). Project management methodology can also refer to a set of guidelines, processes, and procedures for managing and prioritizing projects established by an organization or part of its governing body. Also, an organization can use multiple methodologies simultaneously. For instance, there may be a methodology for information system projects and another for new product development. Other examples of integrated methodologies may include change, risk, and quality management methodologies. Still other examples include Waterfall, Agile, and Rational Unified Process (RUP), which are common methodologies for software development projects known for their iterative processes (Huijbers et al., 2004). Other methodologies, such as Six Sigma focus on techniques for identifying and reducing defects to achieve quality improvement.

Another example of a project management methodology is critical chain project management (a.k.a. theory of constraints [TOC]), which focuses on recognizing project constraints and the use of resource management to address these constraints (Goldratt, 1997; Newbold, 1998). The set of individual tasks necessary to completing a project and determining its overall duration, (i.e., the constraint) is called a critical chain (Newbold, 1998). Goldratt (1997) and Newbold (1998) strongly advocated the critical chain project management (CCPM) approach, which involves analyzing resource contention and the

use of buffer management. By following the CCPM techniques, it is believed that project durations can be reduced significantly. However, other researchers contend that the concepts presented in CCPM are not original, but instead are presented in new way (Raz et al., 2003). Other criticisms of CCPM include that it can be oversimplified in theory and literature, making it much more difficult to apply in complex and resource-constrained project environments (Herroelen et al., 2002). Raz et al. (2003) also contended that CCPM is based on the assumption that uncertainty in activity duration is the major factor for increased project duration. Instead, they believed that personal skills and leadership capabilities play much more of factor as project managers must know how to gather customer requirements, plan for future needs, and engage resources from various departments (Raz et al.).

Kerzner (2005a) noted that when companies reach a level of commitment for using project management across their entire organization, it becomes critical to centralize its project management knowledge. The centralization of the project management knowledge usually takes the form of a project office (PO) or project management office (PMO). The PO/PMO is responsible for strategic planning, continuous improvement, mentoring, benchmarking processes, establishing shared standards and practices, and creating a repository for lessons learned and other project management tools (Kerzner). Kerzner established a project management maturity model for benchmarking and building a desired strategic plan for organizational project management. It takes time for organizations to develop mature project management methodologies and established project management offices. The reason for long

maturation processes is that common languages, common processes, and continuous improvement must usually occur. While Kerzner believed that PMOs and centers of excellence can help in the project management maturity model, his work failed to consider whether project management CoPs offer similar advantages to improving an organization's project management maturity level. The current study should illustrate whether the social interaction, communication, and shared interests and experiences within a CoP influences an organization's project management methodology.

Project management has been around in various forms for centuries (Cleland & Ireland, 2007). Yet, only in the past few decades has it evolved into a professional discipline and strategic management methodology. As a result, project management has grown and matured through the emergence of professional associations (i.e., groups of people that share common professions, backgrounds, or accreditations). The PMI and its numerous local chapters is an example of such a professional association that collectively and continuously promotes the use of project management methodology. It may also be in these social environments that relationships foster improved knowledge sharing to help achieve project success. For these reasons, CoP theory makes for a good fit for studying the project management profession.

Communities of Practice Theory

For more than a decade, knowledge management has become an emerging discipline for researchers and practitioners. Organizations are turning to knowledge management in order to seek new and improved methods of transferring knowledge more effectively among their employees. The objective of knowledge management is to create

value to the organization by means of capturing, storing, organizing, and sharing internal company knowledge and intellectual capital (Hemmasi & Csanda, 2009). While each of these components are important, it is the ability to facilitate knowledge sharing (i.e., organizational learning) that may be most essential.

One of the more widely recognized concepts in knowledge management literature is the information hierarchy, also known as the knowledge hierarchy (Rowley, 2007). Frequently credited for its creation, Ackoff (1989) presented the hierarchical levels as data, information, knowledge, understanding, and wisdom. Since then, other authors dispute whether knowledge and understanding deserve separate distinctions (Rowley). Therefore, data, information, knowledge and wisdom (DIKW) are commonly the levels used when describing the hierarchy. Data are observable elements, products, or properties within an environment (Ackoff, 1989). In raw form, data has little value. It is only when data has been analyzed or processed that it becomes functional information. Information is a description that offers the answers to questions that begin with who, what, where, when and why. Ackoff (1989) defined knowledge as know-how and that it allows for "the transformation of information into instructions" (p. 4). Moreover, knowledge can be learned from another who has it or through their own personal experience. Lastly, wisdom is the benefit that stems from judgment and evaluated understanding. According to Ackoff (1989), understanding increases efficiency, whereas wisdom increases effectiveness. Ultimately, project managers need wisdom to make good decisions and this study analyzes CoPs as one method of knowledge development within an organization.

Knowledge management is different from information management. Knowledge is more than just a body of information, but can include facts, opinions, practices, ideas, or subjects. In addition, knowledge refers to an individual's level of understanding of that body of information. Although, the act of knowing something is not limited to an individual experience rather, it includes the contributing and exchanging of knowledge (i.e., experiences). This exchange can occur through established processes, social interactions, knowledge depositories, and other technology. As a result, knowledge must be managed differently than other more traditional organizational assets (Wenger, 2004). The community of practice (CoP) model is the most commonly practiced method for knowledge management and organizational learning (Wenger et al., 2002; Hemmasi & Csanda, 2009).

Definition and Maturation of Communities of Practice

A CoP is a group of practitioners that interacts regularly with a shared concern, a set of problems, or passion for something that they do and are committed to improving through knowledge sharing activities (Lave & Wenger, 1991; Wenger et al., 2002; Wenger & Snyder, 1999). CoPs can include groups of engineers, teachers, nurses, insurance agents, project managers, or just about any other set of professionals united together by a shared expertise. Moreover, CoPs exist in many sectors such as corporations, governments, educational institutes, as well as numerous other organizations and associations (Seaman, 2008).

Wenger et al. (2002) identified three fundamental elements of a CoP: the domain, community, and practice. Similarly, Tiwana and Bush (2001) identified community,

practice, meaning, and identity as the characteristics of knowledge sharing communities. All of these evolved from Wenger's (1998) earlier work that introduced the three dimensions as mutual engagement, shared repertoire, and the negotiation of a joint enterprise. The domain is the common ground or area of knowledge that the group shares. This element inspires or gives the group its identity. The domain is the purpose or mission that the group uses to guide their learning or actions. The community element refers to the people within the group and the social interactions and relationships that are fostered. These interactions can take place in person or in a virtual environment. The stronger these relationships are, the more willingness to share opinions, ideas, war stories, and experiences. Lastly, the practice is the body of knowledge that includes methods, ideas, tools, cases, documents, technology, and experiences shared and development by the community (Wenger et al., 2002, Wenger, 2004). Figure 3 illustrates these elements of a CoP and questions that can help guide the community's development.

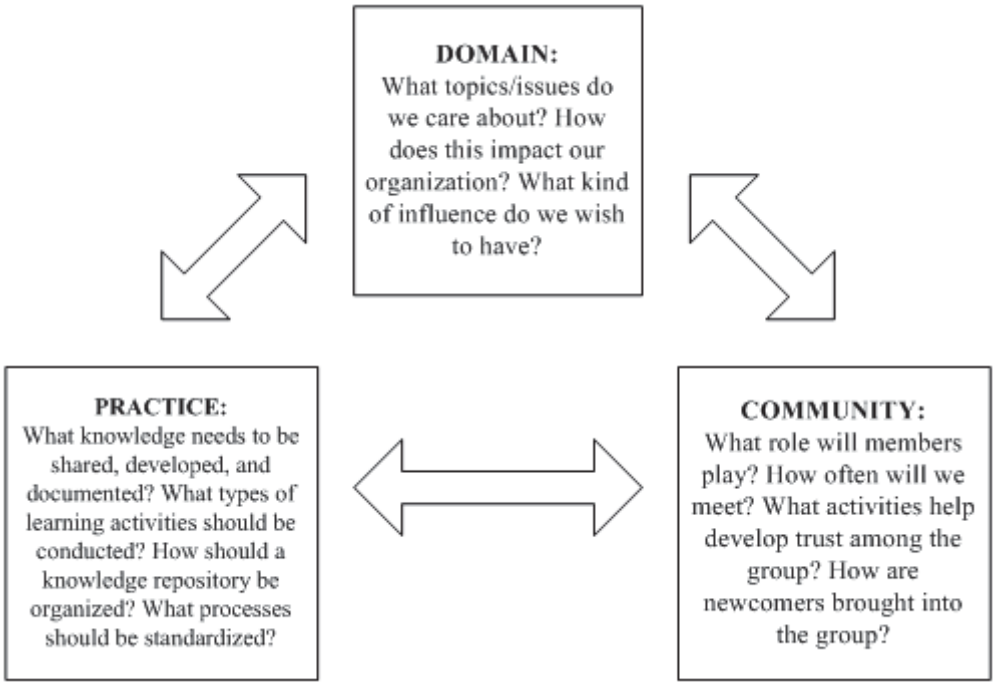


Figure 3. Three elements of a community of practice. From *Cultivating communities of practice* (p. 45) by Wenger et al., 2002, Boston, MA: Harvard Business School Press. Adapted with permission of the publisher.

As communities develop, they may follow several stages of maturity. Wenger (1998b) identified these stages as potential, coalescing, active, dispersed, and memorable (see Figure 4). The active, dispersed, and memorable stages are also referred to as maturing, stewardship, and transformation respectively (Wenger et al., 2002). Wenger et al. referred to the *potential* stage as an embryonic period when people within a network begin to come together for a shared interest. Next, during the *coalescing* stage, relationships have formed and regular meetings or events are being held. In addition, members are starting to better establish its community as well as identify its value and objectives (i.e., practice). At the *active* (maturation) stage, the community has defined its role, but also seeks to manage or expand on its boundaries. It is also during the active stage where gaps in knowledge and methods for knowledge capturing are identified. The

focus of the CoP in the dispersed (stewardship) stage is to maintain the energy, interest, and relevant intellectual discussions. At this stage of maturity, it may become necessary to rejuvenate the community through recruitment or new leadership. Lastly, the memorable (transformation) stage is the natural ending for the community. The dissolution of the group can be the result from the lack of interest, lack of new members, or from changes in the market or the organizational structure. But, the end of a community may not necessary be a bad thing. CoPs can fade out due to improvements in technology or because their knowledge has become institutionalized (Wenger et al., 2002).

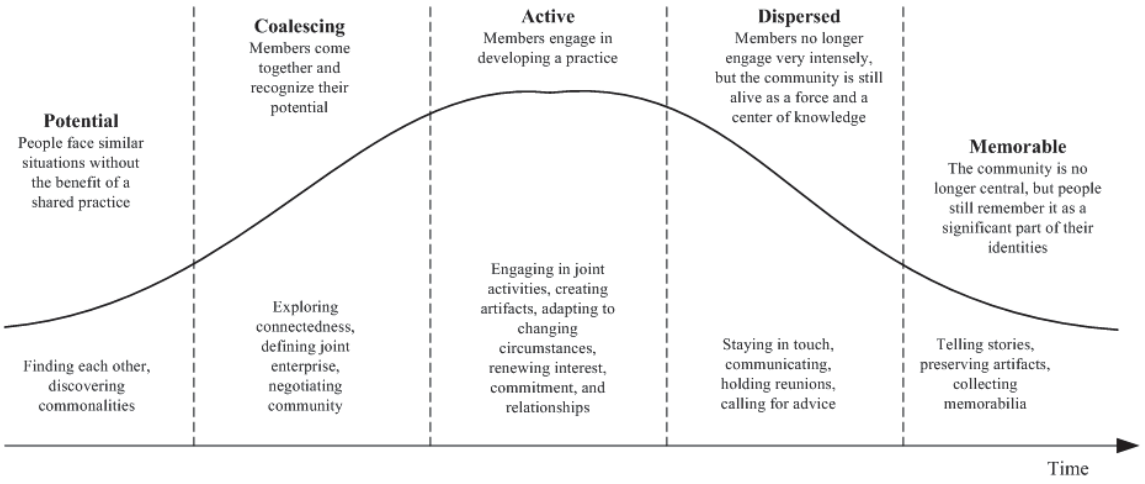


Figure 4. Stages of development for communities of practice. From *Communities of practice: Learning as a social system.* (p. 3) by Wenger, 1998b. Adapted with permission of the publisher.

While not all CoPs follow these same stages, many of those studied have. Wenger et al. (2002) also recommended that these groups be formed voluntarily and informally in order to be successful. Although, other researchers have shown that some intentionally formed CoPs have succeeded (Perry & Zender, 2004).

According to Wenger (1998), CoPs are not inherently beneficial or detrimental. While their influence can be significant, just its mere formation does not guarantee that the community will be harmonious and collaborative. CoPs create relationships through social interaction, they promote learning and knowledge sharing, advance improvements in their practices, and can create a unique identity. Communities can serve as the source of creative achievements or the cause of resistance or constraint (Wenger, 1998).

CoPs are not without limitations or challenges. For instance, Roberts (2006) noted that typically in decentralized organizations, the range of members becomes more diverse. In more centralized or hierarchical organizations, members may be more influenced by key authority figures and therefore hinder openness and sharing of ideas and opinions. Kerno (2008) added that due to their durability and ubiquity, organizational hierarchies could impede community efforts or promote the status quo. Furthermore, Kerno (2008) identified time constraints and increased organizational efficiencies as challenges against CoPs. Apparently, the belief is that as organizations become faster paced due to competitive pressures, complexities, and regulations that the amount of time needed for communities to engage and sustain will diminish. Finally, amicable and trusting organizational environments play a strong part of the success of CoPs (Roberts, 2006). Organizations characterized by mistrust, strong hierarchical control, and adversarial relationships may fail to adopt effective CoPs. Even though these limitations and challenges exist, Roberts (2006) and Kerno (2008) still recommended CoPs as an effective means of knowledge management.

Review of the CoP Literature

Numerous researchers have analyzed CoPs. Davenport and Hall (2002) provided an exhaustive review of CoP literature. Since then, CoPs have also been examined for their effectiveness in project management learning at NASA (Chindgren & Hoffman, 2006), improving communicative processes (Iverson & McPhee, 2008), supporting learning needs in virtual environments (Booth et al., 2003; Richardson & Cooper, 2003) and knowledge sharing across decentralized organizations (Hemmasi & Csanda, 2009). CoPs continue to be examined in various professions, such as insurance agents (Hemmasi & Csanda), the American Health Information Management Association (AHIMA: Perry & Zender, 2004), data management division at IBM (Fisher & Bennion, 2005), IT bank examiners (Smith, 2008), elementary school educators (Rowland, 2008) and state governmental project managers (Adkins, 2008).

A search of the ProQuest database for dissertations with the keyword *communities of practice* provided a list of over 300 results. By narrowing this search to include *project management* in the citation or abstract, this yielded only two results. One of those results was Smith's (2008) study on the influence of CoPs as it relates to knowledge management among a group of IT bank examiners. This study consisted of a small sample of eight participants where project management was just one of several IT related roles examined. The second study found was Adkins' (2008) dissertation on the New York State Project Management Community of Practice. This study took a social network analysis approach to examine a CoP that extends across multiple government agencies. While project management was the practice used in Adkins' study, the focus was more

on identifying whether the group was truly a CoP and measuring the participation and roles that members played.

In addition to the dissertation search, another search for peer-reviewed journal articles was conducted using EBSCO, ebrary, ERIC, Gale, Ovid, ProQuest, and Sage. By searching on the keywords "communities of practice", a much large volume of articles on CoPs was produced. The results were an overwhelming majority of the articles related to the health care industry and very few directly related to project management. As a result, this meant expanding into similar searches on keywords such as "knowledge management" and "centers of excellences" or going to sources like Gartner and PMI for industry articles about CoPs and project management.

For instance, Delisle (2004) provided an industry research article on project management CoPs within the Canadian federal government. At the heart of the study was the use of CoPs to address key issues, such as crisis management, employee turnover, unexploited economies of scale, and the inability to meet service quality demands. The study provides an awareness of the project management CoP used in the Canadian government and the benefits and challenges associated with it. Although the study relied heavily on work by other researchers and therefore, it lacked any in-depth data gathered from participants, co-workers, or other internal resources.

Chindgren and Hoffman (2006) examined two key themes from CoP theory, the link between knowledge and activity and the importance of relationships. Next, the authors demonstrated how these themes have been applied to practices at NASA. The article is significantly insightful for its examples of Transfer Wisdom Workshops and

accelerated strategies to enhance learning when NASA reduced 52% of its supervisory positions from 1993 through 2000 (Chindgren & Hoffman). Similar to the Delisle (2004) study, both identified increasingly complex projects and reduced workforces as challenges within organizations. Even so, neither study presented anything more than anecdotal evidence that CoPs are the resolution to these problems. I intend to expand on those of studies like Chindgren and Hoffman and Delisle by examining whether project management CoP members perceived similar benefits of increased learning.

The concept of knowledge management using social networks has developed into several various types or ideas. For example, Walker and Christenson (2005) explored the differences between CoPs, centers of excellence (CoE), communities of interest (CoI), and project management specific groups sometimes referred to as project management offices (PMO). Each of these represent a form that has evolved from their original informal associations into knowledge networks that are "more formally structured and organization initiated" (Walker & Christenson, 2005, p.277). It is suggested that the degree of engagement among members and the support systems in place is a direct influence on the effectiveness of the knowledge network. It is important to make the distinctions between the types of social groups because of the similarities.

For instance, a community of interest (CoI) is characterized as an informal and typically short-lived group that meets infrequently to share information or similar interests (Wenger et al., 2002; Walker & Christenson, 2005). Additionally, because the group lacks formal structure, information is rarely captured or recorded from their meetings. Examples of CoIs might include a Women in Business group, a cultural group

like East Indian-American employees, or an internal green team for environmental sustainability discussions. While CoIs may be informal and short-lived in nature, there is value for individual learning as they also exchange and share information and provide an informal social network. Typically, CoIs form from a bottom-up arrangement within an organization and with little or negligible costs for support (Walker & Christenson.

Conversely, CoEs can be highly resource intensive and structured in their approach (Wenger et al., 2002; Walker & Christenson, 2005). CoEs take a concerted effort to facilitate, capture, and communicate knowledge sharing. In addition, CoEs seek to implement best practices into standard practices through learning and knowledge management within an entire organization (Walker & Christenson). By doing so, the expectation is it will help the company save money through improved service quality or a reduction in waste. Still, Walker and Christenson contended that future research is needed to prove conclusively that this is the direct result of a CoE.

When applied to project management, highly matured project management CoEs can evolve or stem from CoPs and PMOs. Kerzner (2005a) made several distinctions between project management CoEs and PMOs. Although, both concepts have close similarities some companies use the two names interchangeably. Basically, PMOs are permanent and formal areas within an organization responsible for strategic planning, continuous improvement, mentoring, establishing shared standards, benchmarking processes, and creating a repository for lessons learned and other project management tools (Kerzner). CoEs also have many of these same functions, but may do so as a formal

or informal committee and may only be on a part-time basis. CoEs may also be more focused on finding continuous improvements and identifying new tools and techniques.

There were several reasons for selecting CoPs for this study over the other forms of knowledge sharing communities. First, as it has been noted, CoIs typically have a short term life and a lesser degree of engagement or interaction among members. Therefore, it would be extremely difficult in identifying them as well as measuring their effectiveness. Conversely, CoEs are perceived as more structured, mature, and influential in their development. Therefore, this may be considered more like an ideal solution of what companies would like to implement, but that few may actually achieve. CoPs provide a lifecycle that begins informally and can develop into a knowledgeable asset and social collaboration.

It is important to note these various forms of knowledge sharing communities since multiple ones can exist within an organization. In addition, because the knowledge sharing in these social networks tends to be informal and dynamic, it becomes even more difficult for employees to remember exactly where they learned something. The following sections focus on specific knowledge sharing in these communities and how they may address the five common causes of project failures.

CoP Research and Project Management Skills Factors

In the search for studies on project management communities, examples of effective CoPs can be found. For instance, Chindgren and Hoffman (2006) examined a project management CoP at NASA as a case study. Formed in 1988, the CoP known as APPEL (Academy of Project/Program and Engineering Leadership) originally focused on

providing training and foundational knowledge to the organization's project managers. Even early in its inception, the community significantly increased the amount of projects completed with an emphasis on safety, speed, low cost, quality, and innovation. Since then, APPEL's objectives have moved into areas, such as career development, knowledge transfer, professional certifications, benchmarking, new technology identification, and customer satisfaction (Chindgren & Hoffman, 2006). The researchers examined this community as an illustrative case study for its extensive and effective knowledge sharing endeavors. The APPEL CoP offers a knowledge-sharing program consisting of a forum of Master Project Managers, wisdom transfer workshops, and a knowledge-sharing magazine. While Chindgren and Hoffman did not examine scientifically whether their community was the actual cause of the increase in completed project, it was significant in its' exploration of the potential benefits the CoP brought to NASA. Moreover, the article served as a good starting point for answering this study's RQ2: How do CoPs improve member's project management skills?

Sapsed and Salter (2004) examined project management tools (e.g., Gantt charts, PERT charts, critical path methods, and work breakdown structures) as boundary objects within dispersed organizations. Boundary objects are the tools, documents, processes, schedules, etc., shared among a local group, but also satisfy or are adaptable across multiple communities. Sapsed and Salter discovered that these program management tools were widely agreed upon and used in local communities where face-to-face interaction was more common than across groups with dispersed, multiple locations. The case study involved interviews with project managers over six locations within the

selected organization. Moreover, the underlying result of the study demonstrated that knowledge sharing tools and communities are stronger in local face-to-face environments. Sapsed and Salter's study may serve as a good explanation for how CoPs improve the project management skills of its members.

Additional CoP research can be found in Adkins' (2008) dissertation on the New York State Project Management Community of Practice. Adkins examined several contributing variables for community participation. For example, the quantitative social network analysis found a higher positive association between members' level of domain knowledge, as represented by PM certifications, and their participation in the community and greater sharing of knowledge. In addition, the research found a positive association between a member's participation level in the CoP and their perceived usefulness and value of membership. This is similar to Zboralski et al.'s (2006) quantitative study of 222 members within 36 communities that found a strong positive correlation between CoP members who were avid community participants and their network position within the organization and performance levels.

While Chindgren and Hoffman's (2006) case study at NASA provided excellent examples of knowledge sharing activities within its organization, unfortunately the study offered only anecdotal evidence for project management CoPs improving project manager's skills. The present study intends to fill the gap in literature by quantifying whether CoP members believe that their skills improve as a result of participation in the community. Studies such as Sapsed and Salter's (2004) research on boundary objects (and diffusion of innovations theory in the later section) serve as possible explanations

for how project management tools and techniques are adopted through a CoP. Lastly, Adkins (2008) study demonstrated a positive association between the members' level of knowledge and their participation in the community. By using similar variables as Adkins (e.g., certification level, amount of experience, years with the company), the present study builds on existing CoP knowledge by examining the association between these characteristics and the responses of project management CoP members perceived benefits.

CoP Research and Organizational Factors

Some CoPs form with a primary objective of improving organizational processes and practices. Linehan (2010) examined a state-based educational CoP with subset communities dedicated to the Individuals with Disabilities Education Act (IDEA) and No Child Left Behind (NCLB) programs. Linehan's case study examined a CoP that formed in order to better integrate policies and create effective practices. The community practitioners identified policy problems in general and special education programs and then established potential strategies to improve the educational system. The members faced the challenges of translating and implementing state and federal policies as well as exploring best practices for improving teaching and learning. Similarly, Meduna (2009) examined a district level educational CoP focused on setting direction, redesigning its organizational culture, and developing its members as leaders and educators. Educational CoP studies, like Linehan and Meduna, were selected for review because of the constantly changing federal, state, and district policy conditions within their professions and the effectiveness that CoPs may provide for diffusing those policies and practices.

Project managers experience similar challenges in adapting to new organizational policies and practices, as a result, this study examines whether project management CoPs improve member's understanding of organizational methodologies, processes or policies.

CoP Research and Complexity Factors

If the complexity of a profession with changing federal, state, and local policies was not demanding enough, then consider the emergency preparedness and management (EPM) professional. Turoff and Hiltz (2008) surveyed EPM practitioners whose job it is to respond to disasters of any type. The challenge that these practitioners faced was the excessive amount of information on the Internet regarding emergency preparedness, particularly from a national best practices perspective. Moreover, some EPM managers are unable to easily locate the information needed specifically for their local regions. Consequently, Turoff and Hiltz focused on the CoP as a collaborator for designing a knowledge database for relevant information to the members. Other researchers, such as Campbell-Meier (2008) studied project management repositories developed within organizations. Schindler and Eppler (2003) described a database used by the project managers at NASA, whereby users enter lessons learned into the database via an Internet browser and follow a checklist of questions meant to determine whether the lesson is noteworthy. These are examples of technology that supports the CoP, whereas there are other examples of how CoPs reduce the uncertainty and complexity of technology.

For instance, Hildrum (2007) studied the impact of face-to-face interactions of project teams on their ability to create new technologies. As part of a comparative case study, the researcher looked at two similar organizational projects each that have CoPs.

Interestingly enough, the project with the CoP that met frequently in plenary sessions proved valuable for overcoming conceptual ambiguities, prioritizing project goals, and creating new technical solutions (Hildrum, 2007). During these sessions, members actively discussed concepts or problems, which helped them to successfully deal with those problems. Hildrum's study focused on comparing project team performance between one using the CoP approach and another that did not. While that case may have shown an immediate benefit of using CoPs in a project team environment, it lacked detail about any continuing project manager development. This study examines whether project management CoP members perceived an improved understanding of technical or complex issues as a result of being active within their professional community.

CoP Research and Senior Management Factors

In order for CoPs to succeed within an organization, they need to be actively endorsed and recognized by the firm's leadership (Saint-Onge & Wallace, 2003). Support from executive management can come from financial backing, commitment to the goals of the community, guidance and direction, and investment in technology and resources (Saint-Onge & Wallace, 2003). Managers that recognize the value of CoPs will work to support them. Bourhis and Dube (2010) investigated this topic further and identified management practices that help increase the likelihood of a community's success. Some of these additional management practices for encouraging community participation include providing individual incentives (e.g., professional/social recognition, business cards), face-to-face events with senior managers, promotional contests, and overt communications recognizing CoP achievements (Bourhis & Dube). While gaining

management support and commitment is essential for success, allowing senior management too much control within the CoP can be detrimental (Saint-Onge & Wallace, 2003). Therefore, CoPs must ensure that they are staying committed to the goals of the community and maintaining some level of autonomy from their organizational management. The proposed case study intends to build on Bourhis and Dube's ideas by using two approaches to gauge senior management support of the CoP. By surveying CoP members and senior management about their involvement and support, this will help to answer whether CoPs offer any benefits to the organization. Moreover, a CoP that regularly interacts with its senior management may realize an increased commitment to each other's goals and an improved understanding of any challenges that the other is facing.

CoP Research and Human Relationship Factors

For this study, human relationship factors can have a couple of meanings. Human relationship factors can refer to the personal skills needed to manage or influence people. It can also include the relationships between group members that allow them to engage in joint activities, share information, and help each other (Wenger et al., 2002). For instance, Hemmasi and Csanda (2009) studied State Farm Insurance employees that are members of a CoP. In their study, they found significant levels of perceived trust, impact on job performance, interpersonal connections with co-workers within the community. The results appear to demonstrate the effectiveness of CoPs on job performance because of the knowledge-sharing and collaborative relationships.

Likewise, the personal skills needed to manage or influence people can also be learned through CoPs. White (2007) investigated the knowledge-sharing experiences of members of a human resources CoP. In that study, participants responded that the community helped them value other people's knowledge and understanding what people are going through in order to allow you to help them. Participants also discussed the value of knowledge-sharing issues such as communicating with people as well as logical (impersonal) and value-based decision making (White). White's qualitative analysis demonstrated that there is at least a perception by members that the community can help to manage or influence people. The current case study examines a similar theme by exploring whether the same values exist in a project management CoP.

Conclusion of CoP Literature

Community of practice theory suggests two key themes, the link between knowledge and activity and the importance of relationships. Project management involves the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. Moreover, project management also involves fostering constructive interaction of the members within the project team. As a result, the selection of CoP theory for this study as it applies to the field of project management appears to be a natural fit. Additionally, project management professional organizations, such as PMI, promote continual learning in order to advance the profession and maintain certification. Each organization has its own structure and culture as well as different project management methods. Therefore, CoPs are useful not only for transferring knowledge, but also for exchanging experiences, ideas, and opinions about improving processes.

The previous five sections presented literature on how CoPs address factors, such as project management skills, organizational policies, complexity, senior management, and human relationships. By addressing these specific areas, CoPs offer a potential means to tackle the problems identified as potential causes of project failures. While individual needs and organizational structures differ, the collaborative style that CoPs provide is proving to be beneficial to its members and the organizations that they serve. Therefore, the current case study expands on existing literature about project management CoPs and their influence on addressing the five project success factors.

Diffusion of Innovations Theory

As previously noted, the CoP model is the most commonly practiced method for knowledge management and organizational learning. Moreover, this method involves exchanges that can occur through established processes, social interactions, knowledge depositories, and other technology. Similarly, Rogers (2003) presented the diffusion of innovations theory, whereby he studied how innovations are adopted or rejected within social systems. In that study, Rogers described an innovation as "an idea, practice, or object that is perceived as new or other unit of adoption" (p. 12). By this definition, an innovation might also include the knowledge and learning adopted by its members. Martinsuo et al. (2006) agreed with this interpretation in their study on project-based management as an innovation within an organization. In addition, Rogers defined diffusion as "the process in which an innovation is communicated thorough certain channels over time among the members of a social system" (p. 5). These interpersonal communication channels studied by Rogers are significantly relevant when applied to the

interaction of members within a CoP. For these reasons, this study uses the diffusion of innovations theory as a framework for analyzing CoPs.

Diffusion of innovation theory is widely used as a theoretical framework applied to technology diffusion and adoption. Rogers' (2003) diffusion of innovations theory has been applied to other disciplines, such as education (Sahin, 2006; Schroll, 2007), political science (Mintrom & Mossberger, 2008), healthcare (Kitson, 2008; Kovach et al., 2008), and economics (Gatignon et al., 1989; Vasquez-Barquero, 2005). The intent of this study is to apply this theoretical framework to the adoption or rejection of project management practices, tools, and techniques within a social setting (i.e., the CoP).

It is important to identify the definitions that Rogers (2003) used for many of the concepts in the diffusion of innovations theory. For instance, he used the terms *innovation* and *technology* almost interchangeably. As such, Rogers, defined technology as "a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome" (p. 13). This definition of technology and innovation could be extended to include new processes or techniques that reduce uncertainty. Therefore, the adoption of project management practices, techniques, and tools may be classified as such. The following sections describe the diffusion of innovations theory and its four key components: innovation, communication channels, time, and social system.

Four Main Elements in the Diffusion of Innovations

Innovation. The first key element of the diffusion of innovations process is the innovation itself. As noted previously, an innovation is "an idea, practice, or project that

is perceived as new by an individual or other unit" (Rogers, 2003, p. 12). Furthermore, an innovation does not necessarily mean that it was newly created; only that it is perceived as being new to the individual. For instance, some project management techniques have been around for decades, but for a particular group or individual they still hold a characteristic of "newness". The newness of an innovation refers to the condition where someone has not yet passed any judgment, favorable or otherwise, nor decided whether to adopt or reject it (Rogers, 2003).

One of the main obstacles to the adoption of innovations is uncertainty. Uncertainty is created by the consequences that an innovation might bring. Rogers (2003) described consequences as "the changes that occur in an individual or a social system as a result of the adoption or rejection of an innovation" (p. 436). Moreover, in order to reduce uncertainty, individuals should be informed of the advantages and disadvantages of all of the consequences. Rogers identified five attributes of innovations that help to decrease uncertainty as (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability. These attributes are detailed further in this Chapter.

Another phenomenon to arise from the diffusion of innovations study is the process of reinvention. Reinvention is the degree in which a process or product has been changed or modified by the individual to meet their needs. Re-invention is sometimes viewed as the degree between the individual's use and the original intended use. For example, a new software program being used for something that it was not originally designed or being used for only a limited amount of its total functionality. It is common for managers to use project management software only for a couple of its main features

without knowing the full line of capabilities or the understanding of how to use these capabilities. Project managers may even go years without knowing what additional features are available. Still, reinvention is not necessarily a bad thing. Rogers (2003) reported several reasons why re-invention may occur, but more importantly noted that in those cases re-invention reduces the likelihood of rejection or discontinuance of the innovation. In any case, if an innovation is expected to expand throughout a social system then communication must take place. Therefore, the second element of diffusion of innovations addresses the communication channels involved.

Communication channels. Communication is described as "a process in which participants create and share information with one another in order to reach a mutual understanding" (Rogers, 2003, p. 5). Similarly, diffusion is a particular form of communication where the source and receiver exchange information regarding a new idea. Furthermore, the methods by which communication occurs are called channels and usually take one of two forms: mass media or interpersonal. Mass media channels typically refer to medium such as TV, radio, Internet, or newspaper. Whereas interpersonal communication channels is more face-to-face or interactive between two or more individuals (Technically, the Internet or some electronic medium could fall into this category as well.).

Rogers (2003) believed that while mass media channels are faster and more effective at providing "awareness-knowledge" to a large group, interpersonal channels are more powerful to create since these can involve strong attitudes between the individuals. Moreover, interpersonal channels can have a characteristic of homophily.

According to Rogers, homophily is "the degree to which two or more individuals who interact are similar in certain attributes, such as beliefs, education, socioeconomic status, and the like" (p. 19). Conversely, heterophily is the degree in which the individuals are different in those or other attributes. Rogers considered heterophily to be one of the major obstacles in the diffusion of innovations. If this is true, then perhaps CoPs is likely beneficial to adopting new ideas and innovations within an organization because of the homophily (i.e., similar backgrounds) of its members.

Time. While the dimension of time is usually ignored in other behavioral research, it serves as a key aspect in diffusion research (Rogers, 2003). The time dimension is a necessary facet for the analysis of the innovation-decision process, the adopter categorization, and the rate of adoption. For instance, the innovation-decision process refers to the decision process and period when an individual or group has first knowledge of an innovation until the point that they choose to adopt or reject the innovation or adopt a similar variation of the innovation (Rogers). Other examples of the time dimension within Rogers' diffusion theory is detailed in the later sections.

Social system. The last component of the diffusion of innovation process is the social system. Rogers (2003) described a social system as "a set of interrelated units engaged in joint problem solving to accomplish a common goal" (p. 23). Coincidentally, this is similar to Wenger's definition of a CoP. Basically, these "interrelated units" refer to individuals, informal groups, entire organizations, or their subsystems. Diffusion is the communication and cultural practices that occur within the social system. More importantly, the structure of the social system affects the diffusion process based upon

factors, such as existing hierarchies, informal cliques, and communication structure within that system (Rogers, 2003).

Rogers (2003) also noted that social systems influence how innovations are diffused because of system norms, opinion leaders, change agents, and by the type of innovation-decisions. Norms are a range of acceptable behavior patterns within a social group and can affect innovation diffusion. For example, the cultural norms among an Amish village would likely cause its citizens to reject purchasing high definition televisions. Rogers also recognized opinion leaders and change agents as other influencers within the social system. An opinion leader is someone whose opinions can influence others within a social circle, not particularly because of their title or status, but because of their technical expertise and communication style (Rogers). Similarly, change agents try to promote innovations and ideas that are usually proposed by external change agencies or organized professions. Lastly, the types of innovation decisions also influence the social system. Rogers classified three types of innovation decisions as optional, collective, and authority innovation decisions. Optional decisions mean that the choice to adopt or reject an innovation is solely on the individual. Under the collective approach, a consensus of the group determines the decision. Finally, the authority innovation decisions are made by one or a select few people that serve in an authoritative role. This study looks at a project management CoP and identify some of the optional, collective, and authoritative decisions that they face. Furthermore, it is important to recognize whether members are able to recognize change agents within their community.

The Innovation-decision process. According to Rogers (2003), individuals follow an information seeking process in order to reduce the uncertainty about the advantages or disadvantages of an innovation. This five-step innovation-decision process sequentially consists of (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation (Rogers). Of these steps, the knowledge and persuasion stages may be the most relevant for this study.

The knowledge stage of the innovation-decision process is where the individual first learns of the existence of the innovation as well as some of its key elements. Basically, they are looking to understand what the innovation is and how it works. Rogers (2003) went even further to classify the three types of knowledge involved: awareness-knowledge, how-to-knowledge, and principles-knowledge. Awareness knowledge is somewhat self-explanatory in that it simply involves knowing that the innovation exists. Subsequently, how-to-knowledge relates to the type of instructional information on using the innovation properly. This is relevant to a small degree in this study since CoPs, usually instruct their members on how processes or products work. Finally, principles-knowledge involves the functioning principles behind how an innovation works. Furthermore, Rogers cautioned that principles-knowledge is not a prerequisite for adopting an innovation, but that without it the risk of misuse can cause its discontinuance.

In the persuasion stage, individuals form favorable or unfavorable attitudes toward the innovation (Rogers, 2003). Yet the opinion they establish does not necessarily result directly to the innovation's adoption or rejection. Rogers added that while the knowledge stage is more cognitive (knowing) focused, conversely the persuasion stage is

affective (feeling) centered. As a result, the individual is more impressionable at this stage and may rely on social reinforcement (i.e., opinions of other colleagues or members). Sahin (2006) noted that close peer evaluations serve to be more credible to the individual. Although, the term "persuasion" does not specifically mean the formation of attitudes based upon the influence from others, instead it can include attitudes formed by the individual based upon their own personal knowledge of the innovation (Rogers, 2003). This simply means that the act of persuasion also includes the attitudes formed by the individual based upon their own interpretations.

While the remaining innovation-decision stages of decision, implementation, and confirmation may not be as relevant for this study, it may be worth noting what they involve. As one might expect, the decision stage involves the individual choosing whether to adopt or reject the innovation (Rogers, 2003). Subsequently, the innovation is applied to practice in the implementation stage. Lastly, individuals look for support or approval from others on their decision in the confirmation stage. While these individuals generally seek supportive messages, Rogers warned that decisions could be reversed if they are continually exposed to negative or conflicting messages regarding the innovation.

Attributes of Innovations and Rate of Adoption

The diffusion of innovations theory also addresses that not all innovations are equal in their units of analysis. For example, some consumer technology goods like computers, iPods and cell phones are quickly adopted, whereas other innovations like the metric system or recycling may take decades to reach widespread adoption. Rogers

(2003) explained this by identifying five attributes of innovations: relative advantage, compatibility, complexity, trialability, and observability. Moreover, individuals' perceptions of these attributes can determine how quickly the innovation will be adopted. Chicoine (2005) modified Rogers' attributes on innovations to create the acronym *TACOS* (trialability, advantage, compatibility, observability, and simplicity).

In the context of diffusion of innovations theory, relative advantage is the extent that the new idea, thing, or process is perceived as being better than what is currently in place (Rogers, 2003). There can be various motivators for relative advantage, such as cost, social status, competitive advantage, and usefulness. Rogers further characterized innovations into two types: preventive and incremental innovations. Preventive innovations are those adopted in order to avoid or reduce the probability of an undesired future event. For example, getting your car a tune-up. This may not show any immediate benefit, but can help in extending the overall life of the vehicle. Conversely, incremental innovations recognize beneficial outcomes in a relatively shorter period (e.g., websites that allow for electronic payments). Because the relative advantage is a delayed reward for preventive innovations, therefore they typically have a slower rate of adoption compared to the incremental ones. Relative advantage is significant for this study because many project management practices show any immediate benefits, but can prove to be beneficial over the course of the project or over multiple projects.

Compatibility is another contributing factor in the diffusion process. While compatibility and relative advantage may seem similar, conceptually they are different. According to Rogers (2003), "compatibility is the degree to which an innovation is

perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). Compatibility is ensuring that the innovation is appropriate for the culture and systems of the individual or group that it is intended (Chicoine, 2005). New software can help farmers improve their crops, but this would likely be incompatible for farmers in remote parts of the world where villages lack electricity. Similarly, a creative, entertaining, and casual environment may work successfully for the staff of people at Google, but would clash or fail quickly at a conservative financial institution.

Complexity, according to Rogers (2003), is "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 15). As a result, complexity has a negative correlation to the rate of adoption (Rogers, 2003). Typically, examples of software innovations are given to demonstrate this attribute, but it applies to new processes as well. For example, implementing a PMO would be difficult for an organization that has never followed any sort of formal project management methodology. Although, an organization with an experienced staff of project managers and an established methodology the transition into forming a PMO may be less complicated.

The trialability of an innovation is another factor that positively correlates with the rate of adoption (Rogers, 2003). Consequently, the more often that an innovation is attempted, the more likely and faster its adoption becomes (Sahin, 2006). This is possible because trialability is "the degree to which an innovation may be experimented with on a limited basis" (Rogers, p. 16). Furthermore, this allows the individual to try the innovation with minimal risk (e.g., cost, reputation, etc.)(Chicone, 2005). Re-invention is

another facet of trialability. If the potential adopter can change or modify the innovation to meet their own conditions, then this will also increase the rate and likelihood of adoption (Rogers).

The last remaining attribute of innovations is observability. Observability is the extent that results are noticeably evident to others (Rogers, 2003). In addition, observability has a positive correlation with the rate of innovation adoption. As individuals see the benefits of an innovation realized by their peers, this becomes a key motivational factor in adoption (Rogers). Even innovations and ideas that offer clear advantages can be difficult to get adopted (Rogers). Still, Rogers believed that innovations possessing more of these five attributes are adopted quicker than other innovations and consequently accelerate the innovation-diffusion process.

Another aspect of diffusion of innovations theory considered for this study is the adopter categories. Rogers (2003) established a set of adopter categories in order to classify individuals and groups by their level of innovativeness. The categories were identified as innovators, early adopters, early majority, late majority, and laggards. Although the relevancy of the adopter categories did not play a significant factor for this study, it can serve as a potential future topic on correlating diffusion theory and CoP research.

Other Studies Using Diffusion of Innovations Theory

While a significant amount of literature on diffusion of innovations theory exists, a gap remains in the amount used in project management studies. For example, Maylor, Brady, and Thomas (2008) considered diffusion theory when studying project

management environments. Though they concluded that even if the case organization was considered innovation laggards, diffusion theory did not explain a wide range of the behaviors they had observed. As a result, Maylor et al. (2008) chose the theory of complicity to explain project environments where team members and stakeholders collude as a defensive mechanism.

Martinsuo et al. (2006) relied on organizational innovation management and institutional theory literature as a framework for their research on the adoption of project-based management. This study examined the main drivers for organizations introducing project-based management. However, this differs from diffusion of innovations theory. Diffusion theory explains the process of how an innovation is adopted or rejected based on attributes of the innovation and the influence within a social setting. Similarly, Martinsuo et al. examined what conditions serve as a rationale for adopting project-based management.

Literature on the Research Method

Case study research has been described as a qualitative approach for studying a "bounded system" (i.e., an event, entity, individual or unit of analysis) or multiple cases of individuals within a particular setting or circumstance (Creswell, 2007; Denzin & Gerring, 2007; Lincoln, 2005; Yin, 2009). While these authors presented case study research as a methodology or strategy, others such as Stake (2005) believed it is neither exclusively qualitative nor a methodological choice. Instead, Stake considered a case study to be simply a choice by the researcher of what to study. The rationale is that a selected case can be studied using various approaches including: qualitative, quantitative,

narrative, exploratory, explanatory, analytical, holistic, or any number of mixed methods (Papa, 2009).

Yin (2009) recognized case study research as an effective method and also provided examples of case studies using exploratory, descriptive, and explanatory strategies with each being able to use single or multiple cases. While case study research has been criticized for lacking scientific rigor, its strengths such as applying a holistic perspective have been useful for business and technology related subjects (Mohd-Noor, 2008). This is because exploratory case study research is suitable for capturing organizational activity and rapidly changing business and technology environments (Darke et al., 1998; Mohd-Noor, 2008).

While many articles and books exist on how to write or conduct case studies in general, very few are specific toward project management research. Regardless, the case study approach remains a predominant method found in countless project management articles. The popularity of the case study method is likely due to its value in presenting stories to readers about other people's experiences in a context that helps to link theory and practice (Bennett, 2009; Yin, 2003). Furthermore, as noted previously cases studies can incorporate various qualitative, quantitative, or any number of mixed-method approaches. As a result, it may be the flexibility that makes case study research the most widely used research method for the organizational and social issues found in information systems studies (Darke et al., 1998; Mohd-Noor, 2008).

Case studies on project management topics can also be found in doctoral research; although many follow a mixed-methods model. For example, Marouni (2010) presented a

case study on the perceived value of total quality management (TQM) for improving project success. Marouni studied members of the Project Management Institute and American Society for Quality as a case, but also incorporated it with a comparative quantitative approach (multiple analyses of variance). Similarly, Vergopia (2008) also provided an example of a doctoral case study research of a project management topic. Moreover, Vergopia used multiple case study organizations and an action research approach to examine various project review models for effectiveness. As a result, the use of qualitative (e.g., interviews, forums, and observations) and quantitative (e.g., surveys) instruments strengthened the findings of the study. Cueller (2008) provided yet another example with a dissertation on the "deaf effect" on the reporting of bad news in I.T. projects. In that study, Cueller used a case study approach and laboratory experiments to examine the behaviors. Ultimately, each of these examples relied on mixed-methods, case study approaches and therefore influenced the researcher's decision in providing the same for this proposed research.

Survey and Interview Design

Careful planning is not only critical to project management, but also to the task of survey design. Developing questionnaires may seem straightforward, but there are many considerations. For instance, "who is the survey intended?", "is it meant to gather facts or opinions?", and "is the goal to test a hypothesis or theory or develop one?" are just a few the concerns a researcher must consider first. Therefore, the process of survey design should not begin with writing the questions, but rather identifying the objectives of the research (Patten, 2001; Iarossi, 2006; Gillham, 2007). By doing so, the researcher can

focus on obtaining the most relevant information to the study by reducing the number of unnecessary questions.

For this study, I rely, in part, on survey research on the many advantages cited by Gillham (2007), which include ease in gathering information from many people quickly, convenience for participants to complete during free time, respondent anonymity, lack of interview bias, standardization of questions, and low cost in time and money. Conversely, surveys also have disadvantages. Disadvantages of surveys include low response rate, incomplete or inaccurate responses, a need for relatively simple questions, potential misunderstanding of questions, and displeasure in writing by respondents (Patten, 2001; Gillham, 2007). Despite these disadvantages, the positive characteristics of surveys justify this choice of methodology. In addition, the use of an online survey site for this study should add to the convenience for both the researcher and participants.

Nevertheless, survey research alone is seldom sufficient (Gillham, 2007). By using multiple research methods, it can paint a clearer picture of the topic being studied. For that reason, interviews served to strengthen and validate the findings of this study. Interviews offer several advantages. Interviews allow the researcher to probe for deeper understanding of the participants' responses. Furthermore, the interview protocol can be structured (scripted), semi-structured, or unstructured in nature (Creswell, 2007; Beatty & Willis, 2007; Hart, 2004). In structured interviews, the interviewer usually follows a script of identical questions in the same order for all interviewees. In semi-structured designs, the interviewer has specific questions but some flexibility in their sequence and the ability to probe participants for additional information. Lastly, with unstructured

formats, the interviewer uses broad, open-ended or even improvised questions to gain an in-depth understanding of the interviewee's views and behaviors (Hart).

There are advantages and disadvantages of interviewing as a research method. Hart (2004) identified the strengths of interviewing as offering comprehensive questions, probing for further information, flexibility in handling interviewees, and unanticipated information. The disadvantages of interviews include that they are time consuming to conduct, transcribe the responses, and analyze the data (Hart, 2004; Creswell, 2007). Other weaknesses include a lack of anonymity and responses containing irrelevant information. Interviews may reduce errors since the participants can clarify their responses rather than selecting predetermined answers. On the other hand, the potential for interviewer bias through subtle persuasive questions, bias in interpreting data, or influence on answers still exists (Hart, 2004; Creswell, 2007).

Summary

This literature review began with an overview of project management concepts in order to describe the underlying problem being addressed in this study. Subsequently, the review provided a dozen of the most commonly noted reasons for project failures. The root causes are grouped into five categories identified as project management factors, senior management factors, complexity factors, organizational factors, and human relationship factors.

CoP theory as a common technique for organizational learning and knowledge management was reviewed. The purpose of this is to establish the underpinning of CoP theory in order to demonstrate later in this study whether the influence can be significant.

The literature reviewed in this study points out how CoPs create relationships through social interaction, promote learning and knowledge sharing, advance best practices, and can create a unique identity. This section relied heavily on the works of Wenger (1998) to define a CoP and its various stages of development, which will be relevant for applying it to the selected case study for this research.

The subsequent sections under the CoP Research were grouped into literature containing specific examples of communities' effectiveness in addressing the identified root causes for project failures. The purpose of grouping the literature in this manner was to help answer the secondary research questions of this study. The first of these sections provided examples of how CoPs improve its member's project management skills. For instance, Chindgren and Hoffman's (2006) studied NASA's project management CoP and the use of workshops and other knowledge-sharing sessions to improve member's skills. Sapsed and Salter's (2004) study also explained how project management tools (e.g., Gantt charts, critical path methods, and work breakdown structures) serve as boundary objects that become widely adopted when used in face-to-face environments as opposed to dispersed groups.

Next, I reviewed CoP literature related to organizational factors. Project managers can face challenges with learning new organizational processes or policies. Therefore, this section sought to address the research question, "In what ways can CoPs improve a member's understanding of organizational processes or policies?" For this, Linehan (2010) and Meduna (2009) studies on educational CoPs were reviewed for their

frequently changing federal, state, and district policy conditions within their profession and the effectiveness that CoPs may provide for diffusing those policies and practices. Similar to the complexities of changing policies, I then reviewed literature addressing how CoPs can improve their member's understanding of technical or complex issues. For instance, Hildrum (2007) compared separate project management CoPs and their effectiveness on technologically complex projects as one group met frequently to discuss technical issues and solutions. Turoff and Hiltz's (2008) study served as another example by examining an EPM practitioner community that formed its own knowledge repository for emergency response specific to their region.

Next, I reviewed CoP research on senior management factors, where the aim was to understand how CoPs gain senior management support. In addition to leadership, executive management can offer support through financial backing, commitment to the goals of the community, guidance and direction, and investment in technology and resources (Saint-Onge & Wallace, 2003). Methods were reviewed regarding management practices that help increase the likelihood of a community's success.

Lastly, I looked at human relationship factors. This section looked at studies like Hemmasi and Csanda's (2009) examination of an insurance employee CoP, which found significant levels of perceived trust, impact on job performance, and interpersonal connections with co-workers within the community. In a similar study, White (2007) demonstrated that there was at least a perception by members that the community can help to manage or influence people. The survey instrument for this study included

questions for the participants related to whether their CoP addresses each of the five factors of project success presented.

The social aspects of communities allowed for an appropriate transition into diffusion of innovation theory. Diffusion theory describes the processes and behaviors that can occur within a social environment as it relates to adoption of ideas, practices, and innovations. This chapter presented a review of the literature on diffusion of innovation theory and its relevance to studying CoPs.

Finally, this chapter presented a review of the literature on the case study methodology including the survey and interview design methods that were critical to the study. Chapter 3 includes an introduction and justification of the selected research methodology and instruments for this study.

Chapter 3: Methodology

Introduction

As previously indicated, the purpose of this mixed-methods case study was to determine whether internal project management CoPs were influential in improving project management performance in a midsized financial institution.

Chapter 3, which consists of five primary sections, offers an outline and a rationale for the study's research methodology: (a) research design (which introduces the case study methodology and explains its rationale, (b) population and sample size, (c) instrumentation, (d) data collection procedures, and (e) data analysis. The research and data collection plan detailed in this section was approved on October 30, 2011 by the IRB (# 10-31-11-0037307).

Research Approach

For this study, I used a sequential, mixed-methods, case study methodology. In order to create a well-designed study, this dissertation followed several steps (see Figure 5). In this case study, the hypotheses relate to whether project management CoPs positively influence their members' project management performance. The literature review examines and compares existing research and theories in order to help inform the research questions and design the survey and interview questions for the case study organization. The survey instrument served in a quantitative capacity to answer the research questions and hypotheses, while interviews offered a qualitative approach to expand and explore further. In addition, historical project success rates were obtained from the organization and reviewed. Subsequently, the data was collected and analyzed

based on the research design. Lastly, the research questions and hypotheses were addressed based on the data gathered, thereby presenting the results and articulating the conclusions.

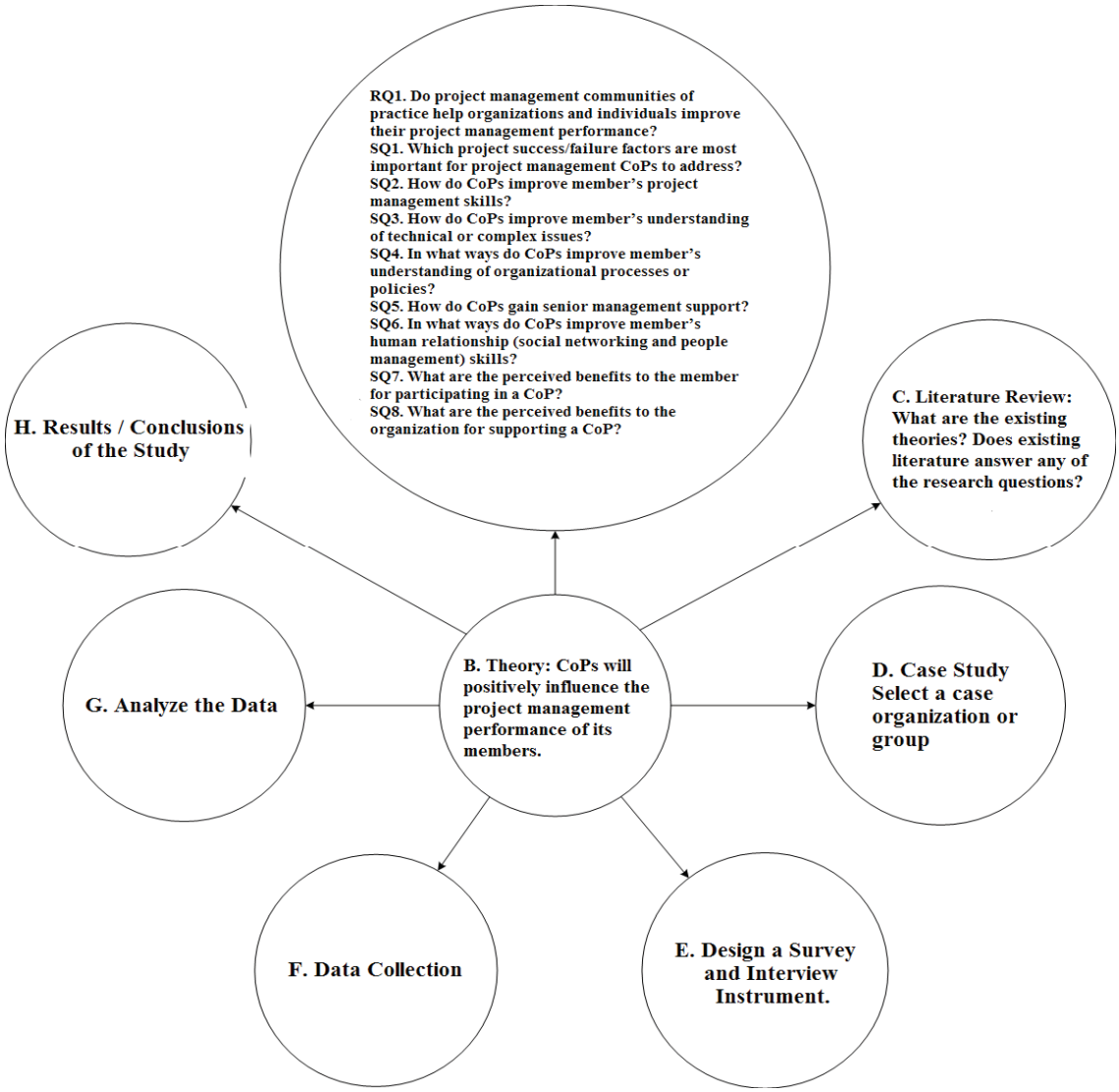


Figure 5. Research design for this study.

Research Design

There are several reasons for selecting a sequential, mixed-methods case study methodology. First, it allows for a combination of both quantitative and qualitative

methods. Second and more importantly, a key characteristic of case study research is the holistic investigation and analysis that it can offer a subject (Papa, 2009; Yin, 2009). This is effective for understanding the complex interactions between people, processes, technologies, and organizations. In addition, by using (a) multiple sources of data and (b) qualitative and quantitative methods of data collection, the case study process achieves rigor and validity. Thus, case study research has become increasingly popular for exploring, generating, and testing hypotheses (Dube & Pare, 2003; Yin, 2009).

There was another reason for conducting a single-case study. The selected case is instrumental, as it appears to ideally demonstrate the conditions needed to confirm, challenge, or extend on the existing community of practice theory. Stake (2005) posited that the purpose of an instrumental case study is "to provide insight into an issue or redraw a generalization" (p. 445). The instrumental study uses a selected case in a supportive capacity to demonstrate an issue or illustrate what a situation is like (Stake, 2005; Yin, 2009). In addition, this study analyzes and draws comparisons to case studies and research from other authors on CoP theory applied to other professions or organizations.

The mixed-method, case study approach was not the only method considered for this study. A qualitative, ethnographic research approach also received consideration since it focuses on studying a group of people in their own environment or social setting (Creswell, 2007). Ethnography is the most commonly used way to study cultures, religions, or ethnic groups (University of California, Irvine, 2012). However, it has gained wider acceptance in studies of smaller groups, such as a business, a charitable

organization, a school, a field of professionals, victims of a particular disease, or nearly any other type of group (Creswell, 2007). The goal of the ethnographic researcher is to describe and interpret the actions, behaviors, values, language, or beliefs of a particular culture (Creswell, 2007). An ethnographic approach was considered for this study because of its applicability with diffusion of innovation theory due to its in-depth look at particular group and its actions, behaviors, values, and culture.

The advantage of ethnographic research is that the researcher, by being a participant-observer, gains an improved understanding of the group. As a participant-observer, the researcher is sometimes privy to information, events, common practices, candid interviews, or documents. However, this close interaction with participants and their environment could cause the researcher's interpretation to be more subjective or biased; sometimes this is referred to as "going native" (Spano, 2005). While a full ethnographic treatment of CoPs would be valuable, the intent of this study was to measure a groups' influence on a particular outcome (i.e., project management performance). A full ethnographic treatment for this study would have included more interviews or focus groups with members, an analysis of group dynamics, and measuring performance using instruments other than just a self-evaluation survey.

I explored other research methods and determined that the case study approach was most appropriate, since it provides a better descriptive analysis for the CoP theory. Furthermore, the case study approach allows the identified research questions to be addressed in a number of ways. First, purposive sampling with the selected organization provides an appropriate representation of community members. Second, interviews with

stakeholders outside of the community offer an opportunity to confirm or refute beliefs about the value of the CoP. Next, a review of the documents, tools, communications, and repositories of the community may provide further insight. Lastly, an examination of existing CoP case study literature may help to draw parallels or contrasts between communities of other professions. While the use of case studies can take the form of either quantitative or qualitative research, the strength of this approach is that it allows for generating analytical and/or statistical generalizations (Yin, 2009).

The case study approach is not the only method used for this study. Ethnographic techniques were incorporated to certain degree to help guard against bias. For instance, participant observation refers to a range of ethnographic methods where the level of involvement by the researcher to the group being studied is categorized as either complete participant, participant-as-observer, observer-as-participant, or complete observer (Gold, 1969). The rationale for using the participant observation approach is that I can be part of the community being studied and provide an insightful look at everyday practices. Furthermore, by following an overt method (i.e., the participants are informed of the purpose and nature of the research), this may be helpful to recognize and eliminate bias by creating a dialogue with participants (Holt, 2010). Regardless, participant observation played only a small part of this study since a quantitative approach and analysis were used. While a full ethnographic approach to studying CoPs would make for valuable future research, instead, the goal for this study was to measure a groups' influence on a particular outcome (i.e., project management performance).

Population and Sample

The research population for this study and that may benefit from its potential for social change are the members of project management CoPs. In this study, the sample community consists of 150 project managers from various areas within the organization. The group, known simply as CAPP (*C* for the bank's name and Association of Project Professionals), was formed in 2005. At present, CAPP has 110 members (PMP certified employees) and 42 associate members (non-certified or contractors).

Purposive sampling was used to recruit enough survey respondents to allow for an adequate representation of new and old members as well as diversity in their project management experience. Sample size calculation can be difficult and may produce misleading results during the analysis if done incorrectly (Lenth, 2001). To conduct a power analysis for determining sample size requires the significance level, the effect size, the number of independent variables, and desired level of power (Length, 2001). Based on these factors, GPower 3.0 and Minitab 16 software were used as power analysis tools to calculate an adequate sample size for this study. Table 1 lists the statistical factors that were used to determine the adequate sample size based on the total population.

Table 1

Statistical Factors Used to Calculate Sample Size

Factor	Input parameters	Description
Alpha level	.05	Also called the Type I error rate
Anticipated effect size	.50	By convention, effect sizes .10, .30 and .50 are small, medium, and large respectively
Number of independent variables	2	The total number of predictors in the model

Desired statistical power	.95	By convention, this value should be .80 or Greater
Adequate sample size	42	This sample size number shrinks to 26 if the statistical power is reduced to only .80

In addition to the survey respondents, six department managers (nonmembers) were interviewed to gage their opinions on the benefits and efforts of the CAPP group. The number of managers selected were a representation of the five primary departments that the majority of CAPP members report to directly.

The CAPP group meets quarterly to discuss relevant topics usually related to organizational issues. The members elect four leaders to 2-year terms. These leaders along with a couple of managers help influence their community by planning monthly training sessions on topics both internally and professionally relevant. Moreover, the community is able to work with senior management to change internal policies and processes relating to project management. Finally, the practice element of this community can be found in the training sessions, webinars, and project management knowledgebase (templates, spreadsheets, tools) that they use.

There are several reasons for selecting the CAPP group for this study. First, the community has been in place since 2005. As a result, they have reached an "active" level of maturity by Wenger's (1998b) definition, where the community is engaging in joint activities, addressing changing circumstances, and renewing interest and commitment among members. Second, the CAPP group has a diverse membership of experienced project managers, some new to the organization and others long standing employees. Third, that I am a member of the organization for the last several years and therefore,

have an established researcher-participant relationship. Lastly, the selected organization is committed to establishing a project management methodology by forming IT and enterprise project management offices (ITPMO and EPMO) as well as project management centers of excellence (COE). These may or may not have been the direct result of CAPP's influence within the organization.

Instrumentation

This study used surveys as a primary source of data. In addition to conducting surveys, interviews with stakeholders (i.e., senior managers) that interact with CAPP should add validity to the results. The survey and interview questions are located in Appendix A and B. Each question was relevant to answering the overall research question: How do project management communities of practice help organizations and individuals improve their project management performance? Therefore, these questions were designed to target whether the participants believe that their involvement in CAPP helps addresses the five causes of project failures. Additionally, other questions focus on the perceived benefits of being a member. More importantly, this helped validate the hypotheses as to whether there exists a relationship between project management performance and membership within a community of practice.

In addition to the survey questionnaire for community members, I also conducted interviews with interacting stakeholders. The interview questions for this group focused on the perceived benefits of the CAPP group. For those responses that aligned with the members' responses, this then increases the validity of the results. Prior to fully engaging CAPP members and stakeholders, a panel reviewed and critiqued the survey and

interview questions. By taking this approach, I was able to work through and determine the more relevant questions and amend those that were poorly worded.

The survey instrument that I developed consists of questions designed mainly to test the hypotheses of this study (see Appendix A). Moreover, the questions also relate to the primary and secondary research questions, as shown in Table 1. Recall that the primary research question is: How do project management communities of practice help organizations and individuals improve their project management performance? This question has been answered to a certain degree in the literature review and is substantiated later through the survey responses, interviews, and historical project success rates from the case study organization. Still, in order to better understand Table 2, it is necessary to label the research questions as follows:

RQ1. Do project management communities of practice help organizations and individuals improve their project management performance?

SQ1. Which project success/failure factors are most important for project management CoPs to address?

SQ2. How do CoPs improve member's project management skills?

SQ3. How do CoPs improve member's understanding of technical or complex issues?

SQ4. In what ways do CoPs improve member's understanding of organizational processes or policies?

SQ5. How do CoPs gain senior management support?

SQ6. In what ways do CoPs improve member's human relationship (social networking and people management) skills?

SQ7. What are the perceived benefits to the member for participating in a CoP?

SQ8. What are the perceived benefits to the organization for supporting a CoP?

Table 2

Survey Questions Correlated to Research Questions

Survey Question	Background Info	Primary RQ1.	Secondary Research Questions							
			SQ1.	SQ2.	SQ3.	SQ4.	SQ5.	SQ6.	SQ7.	SQ8.
1 thru 6	X									
7			X							
8									X	
9									X	
10			X							
11			X							
12			X							
13				X						
14				X						
15						X				
16						X				
17					X					
18					X					
19		X							X	
20		X							X	
21								X		
22								X		
23							X			
24							X			
25									X	
26		X							X	
27		X							X	
28										X

The survey instrument consists of 28 questions designed to answer the research questions. The survey begins with six preliminary questions. These questions asked the participant for (a) their gender, (b) how long they have been with the company, (c) a member of CAPP, (d) working as a project manager, and (e) whether they are professionally certified. These initial questions provide a demographic of the population

of respondents. Question 6 then relates to the frequency of meetings, training sessions, and other community events that the member attends. More importantly, the frequency of participation, professional certification, and the number of years of experience are used as variables to compare respondents' perceived value of the community.

Subsequently, the questionnaire asked participants to rate the level of influence each of the five factors has on project success. This served as a starting point for whether members agree that these factors are an accurate summation. The survey then moves into questions regarding CAPP and more specifically about the community's influence in promoting or teaching various skills to its members. Many of the questions follow a 5-point Likert scale to gather the participant's perceptions about the benefits of the community and its ability to address project failure factors. For instance, Survey Questions 10 through 12 relate to which factors are more important to project management success.

Next, questions 13 through 22 relate to whether the community helps to improve members' social networking skills, understanding of technical or complex issues, and organizational processes or policies. Then, Survey Questions 23 and 24 looked at whether the community has gained senior management support. Questions 25 and 26 focused on members' perceived benefits and project management performance as a result of being in the community. Lastly, question 28 was meant to gauge whether members perceive that CAPP played a part in improved performance of the organization's overall project success rates. By addressing these factors, this gave validation that CoPs help

organizations and members improve their project management performance and satisfaction.

The interview instrument (Appendix B) developed for this study consists of six questions also directly related to some of the nine research questions. The interview was designed for department managers of the organization and not the CAPP members. The rationale for interviewing department managers was to determine if their perceptions of the benefits and effectiveness of CAPP coincide with those of the members. Senior managers usually did not participate or supervise in many of the CAPP sessions. Therefore, the questions pertained to senior management support (SQ6), perceived benefits of the community (SQ9), and more importantly, perceived correlation in project management performance within the company (RQ1).

Data Collection

The data collection process took multiple approaches. CAPP members received an email soliciting their voluntary participation in this study. For those interested, a link to the Survey Monkey website (www.surveymonkey.com) allowed them to access and respond to the questionnaire. Online surveys offer several advantages, such as reduced costs in time and money over mailed surveys (Singleton & Straits, 2005), faster response times, the convenience of responding at the participants' leisure, the lack of face-to-face contact provides participants with a greater sense of anonymity as well as the removal of interviewer bias as the surveys are electronically calculated (Amar, 2008; Kwak & Radler, 2002; Umbach, 2004). Before beginning the questionnaire, the member was required to click on a link agreeing to the informed consent statement. Participants were

reminded that participation in the survey was strictly voluntary and that their results would remain anonymous. The questionnaire asked the participant some preliminary questions such as the number of years as a project manager, number of years with the company, number of years as a CAPP member, and the number of CAPP events they attend per year. These details were used in the analysis of the results based on the variables. Subsequently, the survey moved into questions on project management related topics and the role of the community. The survey remained available for a period of 21 days.

For the second phase of the data collection process, six senior managers were targeted as interviewees for this study. The interviews were conducted face-to-face and audio recorded in order to produce transcripts. The interviews lasted no longer than 30 minutes in length. The interviewees also provided signed consent to use their comments within this study. While interviewees are referred to by first names in the results section of this study, these are pseudonyms meant to conceal the identities of the mangers.

A third phase of the data collection process was a review of company records that track project success rates from the past five years. The number of years' worth of data is relevant since the CoP of the case study organization was formed in 2005. In order to establish a correlation between project success and CoPs, it was important to obtain the company's project success rates for at least the past four years. The project success rates were analyzed for the period of 2008 through 2011 and the results were compared and contrasted to the responses given by the CAPP members and the senior managers.

Triangulation is the process of using multiple sources of evidence that can increase the reliability and validity of the data. Yin (2009) extended the definition of triangulation to include multiple evaluators of data (investigator triangulation), different perspectives on the same data set (theory triangulation), and multiple research methods (methodology triangulation). By using surveys and interviews (multiple methods), and members and executives (multiple perspectives) in the given manner, this expectantly strengthened the reliability and validity of the study. In addition, the data collection methods and instruments adhere to the guidelines and requirements set by the IRB.

Reliability and Validity

Case study methodology is frequently criticized for concerns with generalization, reliability, and validity. While the criticisms may not be baseless, a lack of rigor in the case study methodology used by researchers can only perpetuate this concern. Therefore, it was important that I took the appropriate steps to ensure reliability and validity of the data collected and analyzed. For this study, it meant using a triangulation of instruments (i.e., surveys, open-ended questions, interviews, and internal documents) and a strong method for coding the results.

According to Singleton and Straits (2005), "Reliability refers to the stability or consistency of an operational definition, whereas validity refers to the goodness of fit between an operational definition and the concept it is purported to measure" (p.106). This study uses some suggestions by Singleton and Straights as methods to improve reliability. For instance, preliminary work such as a pilot study were conducted prior to beginning the data collection. The aim of the pilot study was to ensure that the survey and

interview questions were relevant to the research questions of this study. Additionally, the pilot study identified opportunities to improve the questionnaire prior to beginning the full study.

A panel of six members of the CAPP leadership board reviewed the survey and interview questions. The leadership board included directors from various areas within the company each with at least 15 or more years of project management experience. Therefore, their feedback on survey clarity, sensitivity, length, and relevancy was important. This measure of quality between what is being asked and what is being studied is commonly referred to as *construct validity* (Singleton & Straits, 2005). To illustrate, relevancy was determined by asking the panel how they perceive the Survey Questions to be pertinent in helping to answer the research questions. In addition, the panel provided feedback about the questions, the available answers, and definitions or interpretations of anything within the survey.

Next, I recruited six experienced CAPP members to join in a survey pretest. A pretest serves as a practice run where the respondents are interviewed after taking a survey and asked to provide feedback related to the survey's structure, coherency, and content (Reynolds & Diamantopoulos, 1998). Reynolds and Diamantopoulos recommended recruiting pretest participants that are more knowledgeable about the topic as they are more adept at finding faulty questions or concerns around semantics. With that in mind, I performed a Cronbach's alpha analysis on the pretest sample to gauge the level of internal consistency of the questions. Since the survey consists primarily of Likert-style scale ratings, the use of Cronbach's alpha analysis measured the correlation

of the underlying factors (i.e., how closely related a set of items are as a group) (Santos, 1999). I also performed the Cronbach's alpha analysis on a posttest on the same set of participants prior to the survey's release to the general sample in order to evaluate its retest reliability. For both analyses of the internal consistency of Survey Questions and the retest reliability, the results ranged from strong to acceptable reliabilities.

Lastly, a questionnaire review similar to the one created by Iarossi (2006) was used. Iarossi's (2006, p. 91) questionnaire review served as a rubric for addressing problems with survey reading, instructions, clarity, assumptions, knowledge and memory, sensitivity and bias, and response categories. The survey also underwent a review and approval by the organization's legal department and executive management before it was sent to the sample population.

Quantitative Data Analysis

Data analysis within a case study can take a holistic analysis or an embedded analysis approach (Creswell, 2007; Yin, 2009). The holistic analysis approach examines the data for the entire case, whereas the embedded analysis focuses on a specific aspect or subset of data of the case. For instance, this project management study identified several causes of project failures in an organization. Under the holistic analysis, the researcher may examine the methodology, the managers, the culture, the technology, and the people. Conversely, an embedded analysis may focus only on one of these aspects. This study uses elements of both types of analysis.

Yin (2009) identified four general strategies for analyzing data for case studies as relying on theoretical propositions, developing a case description, using both qualitative

and quantitative data, and examining rival explanations. In addition, these strategies can be used along with several other techniques for analyzing case studies: pattern matching, explanation building, time-series analysis, logic models, and cross-case synthesis (Yin, 2009).

I used techniques from some of these strategies. For example, relying on theoretical propositions is a preferred strategy when the proposition being analyzed is already identified by the researcher (e.g., CoPs are an effective means for knowledge management and organizational learning). As a result, the research questions created reflects the direction of the case study. In addition to this technique, pattern matching refers to the qualitative analysis process of comparing two or more cases to determine whether the patterns or themes exist or generalizations can be made (Dul & Hak, 2008; Yin, 2009). Subsequently, a thematic analysis is typically presented across the selected cases. Lastly, I used a strategy of examining rival explanations. This is simply analyzing the selected case or theories against those of rival theories.

Since this study involved surveys, a certain degree of quantitative analysis of the results was necessary. Moreover, I use descriptive statistics to explain the basic attributes of each data set and provide a simplified summary about the sample and measures. Descriptive statistics are useful for organizing and summarizing data (Singleton & Straits, 2005), especially for describing smaller populations being studied (Healey, 2008). In addition, descriptive statistics are useful for exploratory studies like this that typically look at only one variable (Morgan et al., 2002). Descriptive statistics are often compared to inferential statistics that draw conclusions or make judgments beyond what the data

provides. For instance, I only used the survey for this study on the selected organization. Conversely, inferential statistics would be considered if the objective of this study were to compare and analyze CoPs from multiple organizations in an attempt to make broader generalizations. Simply put, descriptive statistics help describe and manage the data, while inferential statistics help reach conclusions that extend beyond the data sample alone (Healy, 2008; Singleton & Straits, 2005).

The first step to analyzing the survey results is to answer the research question, "Which project success/failure factors are most important for project management CoPs to address?" The questionnaire asks participants to rate by pairwise comparison the level of influence each of the five factors has on project success. As indicated previously, this serves simply as a starting point to determine whether members agree that these factors are an accurate summation. More importantly, I used an Analytical Hierarchy Process (AHP) approach to help rank and analyze the participant's responses. AHP involves identifying a set of criteria; in this case, the criteria are the five factors of project failures. The participants then individually rate the importance at each level of the hierarchy using pairwise comparisons (Saaty, 1980). For example, one of the Survey Questions asks, "Rate the level of importance you believe that good project management skills are in comparison to understanding organizational factors." Saaty and Vargas (2001) recommended using a one to nine point scale for comparing options, but indicated that smaller scales can also work. The metric for this study is a one-to-five point ratio scale, where one represents an equal importance and five indicates an extreme difference or preference.

Next, the analysis focuses on the hypotheses of this study. This is done by identifying any perceived value to the members and determining whether there exists a relationship between CoP membership and project management performance. An analysis of the results will be based on three independent variables: the amount of project management work experience, the number of years with the organization, and the certification level of the participants. By analyzing the population based on the member's amount of work experience should determine whether perceived value of the CoP is different for more experienced project managers compared to those with lesser experience.

Table 3

Quantitative Data Analysis Procedures Used for Each Hypothesis

Hypothesis	Related Survey Questions	Analysis Procedure
*H*1. There is a positive relationship between project management performance and membership within a community of practice.	Survey Question 13, 14, 15, 16, 17, 18, 19, 20, 26 and 27	Correlation analysis using Spearman's rank correlation to answer the hypothesis.
*H*2. There is a significant difference in the perceived value of membership in a CoP based on the project manager's amount of experience.	Survey Question 2 (Experience level), 13, 14, 15, 16, 17, 18, 19, 20, 26 and 27	Correlation analysis using Spearman's rank correlation to answer the hypothesis.
*H*3. There is a significant difference in the perceived value of membership in a CoP based on the project manager's certification level.	Survey Question 5 (Certification) ,13, 14, 15, 16, 17, 18, 19, 20, 26, and 27	Correlation analysis using Spearman's rank correlation to answer the hypothesis.

*H*4. There is a significant difference in the perceived value of membership in a CoP based on the employee's tenure with the organization?	Survey Question 3 (Years with the company), 13, 14, 15, 16, 17, 18, 19, 20, 26, and 27	Correlation analysis using Spearman's rank correlation to answer the hypothesis.

Hypothesis testing relied primarily on, but was not limited to using a correlation analysis on each of the results by their categorical variables: more experienced vs. less experienced project managers, certified vs. non-certified project managers, and longer tenured vs. shorter tenured employees. Correlation analysis is a set of statistical tests that help determine whether any linear relationships exist between the sets of variables (for instance, perceived membership value and number of years of work experience). In addition, the correlation coefficient quantifies the pattern and summarizes relationships into a single numeric result. The value of the correlation coefficient varies between +1 (i.e., strong positive relationship) and -1 (i.e., strong negative relationship). The closer the correlation coefficient value is to ± 1, then the stronger the positive or negative degree of association between the two variables. Conversely, the closer the value is to zero, the relationship between the two variables will be weaker. Statistical techniques to evaluate these types of relationships are called measures of association (Singleton & Straits, 2005). While correlation analysis as a statistical method will measure any differences, the responses to qualitative questions were examined to identify the reasons and themes among these groups.

The first hypothesis (*H*1) is,

$H1_0$: There is no relationship between project management performance and membership within a community of practice.

$H1_1$: There is a positive relationship between project management performance and membership within a community of practice.

The data analysis for *H*1 involves applying ordinal values to the Likert scale responses of the participants. For example, a 5 means *strongly agree*, while 1 means *strongly disagree*. Accordingly, the value of Spearman's rank correlation (r_s) then can be calculated. Spearman's rank correlation is a variation of the correlation test that is used to measure the degree of association between two variables when the values are ordinal (i.e., numeric values applied to an ordered set). Participants' responses to the survey questions that correspond to *H*1 (see Table 2.) are then analyzed using Spearman's rank correlation test. As a result, I drew conclusions based on the resulting correlation coefficient and determine the strength of the relationship between project management performance and membership within a CoP.

For the remaining hypotheses, I examine whether the responses differ based on the number of years the member has been with the organization. The reason for using this variable is that participants with longer employment tenures with the company are likely to be savvier about the organization's methodologies, policies, and culture. Therefore, the employee's length of employment may influence the perceived value of their membership in the community. Similarly, analyzing the population by their professional certification level may also show a difference in how they rate the perceived value. As with the first hypothesis, Spearman's rank correlation test is also used to show the

strength of relationships between perceived value of membership and different employment variables. As a result, the remaining hypotheses (*H*2, *H*3, and *H*4) to be analyzed are,

$H2_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H2_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H3_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H3_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H4_0$: There is no difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

$H4_1$: There is a significant difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

Qualitative Data Analysis

While the goal of the survey and its quantitative data analysis is to test the hypotheses of this study, the personal interviews and other qualitative analyses are meant to answer the research questions. Still, the survey instrument offers several open-ended questions that must be analyzed qualitatively. For both the open-ended survey questions and the interview questions, I coded the responses and identify emerging themes. Coding

is a process where the researcher condenses or categorizes the collected data in a systematic way in order to better analyze it and develop conclusions (Lockyer, 2010).

One approach to qualitative data analysis is to begin with a short list of predefined codes (i.e., commonalities) and build from these as any additional themes emerge. In this case, the five factors of project success also serve as the predefined codes. Ultimately, the qualitative analysis followed the methods listed in Table 4 to answer the research questions for this study.

Table 4

Qualitative Data Analysis Used for Each Research Question

Research Question	Instrument	Research Method
RQ1. Do project management CoPs help organizations and individuals improve their project management performance?	Existing research and Survey Questions #19, 20, 26, and 27.	Literature review to identify existing research on the benefits of CoPs in various fields. Conduct surveys among CoP members. Review the organization's project success rates since the CoP was formed.
SQ1. Which project success/failure factors are most important for project management CoPs to address?	Existing research and Survey Questions #7a through 7d.	Literature review to identify commonly noted factors for project failures. Survey asks CoP members to rank factors.
SQ2. How do CoPs improve member's project management skills?	Existing research and Survey Questions #13 and 14.	Literature review to identify examples of benefits in other cases.
SQ3. How do CoPs improve member's understanding of technical or complex issues?	Existing research and Survey Question #17 and 18.	Literature review to identify examples of benefits in other cases.
SQ4. In what ways do CoPs improve members' understanding of organizational processes or policies?	Existing research and Survey Questions #15 and 16.	Literature review to identify examples of benefits in other cases.

SQ5. How do CoPs gain senior management support?	Existing research, interview questions (Appendix B), and Survey Questions #23 and 24.	Literature review to identify examples of benefits in other cases. Conduct interviews with senior managers within the case organization.
SQ6. In what ways do CoPs improve member's human relationship skills?	Existing research and Survey Question #21 and 22.	Literature review to identify examples of benefits in other cases.
SQ7. What are the perceived benefits to the member for participating in a CoP?	Survey Questions #8, 19, 20, 25, 26, and 27.	Conduct surveys with CoP members of the case study organization.
SQ8. What are the perceived benefits to the organization for supporting a CoP?	Survey Question #28 and interview questions (Appendix B)	Conduct interviews with senior managers of the case study organization.

The Role of the Researcher

The role of the researcher is critical throughout this study. I served unassisted as the survey instrument designer and distributor as well as be responsible for collecting and analyzing the gathered data. In order to obtain honest feedback without fear of consequence, it is important to maintain the privacy of the participants. Part of this responsibility was to obtain any approvals from the appropriate bank management, as needed, before distributing questionnaires or conducting interviews. Finally, I provide executive summaries of the findings to the participants upon request.

Summary

This chapter presented a foundation of the research method used for this study including the data analysis techniques, the target population and sample. By using the case study method this should provide a collective means for describing the selected case as well as the qualitative and quantitative analysis to answer the research questions. Data were collected using an online survey and face-to-face interviews. The survey also

included items to collect demographic information and experience levels of the respondents. Spearman's rank correlation was used to provide statistical evidence in support or rejection of the four hypotheses of this study. A qualitative analysis of the open-ended survey questions and the interviews was also conducted. Chapter 4 will articulate the results of these data collection methods.

Chapter 4: Results

Again, the purpose of this mixed-methods case study was to determine whether internal project management CoPs were influential in improving project management performance in a midsized financial institution. In Chapter 4, the data collection and analysis processes are described and the results of the quantitative and qualitative analyses are provided.

The data collected in this study were used to answer the following research questions and test the hypotheses below:

1. Do project management communities of practice help organizations and individuals improve their project management performance?

2. Which project success/failure factors are most important for project management CoPs to address?

3. How do CoPs improve members' project management skills?

4. How do CoPs improve members' understanding of technical or complex issues?

5. In what ways do CoPs improve members' understanding of organizational processes or policies?

6. How do CoPs gain senior management support?

7. In what ways do CoPs improve members' human relationship (social networking and people management) skills?

8. What are the perceived benefits to the member for participating in a CoP?

9. What are the perceived benefits to the organization for supporting a CoP?

$H1_0$: There is no relationship between project management performance and membership within a community of practice.

$H1_1$: There is a positive relationship between project management performance and membership within a community of practice.

$H2_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H2_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H3_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H3_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H4_0$: There is no difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

$H4_1$: There is a significant difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

Data Collection Process

Primary data for this study consisted of an online survey, which I created and conducted through the Web site Survey Monkey. This approach provided quantitative data as well as qualitative data from the explanation and comments sections of the questionnaire. Secondary data came from face-to-face interviews that I conducted with senior managers in the target organization. Lastly, I reviewed corporate records (i.e.,

project scorecards), as source of data about the project environment in the target organization.

Of the 150 CAPP members, 91 responded to the online survey (over twice the number calculated for an adequate sample survey size), and six senior managers participated in the face-to-face interviews.

Data Analysis

The survey question data were imported into SPSS Version 19 and analyzed for statistical purposes. Spearman's rank correlation test was used to show the strength of relationships between perceived value of membership and the different employment variables. For both the open-ended survey questions and the manager interviews, I coded the responses and identified emerging themes, these are discussed below, according to research question in the Qualitative Analysis subsection .

Descriptive Statistics

Table 5 summarizes the characteristics of the sample. Of the 91 individuals surveyed, 62.6% were female and 37.4% were male. Over half of the respondents, 55%, had substantial experience as project managers, having worked in the position over 3 years. In addition, 19.8% had worked 6 to 10 years, 9.9% had worked 3 to 6 years, and 15.4% had worked less than 3 years. A majority of respondents, 67%, had worked at the company for more than 10 years. 16.5% had worked at the company from 7 to 10 years, 13.2% had worked from 3 to 6 years, and 3.3% had worked less than 3 years. Nearly half of the members, 49.5%, had joined CAPP during its first 2 years (2005-2006), 30.8% joined in 2007 to 2008, 15.4% joined the next year, and 4.4% joined in 2011-2012. In

terms of certifications, the most common was PMP, which 79.1% of the sample held. 5.5% held a CAPM certification, while the remaining 15.4% held no certification.

Table 5

Summary of Demographics (*N* = 91)

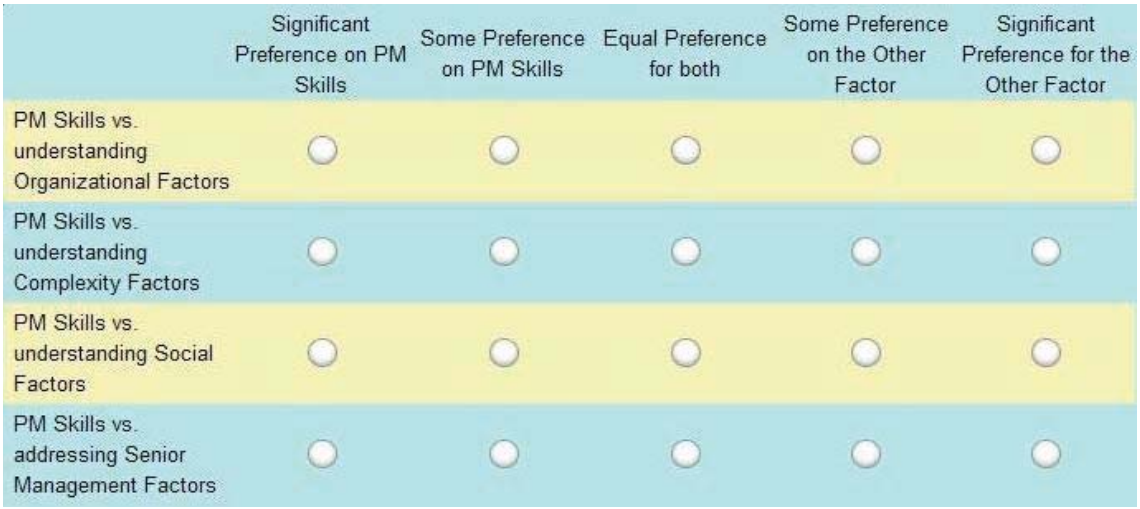
	N	%
Gender		
Female	57	62.6
Male	34	37.4
Years as Project Manager		
3 years or less	14	15.4
3 to 6 years	9	9.9
6 to 10 years	18	19.8
10+ years	50	55.0
Years at the Company		
2 Years or Less	3	3.3
3 to 6 Years	12	13.2
7 to 10 years	15	16.5
10+ years	61	67.0
Year Joined CAPP		
2005-2006	45	49.5
2007-2008	28	30.8
2009-2010	14	15.4
2011-2012	4	4.4
Certifications		
CAPM	5	5.5
PMP	72	79.1
None	14	15.4

Quantitative Analysis of the Data

Project Success/Failure Factors

Participants were asked to rate by pairwise comparison the level of influence each of the five factors has on project success. This approach served simply as a starting point

to determine whether members agree that these factors are an accurate summation. I used a modified Analytical Hierarchy Process (AHP) approach to rank and analyze the participant's responses to Survey Questions 7a through 7d. The metric for this portion of the study was a five-option scale for comparing factors. For example, Figure 6 shows the comparison options between good PM skills and understanding organizational factors. This was done to help answer Secondary Question 2 which asked, Which project success/failure factors are most important for project management CoPs to address?



	Significant Preference on PM Skills	Some Preference on PM Skills	Equal Preference for both	Some Preference on the Other Factor	Significant Preference for the Other Factor
PM Skills vs. understanding Organizational Factors	○	○	○	○	○
PM Skills vs. understanding Complexity Factors	○	○	○	○	○
PM Skills vs. understanding Social Factors	○	○	○	○	○
PM Skills vs. addressing Senior Management Factors	○	○	○	○	○

Figure 6. Sample of a pairwise comparison between Project Management skills and other factors as it was presented in the survey (Survey Question 7a).

The results of the pairwise comparison were converted into a numerical value between 1 and 5. One represented an equal preference while 5 represented a significant preference of one variable over the other. Based on the formulas used to convert the results into a numerical ranking, the results show that good project management skills ranked highest followed by organizational factors and senior management factors (see Table 6).

Table 6

Results of Analytical Hierarchy Ranking of Project Management Factors

	PM Skills	Organizational Factors	Complexity Factors	Social Factors	Senior Management Factors	AHP Ranking
PM Skills	1	1	3	3	1	23.52%
Organizational Factors	1	1	3	2	1	21.68%
Complexity Factors	1/3	1/3	1	1	1/2	8.53%
Social Factors	1/3	1/2	1	1	1/2	9.25%
Senior Management Factors	1	1	2	2	1	20.02%

Hypothesis 1

$H1_0$: There is no relationship between project management performance and membership within a community of practice.

$H1_1$: There is a positive relationship between project management performance and membership within a community of practice.

The first hypothesis was that membership in a CoP had a positive impact on project management performance. Table 7 presents a summary of the results for each of the variables measuring performance. The survey questions asked participants to gauge, using a Likert-style scale, how much CAPP had helped them with each variable. For example, subjects were asked if their project management (PM) hard skills had improved through CAPP sessions. For this variable, the most common response was *Somewhat*,

which 43.7% endorsed. A similar distribution of responses was seen for soft skills, whereby the largest response (46%) said their soft skills also improved Somewhat.

The pattern of favorable responses repeats itself across this subset of questions. All of the variables, with the exception of identifying hidden complexities, resulted in the majority of respondents indicating they believed CAPP contributed somewhat to their understanding or improvement of that topic. Again, only when asked if CAPP sessions improved their ability to identify hidden complexities were answers a bit more pessimistic with 32.6% responding with *Not Sure*, 26.7% indicating *Very Little*, and 10.5% saying *Not at All*. Answers were most positive for the questions regarding social interactions and job satisfaction. In these categories, the combined percentage that favorably answered with significantly or somewhat ranged between 65 and 83%.

Overall, the results shown in Table 7 are consistent with CAPP involvement improving skills and satisfaction. Table 8 presents Spearman's rho correlations between these same variables and shows that subjects who were more positive on one item tended to be positive on the others as well. Every correlation was positive and significant at the .01 level. In terms of size, the correlations were moderate to strong. Based on these results, these correlations reject the Null Hypothesis 1 and consequently finds significant support of a positive relationship.

Table 7

Summary of Variables (*N* = 91)

Survey Question / Variable	Significantly	Somewhat	Not Sure	Very Little	Not at All
13. Improved Hard Skills	8.0	43.7	39.1	6.9	2.3
14. Improved Soft Skills	6.9	46.0	39.1	5.7	2.3
15. Understanding of Processes	12.8	40.7	27.9	12.8	5.8
16. Maturation of Company's PM Methodology	29.1	39.5	15.1	10.5	5.8
17. Improving PM in Complex Environment	9.3	37.2	30.2	16.3	7.0
18. Identify Hidden Complexities	4.7	25.6	32.6	26.7	10.5
19. Find Satisfaction in Interactions	36.0	47.7	7.0	5.8	3.5
20. Increase Job Satisfaction	19.8	51.2	10.5	9.3	9.3
26. Your Skills, Productivity, & Satisfaction	9.3	66.3	10.5	9.3	4.7
27. Member Skills, Productivity, & Satisfaction	12.8	52.3	20.9	11.6	2.3

Table 8

Spearman's Rho Between Variables (*N* = 91)

	Hard Skills	Soft Skills	Processes	Maturation	Complex Environ.
Hard Skill	1.00				
Soft Skills	0.59	1.00			
Processes	0.39	0.41	1.00		
Maturation	0.42	0.47	0.54	1.00	
Complex Environment	0.55	0.52	0.54	0.49	1.00
Hidden Complexities	0.50	0.52	0.48	0.47	0.71
Satisfaction Interactions	0.39	0.42	0.49	0.43	0.42
Job Satisfaction	0.40	0.40	0.40	0.39	0.39
Own Skills/Product/Satisfaction	0.49	0.55	0.51	0.49	0.59
Member Skills/Product/Satisfaction	0.30	0.42	0.48	0.51	0.53

Table 8 (cont.)

Spearman's Rho Between Variables (*N* = 91)

	Hidden Complex	Sat. Interact.	Job Satis.	Own Skills	Member Skills
Hidden Complexities	1.00				
Satisfaction Interactions	0.38	1.00			
Job Satisfaction	0.39	0.56	1.00		
Own Skills/Productivity/Satisfaction	0.43	0.67	0.61	1.00	
Members Skills/Productivity/Satisfaction	0.47	0.42	0.51	0.65	1.00

Note. All correlations significant at .01 level.

Hypothesis 2

$H2_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H2_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

The second hypothesis is that a project manager's experience influences the perceived value of membership, as measured by the variables in Tables 7 and 8. Table 9 presents Spearman's rho correlations between the experience variable and each of the other variables.

Table 9

Spearman's Rho between Experience and Other Variables (*N* = 91)

	Rho	P
Hard Skill	0.10	0.38
Soft Skills	0.02	0.89
Processes	0.05	0.63
Maturation	-0.06	0.59
Complex Environ.	0.02	0.87
Hidden Complex.	-0.03	0.78

Satisfaction from Interactions	0.00	0.97
Job Satisfaction	-0.21	0.06
Own Skills/Productivity/Satisfaction	-0.03	0.76
Member Skills/Productivity/Satisfaction	-0.20	0.07

** $p < .01$.

None of the correlations turn out to be significant at the .05 level. The largest correlations are with job satisfaction (*rho* = -.021, $p = .06$) and member skills, productivity, and satisfaction (*rho* = -.20, $p = .07$). Both of these correlations are negative, meaning that the performance and satisfaction variables tend to be lower (i.e., more negative) as experience levels go up. However, the p-values are just short of significance. Therefore, there is not enough evidence to reject the null hypothesis of no relationship between experience and the perceived value of membership.

Hypothesis 3

$H3_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H3_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's certification level.

The third hypothesis is that there is a relationship between the project manager's certification level and the perceived valued of membership based on previously discussed variables in Table 9 (Hypothesis 2). Because there were only four participants with a certification that was not PMP, a variable was created that equaled 1 if the respondent had any certification (PMP or CAPM) and 0 if there was no certification. The results of the Spearman's rho analysis are in Table 10.

Two of the 10 correlations result in significance. The relationship between certification and satisfaction from CAPP interactions is positive and moderate at .25 (p = .02). That is, those who have a certification tend to answer more positively about satisfaction from interactions. Likewise, certification correlates positively and significantly with the respondent's own skills, productivity, and satisfaction (rho = .24, *p* = .03). The remaining correlations are not significant, however, so the hypothesis only finds partial support.

Table 10

Spearman's Rho between Certification and Other Variables (*N* = 91)

	Rho	p
Hard Skill	0.01	0.96
Soft Skills	0.10	0.36
Processes	0.08	0.46
Maturation	0.08	0.44
Complex Environ.	0.05	0.66
Hidden Complex.	0.01	0.93
Satisfaction from Interactions	0.25**	0.02
Job Satisfaction	0.02	0.88
Own Skills/Productivity/Satisfaction	0.24*	0.03
Member Skills/Productivity/Satisfaction	0.11	0.30

Hypothesis 4

$H4_0$: There is no difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

$H4_1$: There is a significant difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

The final hypothesis is that time spent working at the company will correlate with perceived value of membership in a CoP. The results of the Spearman's rho analysis

appear in Table 11. None of the correlations appear to be significant. The largest correlations are between tenure at the company and improvement in understanding project management processes (rho = .21, p = .06) as well as between tenure at the company and identifying hidden complexities (rho = .18, p = .09). These are moderate in size, but the p-values fall just shy of significance. Thus, the null hypotheses of no relationship with tenure with the organization cannot be rejected.

Table 11

Spearman's Rho between Tenure and Other Variables (N = 91)

	Rho	p
Hard Skill	0.16	0.15
Soft Skills	-0.01	0.95
Processes	0.21	0.06
Maturation	0.12	0.28
Complex Environ.	0.17	0.13
Hidden Complex.	0.18	0.09
Satisfaction from Interactions	0.14	0.21
Job Satisfaction	0.01	0.92
Own Skills/Productivity/Satisfaction	0.14	0.20
Member Skills/Productivity/Satisfaction	0.07	0.53

Other Factors

Originally, I did not intend for characteristics, such as gender and length of time as a CoP member to be factors tested for this study. However, because I included these factors as questions in the survey, it made sense to analyze the results under Hypothesis 1 and determine if there were any significant differences based on gender and the number of years as a member. I used t tests to test whether average answers were significantly different when the independent variable is nominal (i.e., gender). Means and standard errors of the mean are reported along with the t tests. The average response among

females as to whether or not the training improved hard skills was 3.463 (*SE* = .117), while the average among males was 3.515 (*SE* = .138). This difference is small, yielding a non-significant *t* test (*t* = -282, *p* = .78). A similar pattern of responses and non-significant differences occurred across the table (see Table 12).

Table 12

Summary of Variables by Gender

Survey Question / Variable	Mean	SE	t	p
13. Improved Hard Skills				
Female	3.463	0.117	-0.282	0.78
Male	3.515	0.138		
14. Improved Soft Skills				
Female	3.537	0.105	0.632	0.529
Male	3.424	0.151		
15. Understanding of Processes				
Female	3.358	0.15	-0.666	0.507
Male	3.515	0.175		
16. Maturation of Company's PM Methodology				
Female	3.792	0.162	0.37	0.712
Male	3.697	0.197		
17. Improving PM in Complex Environment				
Female	3.962	0.138	1.563	0.122
Male	3.03	0.197		
18. Identify Hidden Complexities				
Female	2.906	0.148	0.37	0.712
Male	2.818	0.182		
19. Find Satisfaction in Interactions				
Female	4.226	0.128	1.884	0.063
Male	3.818	0.182		
20. Increase Job Satisfaction				
Female	3.642	0.162	0.179	0.858
Male	3.594	0.215		
26. Your Skills, Productivity, & Satisfaction				
Female	3.698	0.131	0.646	0.52
Male	3.563	0.162		
27. Member Skills, Productivity, & Satisfaction				
Female	3.585	0.141	-0.192	0.848
Male	3.625	0.133		

As indicated in Table 12, none of the p-values on the gender categorized responses came in at less than .05. The closest is the variable of finding satisfaction in interactions (t = 1.884, p = .063). However, as there are ten tests in the table, one may expect a nearly significant result simply due to chance. Thus, there is not enough evidence to reject a null hypothesis of no gender differences for these survey questions.

Next, I broke down answers according to the year in which the respondent joined CAPP. Under this approach, none of the relationships yielded a p-value below .10 (see Table 13). For instance, the variable of improving project management in a complex environment was typical of this non-relationship. The average score on that question for somebody who joined CAPP from 2005 to 2006 was 3.409 (SE = .157). For a member who joined between 2007 and 2008 the average was 3.077 (SE = .241), and for somebody joining more recently (i.e., 2009-2012) the average was 3.125 (SE = .202). This factor yielded a small negative but non-significant correlation coefficient (ρ = -.148, p = .175).

Table 13

Summary of Variables by Year Joined CAPP

Survey Question / Variable	Mean	SE	rho	P
13. Improved Hard Skills				
2005-2006	3.545	0.119	-0.088	0.419
2007-2008	3.407	0.187		
2009 or Later	3.438	0.182		
14. Improved Soft Skills				
2005-2006	3.614	0.109	-0.127	0.243
2007-2008	3.37	0.194		
2009 or Later	3.375	0.155		
15. Understanding of Processes				
2005-2006	3.568	0.157	-0.142	0.193
2007-2008	3.192	0.235		
2009 or Later	3.375	0.202		
16. Maturation of Company's PM Methodology				

2005-2006	3.909	0.165	-0.138	0.206
2007-2008	3.577	0.255		
2009 or Later	3.625	0.272		
17. Improving PM in Complex Environment				
2005-2006	3.409	0.157	-0.148	0.175
2007-2008	3.077	0.241		
2009 or Later	3.125	0.202		
18. Identify Hidden Complexities				
2005-2006	2.932	0.167	-0.051	0.644
2007-2008	2.769	0.217		
2009 or Later	2.875	0.221		
19. Find Satisfaction in Interactions				
2005-2006	4.114	0.127	-0.008	0.943
2007-2008	4.077	0.228		
2009 or Later	3.938	0.281		
20. Increase Job Satisfaction				
2005-2006	3.659	0.162	0.028	0.801
2007-2008	3.52	0.259		
2009 or Later	3.688	0.338		
26. Your Skills, Productivity, & Satisfaction				
2005-2006	3.795	0.124	-0.161	0.141
2007-2008	3.52	0.267		
2009 or Later	3.438	0.241		
27. Member Skills, Productivity, & Satisfaction				
2005-2006	3.614	0.139	-0.019	0.866
2007-2008	3.68	0.18		
2009 or Later	3.438	0.258		

A similar deduction about the small negative but non-significant correlation coefficient can also be made about the responses for improvement of skills, productivity, and job satisfaction ($\rho = -.161$, $p = .141$). As a result, one cannot reject a null hypothesis of no relationship between responses and the year in which somebody joined CAPP.

Qualitative Analysis

Research Question 1

Research Question 1 asked, How do project management communities of practice help organizations and individuals improve their project management performance? In

order to answer this it was necessary to ask the CAPP members in the survey, but also get the opinion of managers within the case study organization.

Survey Questions 19, 20, 26, and 27 were used to help answer this research question. Recall that from the earlier Hypothesis 1 section, there was a significant positive relationship and, in particular, these four variables (see Table 14). For these specific survey questions, the respondents were given a comment box to provide explanations or examples to their answers. It was in this area that I captured responses and analyzed them for themes. I categorized the most common responses regarding the benefits of CAPP into the following themes: sharing ideas and information, networking, PDU and training opportunities, and reinforcement of project management skills (see Table 15).

Table 14

Summary of Results ($N = 91$)

Survey Question / Variable	Significantly	Somewhat	Not Sure	Very Little	Not at All
19. Find Satisfaction in Interactions	36.0	47.7	7.0	5.8	3.5
20. Increase Job Satisfaction	19.8	51.2	10.5	9.3	9.3
26. Your Skills, Productivity, & Satisfaction	9.3	66.3	10.5	9.3	4.7
27. Member Skills, Productivity, & Satisfaction	12.8	52.3	20.9	11.6	2.3

Table 15

Research Question 1 – Member Themes

Theme 1	Ability to share ideas and information
Theme 2	Socializing and networking
Theme 3	PDU and training opportunities through symposiums and other sessions
Theme 4	Reinforcement of project management skills

Based on the results of the survey questions in Table 14, I was able to break it down further. First, the answers from certified members rated higher than those of non-certified members on all of the questions. While no particular demographic group was significantly stronger than the others were when it came to these responses, still, women responded slightly higher on the survey questions regarding satisfaction in interactions, job satisfaction, and overall improvement in skills and productivity. In addition, longer standing members and employees rated only slightly higher on Survey Questions 19 and 26. This is not to say that there was any significant correlations, but only to present a different perspective of the results.

The managers that I interviewed shared a different perception of the benefit and impact of CAPP compared to the actual members. While all of the interviewees believed that CoPs have some benefit to individuals and the organization, each of them struggled because there was very little measurable evidence to show whether it did or not. Interview Question 6 asked, To what degree to you believe CAPP has been responsible in the overall project success rate of the company? All of the interviewees felt the degree of responsibility was low, since they also believed that the organization's project overall

success rate was low. This will contradict what is being reported in the company's project health scorecard later in this study.

The managers were also asked, To what degree to you believe CAPP has been responsible in the overall teaching and adoption of the company's project management methodology? On this point the managers held a common theme, which was that CAPP helped in providing a forum for and communicating the company's methodology more so than being directly responsible for the creation or implementation of the methodology. For example, Ned responded,

> The role for CAPP was to provide a forum to bring the methodology body and the practitioner people together and I think CAPP did that. Did CAPP actually teach folks about the methodology? Not CAPP per se, but again I don't think that was CAPP's role. To me, the CAPP role was to provide the community and then bring the community and the methodology folks, who by the way are part of that community as well, together.

Pam responded,

> CAPP has been a receptacle; they are the receiver of the communication and not the instigator of the communication. The PMO would use the CAPP community as a sounding board or vehicle when ready to say here's what's going to change or what has changed depending on the timing. I think they [CAPP] were involved, but they were the receivers [of information].

Secondary Question 1

Secondary Question 1 asked, Which project success/failure factors are most important for project management CoPs to address? This question was answered in the earlier section in Chapter 4 under Project Success/Failure Factors. Based on the results of using an analytical hierarchy ranking process, the study showed that the CAPP group placed the highest preference on good project management skills, followed by organizational factors and senior management factors (see Table 6). Conversely, social factors and complexity factors ranked the lowest.

Secondary Question 2

Secondary Question 2 asked, How do CoPs improve member's project management skills? Recall that in the previous Hypothesis 1 section (Table 7), a positive relationship was shown between membership within CAPP and improved hard and soft skills. In addition, responses to the survey revealed that slightly more than half of the participants believed that hard and soft skills are equally important in project management, while 38% placed somewhat or much more importance on soft skills (see Table 16).

Table 16

Survey Question 12 Results ($N = 91$)

12. Rate the level of importance you believe that project management hard skills are in comparison to those of soft skills. Response Option	Response %	Response Count
Hard skills much more important than soft skills	2.3%	2
Hard skills somewhat more important than soft skills	6.9%	6
Equally important	50.6%	44

Soft skills somewhat more important than hard skills	21.8%	19
Soft skills much more important than hard skills	18.4%	16

As a supplemental part of Survey Questions 13 and 14, I also asked respondents to describe their hard and soft skill learning experiences through CAPP. Their answers were coded for themes as to the most common examples of areas of improvement (see Table 17).

Table 17

Secondary Question 2 – Member Themes

Hard Skills	
Theme 1	Improved hard skills related to understanding the organization's PMO processes
Theme 2	Risk management skills improved
Theme 3	Project planning skills improved
Soft Skills	
Theme 1	Project management symposium topics were beneficial
Theme 2	Share ideas, experience, and information
Theme 3	Socializing and networking

Secondary Question 3

Secondary Question 3 asked, How do CoPs improve members' understanding of technical or complex issues? Recall that in the earlier Hypothesis 1 section, a positive relationship was shown between project management performance and membership within CAPP (Table 7). All of the variables, with the exception of identifying hidden complexities, resulted in the majority of respondents indicating they believed CAPP contributed somewhat to their understanding or improvement of that topic (see Table 18).

This category resulted in the weakest of ratings by the respondents. Yet, two groups rated higher on Survey Questions 17 and 18; these were women and longer termed employees. However, neither group were near significance in their results.

Table 18

Summary of Complexity Variables ($N = 91$)

Survey Question	Significantly	Somewhat	Not Sure	Very Little	Not at All
17. My understanding of techniques for improving project management in a complex project environment has increased as a result of my involvement in CAPP sessions?	9.3	37.2	30.2	16.3	7.0
18. My ability to identify hidden complexities within a project environment has improved as a result of my involvement in CAPP sessions.	4.7	25.6	32.6	26.7	10.5

As with most of the survey questions, I added a comment section for the subjects to explain their answers or provide examples. For Survey Questions 17 and 18 there were few substantial comments to draw any positive themes (see Table 19). The most common response was that techniques were discussed, but application of the techniques were never realized.

Table 19

Secondary Question 3 – Member Themes

Theme 1	Techniques were discussed, but limited.
Theme 2	CAPP provided very little in the way of identifying project complexities.
Theme 3	Individual experience played a bigger part in identifying complexities, rather than CAPP's involvement.

Secondary Question 4

Secondary Question 4 asked, In what ways do CoPs improve member's understanding of organizational processes or policies? In order to answer this question, I relied on the results from the survey, but also the responses from the interviews with the managers. In the Hypothesis 1 section, a positive relationship was shown between project management performance and membership within CAPP. The variables used in that hypothesis test included Survey Questions 15 and 16, which relate to understanding organizational processes and influence on the company's project management methodology. Table 20 shows the results from those survey questions.

Table 20

Results of Organizational Variables ($N = 91$)

Survey Question / Variable	Significantly	Somewhat	Not Sure	Very Little	Not at All
15. My understanding of organizational processes and how they affect my project performance has improved as a result of my involvement in CAPP sessions.	12.8	40.7	27.9	12.8	5.8
16. I believe that CAPP has influenced the maturation of the company's project management methodology.	29.1	39.5	15.1	10.5	5.8

As a supplemental part of Survey Questions 15 and 16, respondents were also asked to explain their answers or describe their learning experiences of organizational processes through CAPP. I coded the respondents' answers for themes as shown in Table 21.

Table 21

Secondary Question 4 – Member Themes

Organizational Process Understanding	
Theme 1	CAPP offered a forum for discussing organizational processes
Theme 2	CAPP did not focus enough on organizational processes
Theme 3	Criticisms around the organization's processes
Maturation of the Project Management Methodology	
Theme 1	CAPP had early influence in the company's PM methodology and PM certification
Theme 2	EPMO created the methodology and CAPP helped communicate it
Theme 3	CAPP had influence on the methodology, but not sure to what extent.
Theme 4	CAPP promoted the EPMO processes
Theme 5	The organization's methodology had very little influence from CAPP and the project managers

In order to help further answer Secondary Question 4, the interviewees (managers) were asked, What effect do you believe CAPP has been in informing and preparing members about organizational changes in processes, resources, and policies? Half of them responded that they did not know. The other half said that CAPP did well at informing and preparing members about organizational changes and that CAPP served as the forum and communicator of new PMO changes. For example, Pam responded,

> When the PMO's were formed and took ownership of methodology. CAPP was used as a vehicle for communication of change. At almost every meeting there was a section dedicated to what is new as far as process and methodology. When the meetings became quarterly, I don't know if that was as current in the communication, but it was a vehicle that the PMOs took advantage of to communicate.

Next, the interviewees were asked, Do you believe that CAPP has had any influence (positive or negative) in the maturation of the company's project management methodology? The consensus among the interviewees was that CAPP had some positive influence in the maturation of the company's project management methodology, but only in the early stages of the community's development. There were no negative influences expressed by any of the interviewees. Examples of positive influences included bringing in PMI standards and principles, certification of project managers, and development of the company's PMO. However, if CAPP had any influence on the early maturation of the company's project management methodology, the interviewees believed that CAPP did little to keep that influence after the PMO was formed.

Secondary Question 5

Secondary Question 5 asked, *How do CoPs gain senior management support?* In order to answer this question, I relied on the results, in part, from Survey Questions 23 and 24, but also the responses from the interviews with the managers. Table 22 shows the results from those survey questions.

Table 22

Results of Senior Management Variables (N=91)

Survey Question / Variable	Significantly	Somewhat	Not Sure	Very Little	Not at All
23. I believe that senior management is being made aware of project management issues (challenges) through communications with CAPP.	24.4	30.2	20.9	16.3	8.1

24. I believe senior management supports CAPP and its objectives.	19.8	36.0	24.4	17.4	2.3

For Survey Questions 23 and 24, I wanted to know if there was a correlation of the responses and the amount of time the employee has with the company. There were no significant trends in answers as job tenure increases. In terms of beliefs that senior management is being made aware of project management issues through communications with CAPP, the correlation was only .027 ($p = .810$). In terms of beliefs that senior management supports CAPP and its objectives, the correlation is only .078 ($p = .468$). Thus, there does not appear to be evidence those beliefs about senior management change with job experience.

As a supplemental part of Survey Questions 23 and 24, respondents were also provided with a comment field to explain their answers. I coded their answers for themes as shown in Table 23.

Table 23

Secondary Question 5 – Member Themes

Senior Management Awareness	
Theme 1	Agree that awareness was made, but not sure anything was done.
Theme 2	No clear evidence or feedback of what was conveyed to management or the results.
Theme 3	Not sure that management cares about the problems or challenges that project managers are having.

Senior Management Support	
Theme 1	Some do, most don't.
Theme 2	Superficial support versus actual support.
Theme 3	Senior management is in support of the idea of having CAPP or some other COE
Theme 4	Seems like they do not, since CAPP is disbanding.

In order to get the opposing perspective, the managers interviewed were asked, How effective do you believe CAPP has been in keeping senior management aware of project management issues? All but one participant said not effective. Ned, the one person that gave a slightly different opinion responded,

> My sense is that they have done okay. I don't think that when [the company's Chief Technology Officer] thinks there's something wrong with our project management, I don't think his first thought is to pull a CAPP meeting together and see what's going on. That said, I do think when there has been the quarterly update meeting… I think he did glean some things out of there that he might not have heard elsewhere.

Next, I asked the interviewees, Do you believe that senior management adequately supports CAPP and its objectives? The answers given were mixed. Two managers responded to the affirmative. The remaining interviewees responded that senior management support was minimal or insubstantial. Of the managers that explained the reasons for the lack of support, the common theme was that CAPP failed to demonstrate the value to the company. For example, Pam responded,

> No. I think that this is because we as CAPP did not do a very good job of really clarifying and sticking to what we wanted to do. So, we had a mission and objectives and I think management understood those. But, we didn't have any way to demonstrate the value. I think they wanted to, but we couldn't give them enough to substantiate or warrant their support.

Secondary Question 6

Secondary Question 6 asked, *In what ways do CoPs improve member's human relationship (social networking and people management) skills?* This section was one of the stronger categories, whereby over 75% of the respondents indicated that they had either significantly or somewhat benefited from networking with or better understanding the challenges being faced by other project managers within the company (see Table 24).

Table 24

Results of Social Skills Variables (N=91)

Survey Question / Variable	Significantly	Somewhat	Not Sure	Very Little	Not at All
21. I have been able to network with co-workers from other departments through my involvement with CAPP.	17.4	58.1	8.1	10.5	5.8
22. CAPP allows me to better understand the challenges and perspectives that my project manager colleagues are experiencing.	32.6	55.8	5.8	2.3	3.5

For responses to Survey Questions 21 and 22, I analyzed the results further to see if there was a correlation between any demographic group and the social skills variables. The questions were reviewed by gender, time spent as project manager, time spent with the company, year of joining CAPP, and certification status. Neither of the questions showed significant differences by gender, time spent as project manager, or time spent with the company. All of the means were relatively close to each other, and the p-values were all much greater than .05. However, there was a small negative relationship with answers to the statement, *I have been able to network with co-workers from other departments through my involvement with CAPP* (see Table 25). For those who joined

CAPP prior to 2007, the average response was 3.909 (*SE* = .133). This dropped to 3.52 (*SE* = .265) among those who joined in 2007 or 2008, and it dropped slightly further to 3.438 (*SE* = .258) among more recent joiners. This yielded a negative correlation of -.188, but the p-value of .084 was shy of significance. It should be no surprise, because this only means that the longer that members have been in CAPP, the more they have been able to network with others. The other question about understanding the challenges of their project manager colleagues had even weaker relationships with gender, time spent as project manager, time spent with the company, year of joining CAPP, and certification status.

Table 25

Summary of Variables by Year Joining CAPP

Survey Question / Variable	Mean	SE	rho	p
21. I have been able to network with co-workers from other departments through my involvement with CAPP.				
2005-2006	3.909	0.133	-0.188	0.084
2007-2008	3.52	0.265		
2009 or Later	3.438	0.258		
22. CAPP allows me to better understand the challenges and perspectives that my project manager colleagues are experiencing.				
2005-2006	4.227	0.102	-0.1	0.362
2007-2008	3.96	0.241		
2009 or Later	4	0.204		

Secondary Question 7

Secondary Question 7 asked, *What are the perceived benefits to the member for participating in a CoP*? Since Survey Questions 19, 20, 26, and 27 were already analyzed in Research Question 1 and Hypothesis 1 with some positive results, this section looks at

Survey Questions 8 and 25 for more depth. Survey Question 8 asked the participant to rate the importance of each of the objectives that CAPP was meant to offer. Over half of the respondents rated offering free PDUs, teaching best practices, and recommending process and methods improvements as being very important (see Table 26).

Table 26

Responses to Survey Question 8 – Importance of CAPP's Objectives to its Members

	Very Important	Somewhat Important	Neither Important nor Unimportant	Somewhat Unimportant	Very Unimportant
Offer free PDUs to its members	64.8% (57)	22.7% (20)	8.0% (7)	0.0% (0)	4.5% (4)
Networking with other Project Managers within the organization	43.2% (38)	37.5% (33)	15.9% (14)	2.3% (2)	1.1% (1)
Teach best practices and other learning opportunities	59.1% (52)	28.4% (25)	8.0% (7)	3.4% (3)	1.1% (1)
Recommend improvements to the methods and processes used within the organization	52.3% (46)	34.1% (30)	9.1% (8)	3.4% (3)	1.1% (1)
Champion the company's PM methodology	40.9% (36)	40.9 (36)	10.2% (9)	4.5% (4)	3.4% (3)
Serve as a collective voice for bringing concern to senior management	44.3% (39)	36.4% (32)	11.4% (10)	5.7% (5)	2.3% (2)
Assist project managers with learning the existing processes and techniques.	40.9% (36)	42.0% (37)	13.6% (12)	2.3% (2)	1.1% (1)

Keep members current on PMI and industry standards	35.2% (31)	40.9% (36)	14.8% (13)	8.0% (7)	1.1% (1)
Provide a forum for lessons learned	36.4% (32)	37.5% (33)	14.8% (13)	8.0% (7)	3.4% (3)
Promote discussions on current topics or practices	42.0% (37)	45.5% (40)	6.8% (6)	4.5% (4)	1.1% (1)

The results from Survey Question 8 regarding CAPP's objectives coincide with the results from Survey Question 25, which asked the participant to select their reasons for joining the group. In this case, obtaining free PDUs, networking with other project managers, and learning best practices were identified as the most popular reasons (see Figure 7).

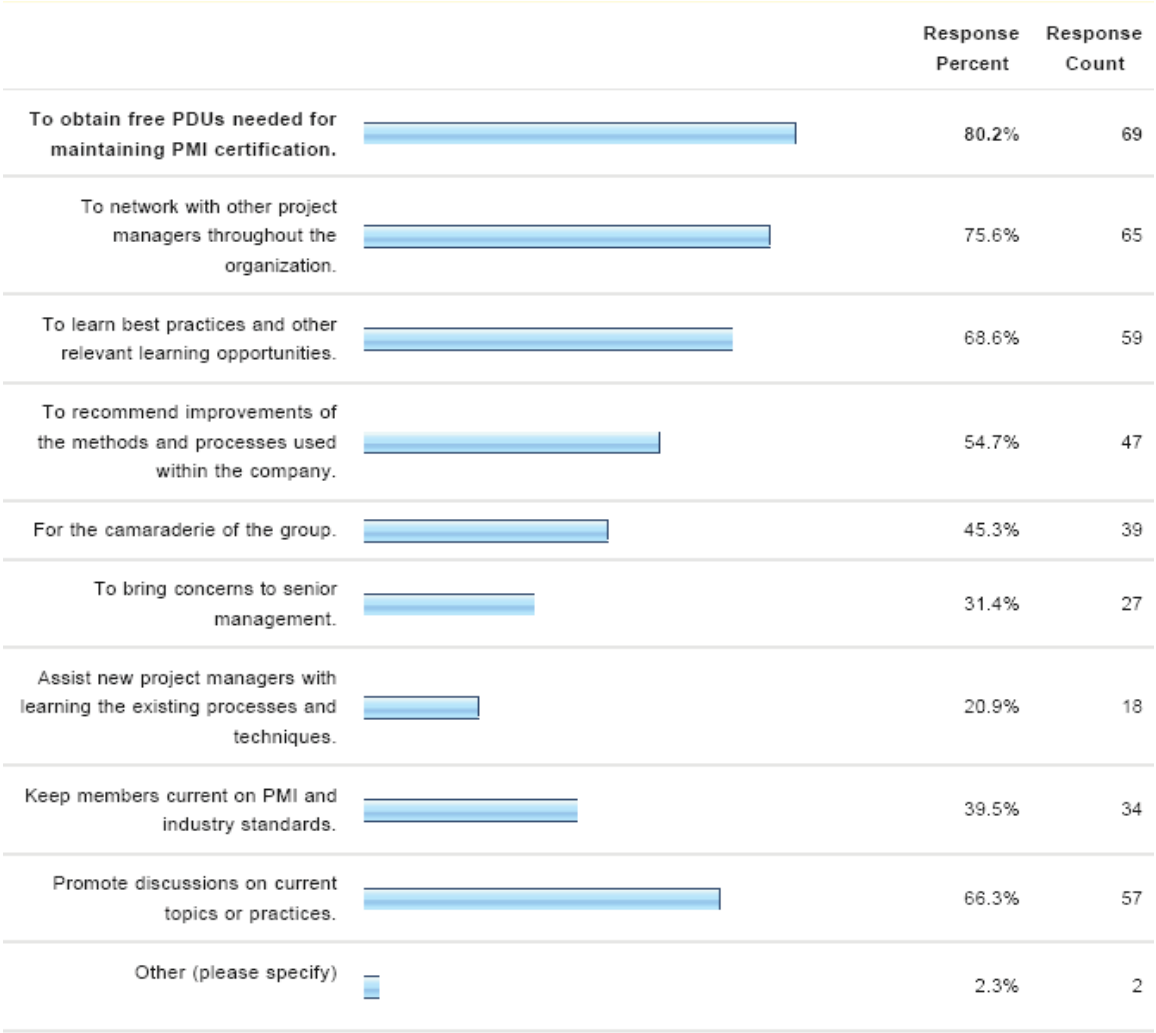


Figure 7. Results of Survey Question 8 regarding reasons for joining CAPP.

Secondary Question 8

Secondary Question 8 asked, What are the perceived benefits to the organization for supporting a CoP? In order to answer this question, I relied on the results from Survey Question 28, but mainly the responses from the interviews with the managers. Table 27 shows the results from those survey question.

Table 27

Results of Organizational Project Success Question (*N* = 91)

Survey Question / Variable	Significantly	Somewhat	Not Sure	Very Little	Not at All
28. To what degree do you believe CAPP contributed in the overall project success rates within the organization?	16.3	36.0	23.3	20.9	3.5

For responses to Survey Question 28, I analyzed the results further to see if there was a relationship between any demographic group and the belief that CAPP contributed to the overall project success rate within the organization. Again, the responses were reviewed by gender, time spent as project manager, time spent with the company, year of joining CAPP, and certification status. Most of the responses showed no significant differences by gender, time spent as project manager, or certification. All of the means were relatively close to each other, and the p-values were all much greater than .05. However, the amount of time a member has been with the company was the closest to having a relationship. Those working less than 7 years had an average score of 3 (*SE* = .257) on the scale; those working 7 to 10 years had an average of 3.286 (*SE* = .266); and those working longer had an average score of 3.509 (*SE* = .150). While this led to a positive correlation between the two variables of .177, the p-value was short of significance (*p* = .105). Thus, there is not enough evidence to reject the null hypothesis of no relationship between this questions and time spent with the company.

As a supplemental part of Survey Question 28, I provided respondents with a comment field to explain their answer. Table 28 shows the themes coded from the answers.

Table 28

Secondary Question 8 – Member Themes

Theme 1	CAPP was successful as it contributed to standardization, better navigation, common language, and/or improved PM skills
Theme 2	CAPP had little impact on the company's overall project success rate
Theme 3	Criticisms towards the organization's processes
Theme 4	Believe that project success is subjective and is not tracked properly

The first interview question was intended to help answer Secondary Question 9, by identifying the perceived benefits to the organization for supporting a CoP. I asked the interviewees, What do you believe are the benefits, if any, of having a community of practice like CAPP? The responses were similar in nature. Each respondent felt it provided a good forum for networking, exchanging ideas, best practices, lessons learned, and discussing challenges. However, each of them struggled with how effective CAPP really was since it was difficult to measure the results. For instance, Ned responded,

> I think it became an opportunity for folks to come together and informally share their concerns but, I'm not sure that there were any actionable items that came out of there. I hope there was for the group, but I can say from a management perception or perspective that I don't think there was.

Clara answered,

> I think that for the folks who participated, I got the feeling that they thought it was helpful, but I can't give you anything tangible. I've always been unsure about the tangible effects. Did they learn something? Was that helpful? But how do you translate that back into project execution, I could never link it.

Next, I asked the interviewees, Do you believe that a CoP is or can be an effective form over other organizational learning methods? Despite any prior criticisms of CAPP and its effectiveness as a group, all of the interviewees believed that CoPs are or can be an effective form of organizational learning. In fact, almost all of the interviewees specifically cited the need for informal as well as formal methods of organizational learning. For example, Beth answered,

> I do think it can be of value. I know for me, I've been over the course of my career…maybe they weren't formal CoPs, but certainly a network of people that I could rely on that we would sometimes meet regularly and I had huge value in that. We would talk about issues or things. I think whether it's formally or informally endorsed as long as there's a mission and we're making sure that we're sticking to it. I think they can be of value.

Ned replied,

> Absolutely. I think in any organization when you're talking about learning you need different mechanisms you need the formal, you need the informal, you need a combination of all of those things.

Corporate Records

The case study organization has been using a monthly scorecard to report divisional performance objectives to their Chief Information Officer (CIO). These weighted factors included Risk Management (30%), Financial Success (30%), Project Execution (25%), Transformation (10%), and Diversity Management (5%). For each factor, a color code of green, yellow, or red was used as a status indicator of the initiatives being performed in those categories.

I reviewed the scorecards from 2008-2011 specifically for the project execution ratings. Under this reporting system, a green status meant that the majority of the projects in the I.S. portfolio were either meeting or exceeding their defined success measures. An example of a defined success measure is whether a project completed within a month of scheduled and less than 10% cost overrun. The company set 75% or higher of the project portfolio as meeting expectations and 85% or higher as exceeding expectations when tracking project closing schedules to less than one month. Conversely, the project cost success measure increased from 75-85% in 2008 to 80-90% in 2009, and then 85-95% in 2010. Therefore, a yellow status meant that some projects had not completed on time or within budget or projects were intentionally delayed during the year to reduce expense. Lastly, a red status meant that a significant number of projects were not completed on time or within budget.

A summary of the Project Scorecard results is shown in Table 29. August and December were used as milestones for review in this study. Based on this collection of performance data, the case study organization appears to have progressively improved

since 2008. The company did fall back into a yellow status briefly in August 2011, which has been explained because of an acquisition and conversation of another financial institute. The Project Scorecard seems to be in contrast with the responses of the managers interviewed, since all of them indicated that company is not where it needs to be in terms of their project success rate. This would mean that either the scorecard paints a rosier picture of the company's actual project performance or that project success is being measured in a subjective way apart from this scorecard.

Table 29

Summary of Project Scorecard Results (2008-2011)

Date	Status	Project Portfolio	Results
Aug 2008	Red	71 total projects: 15 completed, 56 in-progress	Of the 15 completed projects: Schedule: • 1 completed less than one month late • 7 completed less than 3 months late • 7 completed more than 3 months late Cost: • 12 projects with less than 10% cost overrun
Dec 2008	Yellow	67 total projects: 29 completed, 36 in-progress, 2 on-hold	Of the 29 completed projects: Schedule: • 14 completed less than one month late • 7 completed less than 3 months late • 8 completed more than 3 months late Cost: • 26 projects with less than 10% cost overrun
Aug 2009	Yellow	54 total projects: 16 completed, 32 in-progress, 6 on-hold	Of the 16 completed projects: Schedule: • 11 completed less than one month late • 1 completed less than 3 months late • 4 completed more than 3 months late Cost: • 16 projects with less than 10% cost overrun

Dec 2009	Green	58 total projects: 26 completed, 29 in-progress, 3 on-hold	Of the 26 completed projects: Schedule: • 21 completed less than one month late • 1 completed less than 3 months late • 4 completed more than 3 months late Cost: • 26 projects with less than 10% cost overrun
Aug 2010	Green	87 total projects: 31 completed, 51 in-progress, 4 on-hold, 1 withdrawn	Of the 31 completed projects: Schedule: • 27 completed less than one month late • 4 completed more than 1 month late Cost: • 30 projects with less than 10% cost overrun
Dec 2010	Green	114 total projects: 64 completed, 43 in-progress, 6 on-hold, 1 withdrawn	Of the 64 completed projects: Schedule: • 57 completed less than one month late • 7 completed more than 1 month late Cost: • 62 projects with less than 10% cost overrun
Aug 2011	Yellow / Green*	* Firm acquired another company, a large conversion project was tracked separately. 148 total projects: 30 completed, 108 in-progress, 10 on-hold	Of the 30 completed projects: Schedule: • 22 completed less than one month late • 8 completed more than 1 month late Cost: • 30 projects with less than 10% cost overrun
Dec 2011	Green / Green*	* Firm acquired another company, a large conversion project was tracked separately. 174 total projects: 58 completed, 101 in-progress, 15 on-hold	Of the 58 completed projects: Schedule: • 49 completed less than one month late • 9 completed more than 1 month late Cost: • 58 projects with less than 10% cost overrun Acquisition / conversion project was completed on-time and within budget.

Summary

In this chapter, the data from the 91 survey respondents, 6 interviewees, and 4 years of corporate records were analyzed in order to answer the nine research questions and four hypotheses put forth by this study. Descriptive statistics were presented to determine the demographics of the case study participants. Next, the results of a pairwise comparison ranking of project success factors by the survey participants was provided.

In Hypothesis 1, the relationship between project management performance and membership within a community of practice was examined by performing a Spearman's Rho correlation. The results indicated that every correlation was positive and significant at the .01 level. Based on these results, the Null Hypothesis 1 was rejected and therefore the study found significant support of a positive relationship.

The second hypothesis was that a project manager's experience influences the perceived value of membership, as measured by using 10 variables. Again, a Spearman's rho correlations analysis was performed between the experience variable and each of the other variables. The results indicated that none of the correlations turned out to be significant at the .05 level. The largest correlations were with job satisfaction (*rho* = -.021, p = .06) and member skills, productivity, and satisfaction (*rho* = -.20, p = .07). Both of these correlations were negative, meaning that the performance and satisfaction variables tend to be lower (i.e., more negative) as experience levels go up. However, the p-values are just short of significance. Therefore, there was not enough evidence to reject the null hypothesis of no relationship between experience and the perceived value of membership.

Hypothesis 3 sought to determine whether there is a relationship between the project manager's certification level and the perceived valued of membership based on previously identified variables. The results of the Spearman's rho analysis showed that only 2 of the 10 correlations turn out to be significant. The relationship between certification and satisfaction from CAPP interactions was positive and moderate at .25 (p = .02). That is to say, those who have a certification tended to answer more positively

about satisfaction from interactions. Similarly, certification correlates positively and significantly with the respondent's own skills, productivity, and satisfaction (*rho* = .24, *p* = .03). However, the remaining correlations were not significant, so the null hypothesis only found partial support.

The final hypothesis was that length of time spent working at the company will correlate with perceived value of membership in a CoP. The results of the Spearman's rho analysis revealed none of the correlations appear to be significant. The largest correlations were between tenure at the company and improvement in understanding project management processes (*rho* = .21, *p* = .06) as well as between tenure at the company and identifying hidden complexities (*rho* = .18, *p* = .09). These were moderate in size, but the p-values fell just shy of significance. Thus, the null hypotheses of no relationship with tenure with the organization cannot be rejected.

In Chapter 5, I present a summary of the case study findings, including study limitations, recommendations for future research, and conclusions. The chapter highlights the research questions and concludes with a discussion of positive social change implications of the study.

Chapter 5: Summary, Conclusions, and Recommendations

Overview

Again, the purpose of this mixed-methods case study was to determine whether internal project management CoPs were influential in improving project management performance in a midsized financial institution. As part of this study, I examined CoP research from other professions whose tasks or conditions are similar to those of project management to find studies in which CoPs resolved problems or improved conditions. The objective of this mixed-methods, case study was to examine a company undergoing multiple changes to its project management structure and the role of a CoP. The selected case was a mid-sized financial institution with both an organizational project management methodology and an active project management CoP.

This study did more than just address a lack of existing research on whether CoPs help to improve project performance. The study identified and examined elements of a CoP that provide value to both project manager and organization. Thus, the intent of the research was not to show that CoPs are any better than other alternatives, since each organization differs in size, industry, culture, maturity, and project methodology. Instead, the intent was to demonstrate the value of CoPs in mid- and large-sized companies, where project management experience varies significantly and members of project management teams extend across multiple departments or locations.

Chapter 5 provides a summary and interpretation of the findings of the collected data. This includes comparing the results to the literature discussed in Chapter 2. The

chapter includes limitations of the study, implications for social change, recommendations for action, recommendations for future research, and a conclusion.

Summary and Interpretation of the Findings

A sample of $N = 91$ CAPP members in the target organization completed the online survey. Of the 91 individuals surveyed, 62.6% were female and 37.4% were male. Data were collected based on project management experience, number of years with the company, number of years with CAPP (CoP) and certification level. Over half of the respondents, 55%, had substantial experience as project managers, with over 10 years of experience. A majority of respondents, 67%, had worked at the company for more than 10 years. Nearly half, 49.5%, had joined CAPP during its first 2 years (2005-2006), while 30.8% joined between 2007 and 2008. The most common certification was PMP, held by 79.1% of the sample.

Hypothesis 1

$H1_0$: There is no relationship between project management performance and membership within a community of practice.

$H1_1$: There is a positive relationship between project management performance and membership within a community of practice.

The first hypothesis involved membership in a CoP and its impact on project management performance. Several of the survey questions were focused on the participant gauging, using a Likert-style scale, how much CAPP had helped them with each of the identified variables. Overall, the results were consistent with CAPP involvement improving skills and satisfaction. In addition, a Spearman's rho correlation

between these variables showed that subjects who were more positive on one item tended to be positive on the others as well. Every correlation was positive and significant at the .01 level. In terms of size, the correlations were moderate to strong. Based on these results, this Null Hypothesis 1 was rejected and consequently found significant support of a positive relationship. Support for this hypothesis result can also be tied to the results in the sections ahead that answer the Research Questions.

Hypothesis 2

$H2_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

$H2_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's amount of experience.

The second hypothesis involved whether the project manager's amount of experience had an influence on the perceived value of CoP membership by that project manager. Again, a Spearman's rho correlation analysis was performed between the experience level and each of the identified variables. The results indicated that none of the correlations turned out to be significant at the .05 level. The largest correlations were with job satisfaction (*rho* = -.021, p = .06) and member skills, productivity, and satisfaction (*rho* -.20, p = .07). Both of these correlations were negative, meaning that the performance and satisfaction variables tend to be lower (i.e., more negative) as experience levels go up. Since the p-values were just short of significance, therefore, there was not enough evidence to reject the null hypothesis of no relationship between experience and the perceived value of membership. It is difficult to speculate why

performance and satisfactions levels would decline as experience levels go up. However, the differences in the average scores of the three experience levels (i.e., less than 6 years, 7 to 10 years, and 10+ years) were small and thus, the decline could be the result of a small subset of dissatisfied project managers. Regardless, the p-value was still short of significance and therefore, it is unnecessary to warrant any concern.

Hypothesis 3

$H3_0$: There is no difference in the perceived value of membership in a community of practice based on the project manager's certification level.

$H3_1$: There is a significant difference in the perceived value of membership in a community of practice based on the project manager's certification level.

Hypothesis 3 involved whether there is a relationship between the project manager's certification level and the perceived valued of membership. The results of the Spearman's rho analysis between certification level and each of the identified variables showed that only two of the 10 correlations turn out to be significant. The relationship between certification and satisfaction from CAPP interactions was positive and moderate at .25 (p = .02). That is to say, those who hold a certification tended to answer more positively about satisfaction from their interactions. Similarly, certification correlates positively and significantly with the respondent's own skills, productivity, and satisfaction (rho = .24, p = .03). However, the remaining eight correlations were not significant, so the null hypothesis only found partial support. One explanation for the positive correlation is that project managers who put forth the time and effort to achieve

certification are also likely to extend that effort in maintaining their skills and interacting with other project managers.

The results are similar to those in Adkins' (2008) study on the New York State Project Management Community of Practice. Adkins examined several contributing variables for community participation and found a higher positive association between members' level of domain knowledge, as represented by PM certifications, and their participation in the community and greater sharing of knowledge as well as their perceived usefulness and value of membership.

Hypothesis 4

$H4_0$: There is no difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

$H4_1$: There is a significant difference in the perceived value of membership in a community of practice based on the employee's tenure with the organization.

The fourth and final hypothesis was that length of time spent working at the company will correlate with perceived value of membership in a CoP. The results of the Spearman's rho analysis revealed none of the correlations appear to be significant. The largest correlations were between tenure at the company and improvement in understanding project management processes ($rho = .21$, $p = .06$) as well as between tenure at the company and identifying hidden complexities ($rho = .18$, $p = .09$). These were moderate in size, but the p-values fell just shy of significance. Thus, the null hypotheses of no relationship with tenure with the organization cannot be rejected.

Research Question 1

Do project management CoPs help organizations and individuals improve their project management performance? To answer this question, I relied on several factors: survey responses (Likert scale answers and open-ended questions), interviews, corporate records, and draw comparisons to prior literary work.

First, Hypothesis 1 tested positively that membership in a CoP had a positive impact on project management performance. Based on the selected factors (i.e., project management skills, complexity factors, senior management factors, organizational factors, and human relationship factors), between 65 to 83% of the participants responded with either significantly or somewhat to their satisfaction level in the social interactions, increased job satisfaction, and skills and productivity as a result of CAPP. Survey participants provided additional comments or explanation of their answers. As a result, I identified four themes from their responses, these included: the ability to share ideas and information, the ability to socialize and network, access to PDU and training opportunities, and reinforcement of project management skills.

The managers interviewed shared a different perception of the benefit and impact of CAPP compared to the actual members. While all of the interviewees believed that CoPs have some benefit to individuals and the organization, each of them struggled since they found little measurable evidence to show whether it did or not. As a positive aspect, the managers believed that CAPP helped in providing a forum for and communicating the company's methodology more so than being directly responsible for the creation or implementation of the methodology. On the other hand, the managers felt that CAPP's

responsibility in the overall project success rate was low, since they also believed that the organization's project overall success rate was low. However, this was a contradiction to what was reported in the company's project health scorecard, which showed project success rates progressively improving significantly from 2008 through the end of 2011.

Secondary Question 1

The topic of the secondary research question was which project success/failure factors are most important for project management CoPs to address. In Chapter 2, I cited several authors for commonly named reasons for project failures. Common reasons for failure included hidden complexities or over-ambitious projects, lack of understanding of new technologies, difficulty in overcoming existing processes, and a lack of lessons learned (Al-Ahmad et al., 2009). Al-Ahmad et al. grouped these commonly identified root causes into six categories: project management, senior management, technology, organizational, complexity, and process factors. Similarly, I took the approach of grouping the majority of causes into the following root cause categories: project management (skills) factors, senior management factors, complexity factors, organizational factors (e.g., process, resources), and human relationship factors. Based on the results of an analytical hierarchy ranking process, this study showed that the CAPP group placed the highest preference on good project management skills (23.52%), followed by organizational factors (21.68%) and senior management factors (20.02%). Conversely, social factors (9.25%) and complexity factors ranked the lowest with 8.53%.

Secondary Question 2

Secondary Question 2 asked, How do CoPs improve member's project management skills? The survey revealed that slightly more than half of the respondents believed that hard and soft skills are equally important in project management, while 38% placed somewhat or much more importance on soft skills. Moreover, as part of the variables selected for analysis in the Hypothesis 1 section, a positive relationship was shown between membership within CAPP and improved hard and soft skills.

As part of the survey, respondents described their hard and soft skill learning experiences through CAPP. I coded their answers for themes as to the most common examples of areas of improvement. The most commonly cited hard skills improvements included those related to understanding the organization's PMO processes, risk management, and project planning skills. Conversely, the most commonly identified soft skills themes included references to those topics as presented in the project management symposium (offered by CAPP), the ability to share ideas, experience, and information at the CAPP forums, and the ability to socialize and network with other project managers.

The results from the survey are similar to the findings by Chindgren and Hoffman (2006), and Sapsed and Salter (2004). Chindgren and Hoffman examined a CoP at NASA, much like CAPP, that originally focused on providing training and foundational knowledge to the organization's project managers. In both cases, the CoP's objectives moved into areas, such as project skills improvement, knowledge transfer, professional certifications, and training on other skill sets. In another study, Sapsed and Salter examined project management tools as boundary objects within organizations. Boundary

objects are the tools, documents, processes, schedules, etc., shared among a local group. I found Sapsed and Salter's study applicable to mine, because they found that these project management tools were widely adopted in communities where face-to-face interaction was common. What each of these studies provided, was not necessarily a measure of how much hard or soft skills the CoPs' members learned or improved on because of the CoP. Instead, it shows that CoPs provide the forum and setting for learning and strengthening skills, where the opportunity may not have readily existed before.

Secondary Question 3

The topic of Secondary Question 3 was how CoPs improve member's understanding of technical or complex issues. In the earlier Hypothesis 1 section, a positive relationship was shown between project management performance and membership within CAPP. However, of the variables analyzed, the ability in identifying hidden complexities presented the weakest results. The majority of respondents (58.2%) believed CAPP contributed only somewhat or not sure to their understanding or improvement of that topic. A comment section was added for the subjects to explain their answers or provide examples. However, there were few substantial comments to draw any positive themes. The most common response was that some techniques were discussed, but application of the techniques was never realized.

One reason for the weaker results could be due to CAPP's lack of a knowledge database. Researchers, such as Campbell-Meier (2008) studied the value of project management repositories developed within organizations. In addition, Turoff and Hiltz (2008) focused on the CoP as a collaborator for designing a knowledge database for

relevant practitioner information to the members. Even Schindler and Eppler (2003) described a database used by the project managers at NASA, whereby users could enter lessons learned into the database via an Internet browser. By lacking any sort of knowledge database or repository, CAPP's ability to help its' members better track or understand hidden complexities.

Secondary Question 4

Secondary Question 4 asked, In what ways do CoPs improve member's understanding of organizational processes or policies? In order to answer this question, I relied on the results from the survey and the responses from the interviews with the managers. Understanding of organizational processes and influence on the company's project management methodology served as two of the variables studied as part of Hypothesis 1, where a positive relationship was shown between project management performance and membership within CAPP. More than half (53.5%) of the respondents indicated that their understanding of organizational processes improved either somewhat or significantly because of their participation in CAPP. In addition, 68.6% of participants believed that CAPP significant or somewhat influenced the maturation of the company's project management methodology.

As part of the survey questions, respondents explained their answers or described their learning experiences of organizational processes through CAPP. From the responses, I found three themes were most common, (a) CAPP offered a forum for discussing organizational processes; (b) CAPP did not focus enough on organizational processes, or (c) general comments criticizing the organization's processes. Responses

about whether CAPP contributed to the maturation of the organization's project management methodology included (a) CAPP had early influence in the company's PM methodology and certification, (b) the EPMO created the methodology and CAPP helped communicate it, (c) CAPP had some influence on the methodology, but not sure to what extent, (d) CAPP promoted the EPMO processes and (e) the organization's methodology had very little influence from CAPP and the project managers.

To help further answer Research Question 5, I asked the six managers, What effect do you believe CAPP has been in informing and preparing members about organizational changes in processes, resources, and policies? Half of the participants responded that they did not know. The other half believed that CAPP did well at informing and preparing members about organizational changes and that CAPP served as the forum and communicator of new PMO changes. Similarly, the interviewees mildly agreed that CAPP had some influence in the maturation of the company's project management methodology, if only in helping in the communication of it.

From the survey and interview responses, it can be argued that CAPP had some influence in an improvement of understanding of the organization's processes and policies. Similarities of this study can be made to Linehan's (2010) case study on a state-based educational CoP that formed in order to better integrate policies and create effective practices. In that study, the CoP formed with specific goals of identifying policy problems in general and special education programs and then established potential strategies to improve the educational system. In both this study and Linehan's study,

causal relationships were not proven, but each held qualitative evidence that the CoP served as a catalyst of their organizations policies and processes.

Secondary Question 5

How do CoPs gain senior management support? In order to answer this research question, I reviewed the work of several prominent researchers on this topic. For instance, Saint-Onge and Wallace (2003) posited that an organization's leadership must actively endorse and recognize its CoP in order for it to succeed. Moreover, support from executive management can come from financial backing, commitment to the goals of the community, guidance and direction, and investment in technology and resources (Saint-Onge & Wallace).

To find out whether CAPP achieved senior management support, I relied on the results from the survey and responses from interviews with the managers. From the survey, 54.6% of respondents believed that CAPP kept senior management aware of project management issues (challenges) through communications. In addition, 55.8% believed that senior management supported CAPP and its objectives. As part of the survey questions on senior management support, respondents also provided explanation of their answers in the comments section. Themes from these answers included: (a) agreement that senior management awareness was made, but not sure if anything was done, (b) no clear evidence or feedback of what was conveyed to management or the results, or (c) not sure that management cares about the problems or challenges that project managers are facing. For an opposing perspective, I interviewed the managers and asked, *How effective do you believe CAPP has been in keeping senior management*

aware of project management issues? All but one of the managers said that CAPP was not effective in this regard. I also asked the managers, *Do you believe that senior management adequately supports CAPP and its objectives?* The answers given were mixed as two managers responded in the affirmative and the remaining four managers responded CAPP was not adequately supported.

One possible reason for the lack of senior management support may have been a lack of communication between CAPP and the organization's senior managers. While senior managers occasionally spoke at CAPP events, perhaps a stronger commitment could have been achieved through frequent personal meetings to discuss aligning CAPP objectives to those of the organization. As Bourhis and Dube (2010) reported, a CoP that regularly interacts with its senior management may realize an increased commitment to each other's goals and an improved understanding of any challenges that the other is facing. Based on the interviews in this study, it would appear that senior managers had different expectations of CAPP than those of its members.

Secondary Question 6

In what ways do CoPs improve member's human relationship skills? This section proved to be one of the stronger categories, whereby over 75% of the survey respondents indicated that they either significantly or somewhat benefited from networking with or better understanding the challenges faced by other project managers within the company. All of the mean scores were close and I found no significant relationships between networking with co-workers and the members' gender, time spent as project manager, time spent with the company, year of joining CAPP, and certification status. The closest

correlation was for the year that the member joined CAPP, which yielded a negative correlation of -.188, but a p-value of .084 was shy of significance. For those who joined CAPP prior to 2007, the average response was 3.909. This average response dropped to 3.52 among those who joined in 2007 or 2008, and dropped slightly further to 3.438 among more recent joiners. I believe this to be no surprise, because it only meant the longer a member has been in CAPP, the more they have been able to network with others.

The ability to network and exchange ideas and challenges was a consistent theme from CAPP members and also managers. This positive response is similar to Hemmasi and Csanda's (2009) study on State Farm Insurance employees that were members of a CoP. In their study, they found significant levels of perceived trust, impact on job performance, interpersonal connections with co-workers within the community. Also similar, is White's (2007) study, where participants responded that the community helped them value other people's knowledge and understanding what coworkers are going through.

Secondary Question 7

The topic of the seventh secondary research question was to identify what the perceived benefits are for a member participating in a CoP. To address this question, the study's survey asked the participant to select their reasons for joining the group. As a result, the following reasons were given: obtain free PDUs (80.2%), network with other project managers (75.6%), learn best practices (68.6%), promote discussion on current topics or practices (66.3%), recommend improvements of methods and processes (54.7%), group camaraderie (45.3%), keep current on PMI and industry standards

(39.5%), bring concerns to senior management (31.4%), and assist new project managers with learning the existing processes and techniques (20.9%).

As noted earlier in this study, CoP theory merges two key themes: the link between knowledge and activity and the importance of relationships. Regardless, the list of reasons (i.e., perceived benefits) on the survey were part of the mission and objectives found in the CAPP charter as well as other commonly identified goals amongst its members. Based on the survey results, knowledge and networking appear to be key benefits of membership within a CoP. I found the results interesting, because while many of the members do not know about CoP theory, the perceived benefits they gave for becoming members espouse those very themes.

Secondary Question 8

What are the perceived benefits to the organization for supporting a CoP? In order to answer this question, I relied mainly on the responses from the interviews with the managers, but also, in part, from the results from one of the survey questions. The survey asked, *To what degree do you believe CAPP contributed in the overall project success rates within the organization?* The result was that 52.3% of respondents believed either somewhat or significantly that CAPP contributed in the organization's overall project success rate. Furthermore, I coded their comments and explanations for themes that included: 1) CAPP was successful as it contributed to standardization, better navigation, common language, and/or improved PM skills, 2) CAPP had little impact on the company's overall project success rate, 3) general criticisms towards the organization's processes, and 5) believe that project success is subjective and is not tracked properly.

During the interviews with the managers, I asked the question, *What do you believe are the benefits, if any, of having a community of practice?* The responses were similar in nature. Each respondent felt a CoP provided a good forum for networking, exchanging ideas, best practices, lessons learned, and discussing challenges. However, each of them struggled with how effective CAPP really was since it was difficult to measure the results.

In Chapter 2, I presented three fundamental elements of a CoP: the domain, community, and practice (Wenger et al., 2002). The domain is the common ground or area of knowledge that the group shares. Furthermore, the domain is the purpose or mission that the group uses to guide their learning or actions. I believe the question of effectiveness of CAPP by both the senior managers and members could be addressed in the domain space. Perhaps CAPP could benefit by revisiting the key domain questions presented by Wenger et al. (2002). What issues do we care about? How does this impact our organization? What kind of influence do we wish to have? By addressing these questions, the expectation for both parties would become clearer.

Limitations of the Study

There are a couple of limitations of this study. First, the results of the quantitative portion of the study showed the existence of a relationship (i.e., correlation) in some instances. However, a common understanding in science and statistics is that correlation does not imply causation. This study attempts to better understand those relationships through open-ended comments for respondents to explain their answers. The second limitation is that respondents may have responded with bias about the benefits of

membership in the CoP. Again, the study attempts to minimize any bias with comment areas within the survey for participants to provide examples or clarifying remarks.

Implications for Social Change

Expanding the body of knowledge for project management and communities of practice is valuable for academic and practitioner purposes. Equally as important are the implications for positive social change. Organizations can save millions of dollars in costs and time, as well as recognize better opportunity costs through improved project management processes and decision-making. The results from this study show that a CoP can have a positive influence on the learning and adoption of project management practices. Therefore, organizations may wish to consider investing more resources on establishing their own CoPs. This is not to say that a lack of CoPs are detrimental to project management performance. Rather, a lack of the investment in CoPs may exist since there are few measures on their effectiveness. As a result, this study offers improvements based on activities that were successful within the case study organization. Evidence showed that knowledge sharing activities occurred during the period that the case study CoP existed. Again, this alone can be valuable for future organizational decision-making.

Recommendations for Action

The results presented in Chapter 4 provide significant evidence of a positive relationship between project management performance and membership within a community of practice. Based upon these findings, project management professionals within mid to large sized organizations may wish to consider forming a project

management CoP. The rationale for examining CoPs and their potential benefits for use in project management was threefold. CoPs can benefit the organization, the project management community, and finally the individual project manager. For the company, CoPs can help in quickly solving problems, diffusing organizational practices, and recruiting and retaining talented employees (Saint-Onge & Wallace, 2003). For the community of project managers, it allows experts across the company to interact as well as build common practices and language, and sharing of experiences. This is also relevant since the tools and techniques used by project managers are most effective when the organization adopts a common language, and common processes and controls for managing projects (i.e., a methodology) (Kerzner, 2005a). Lastly, the individual member can benefit from mentoring, networking, and participating in any ongoing training to improve their skills and competencies (Saint-Onge & Wallace).

Recommendations for Future Research

This study explored the influence of project management CoPs on project management performance. However, this study focused on one particular case study organization. Therefore, the opportunity exists to expand this study by replicating it to a larger sample of project managers or multiple organizations. Moreover, three of the four hypotheses for this study did not achieve significant positive relationships. This result may be different for other organizations or industries, as is worth consideration of further testing.

Another potential research topic presented itself during the course of this study when the case study organization established both a PMO and a CoE. As previously

discussed, highly matured project management CoEs can evolve or stem from CoPs and PMOs. PMOs are permanent and formal areas within an organization responsible for strategic planning, continuous improvement, mentoring, establishing shared standards, benchmarking processes, and creating a repository for lessons learned and other project management tools (Kerzner, 2005a). CoEs also have many of these same functions, but may do so as a formal or informal committee and may only be on a part-time basis. CoEs may also focus more on finding continuous improvements and identifying new tools and techniques. This may be a good topic to determine whether there is always a natural maturation of a CoP toward these other knowledge groups, as an organization tends to formalize its project management processes.

Another potential topic for future research could focus on the culture aspects of project management CoPs. As mentioned in Chapter 3, an ethnographic approach was considered for this study. The goal of an ethnographic approach would be to describe and interpret the actions, behaviors, values, language, or beliefs of a particular culture (Creswell, 2007). An ethnographic study of an internal project management CoP could offer valuable insight from an organizational culture perspective. For instance, project management CoP cultures could be analyzed to determine to what extent an organization's project management processes are centralized or decentralized (i.e., to what extent they are shared across the organization). In addition, the same study could describe what the project performance and culture is like in organizations where the project managers form or shape their own groups and processes versus relying on senior leaders as a governing body.

Conclusion

Community of practice theory suggests two key themes, the link between knowledge and activity and the importance of relationships. Project management involves the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. Project management also involves fostering constructive interaction of the members within the project team. As a result, the selection of CoP theory for this study as it applies to the field of project management was a natural fit. The intent of the research was not to show that CoPs are any better than other alternatives, because each organization differs in size, industry, culture, maturity, and project methodology. Instead, the research shows the value of CoPs in mid and large-sized companies where project management experience varies significantly and the members extend over multiple departments or locations.

This mixed-methods, case study involved examining the relationship between involvement in a project management CoP and project management performance from 91 participating CoP members. Results of the study pointed to a significant positive relationship between project management performance and membership within a community of practice. In addition, the results indicated partial support for relationships between the perceived value of membership in a community of practice and the project manager's amount of experience, certification level, and tenure with the organization. The research questions within the study addressed how CoPs can improve their member's project management skills, understanding of technical or complex issues, understanding of organizational processes or policies, and human relationship skills. Lastly, the study

looked at the perceived benefits for the member for participating in a CoP and to the organization for supporting a CoP.

With this research and the existing CoP research, organizations should strongly encourage the creation and development of their own project management CoPs, as there is evidence of knowledge sharing, experiential learning, and improved skillsets. Keeping in mind the degree of engagement among community members and the support system in place is a direct influence on the effectiveness of the knowledge network (Walker & Christenson, 2005, p.277).

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Appendix A - Survey Questionnaire

1. Male or Female?
2. How many years have you worked as a project manager?
3. How many years have you been employed/contracted by the bank?
4. How many years have you been a CAPP member?
5. Please check the project management certifications that you hold: PMP____ CAPM____ PgMP____ PMI-SP_____ PMI-RMP Not Certified___
6. How often do you attend CAPP sponsored quarterly meetings, training sessions, webinars, symposiums, workshops, or other events?
a. 0-2 times per year
b. 3-5 times per year
c. 6 or more times per year

7a. (SQ1)

***7a. Please rate how useful you believe that good project management skills are in comparison to other factors, such as: understanding organizational factors, complexity factors, social factors, and identifying senior management factors.**

Examples of these factors are:
-- Organizational factors (e.g. knowing the organizational processes, policies, business strategies).
-- Complexity factors (e.g. knowing the new technology, new processes, hidden complexities).
-- Social factors (e.g. networking with people, mentoring, resolving team conflicts, cultural issues, and learning people skills).
-- Senior management factors (e.g. level of commitment, resource prioritization, setting expectations, or due diligence of solutions).

	Significant Preference on PM Skills	Some Preference on PM Skills	Equal Preference for both	Some Preference on the Other Factor	Significant Preference for the Other Factor
PM Skills vs. understanding Organizational Factors	○	○	○	○	○
PM Skills vs. understanding Complexity Factors	○	○	○	○	○
PM Skills vs. understanding Social Factors	○	○	○	○	○
PM Skills vs. addressing Senior Management Factors	○	○	○	○	○

***7b. Please rate how useful you believe that understanding organizational factors are in comparison to the other factors listed below.**

	Significant Preference on Org Factors	Some Preference on Org Factors	Equal Preference for both	Some Preference on the Other Factor	Significant Preference for the Other Factor
Understanding Organizational Factors vs. Complexity Factors	○	○	○	○	○
Understanding Organizational Factors vs. Social Factors	○	○	○	○	○
Understanding Organizational Factors vs. addressing Senior Management Factors	○	○	○	○	○

***7c. Please rate how useful you believe that understanding complexity factors are in comparison to understanding of social factors and addressing senior management factors.**

	Significant Preference on Complexity Skills	Some Preference on Complexity Skills	Equal Preference for both	Some Preference on the Other Factor	Significant Preference for the Other Factor
Understanding Complexity Factors vs. Social Factors	○	○	○	○	○
Understanding Complexity Factors vs. addressing Senior Management Factors	○	○	○	○	○

***7d. Rate how useful you believe that understanding social factors are in comparison to identifying senior management factors.**

	Significant Preference on Social Skills	Some Preference on Social Skills	Equal Preference for both	Some Preference on Sr. Mgnt Factors	Significant Preference on Sr. Mgnt Factors
Understanding of Social Factors vs. addressing Senior Management factors.	○	○	○	○	○

8. How important are CAPP's objectives to you? (SQ7)
Use the following scale: 1) very unimportant, 2) somewhat unimportant, 3) neither important nor unimportant, 4) somewhat important, or 5) very important.
8.1 Offer free PDUs to its members.
8.2 Networking with other project managers throughout the organization.
8.3 Teach best practices and other relevant learning opportunities.
8.4 Recommend improvements to the methods and process used within the organization.
8.5 Champion the company's project management methodology.
8.6 Serve as a collective voice for bringing concerns to senior management.
8.7 Assist project managers with learning the existing processes and techniques.
8.8 Keep members current on PMI and industry standards.
8.9 Provide a forum for lessons learned.
8.10 Promote discussions on current topics or practices.
8.11 Other:_____.

9. To what level does CAPP fulfill these objectives?
a. Very Good b. Good c. Fair d. Poor e. Very Poor
Can you explain your answer? _____

The next several questions relate to project management hard and soft skills. *Hard skills* refer to the specific techniques and practices that can easily be taught. Examples of hard skills might include project plans, work breakdown structures, and earned value calculations. Conversely, *soft skills* such as leadership, teamwork, and communication are tacit in nature and not as easily taught.

10. When managing projects, please rate the importance of the following tools to project success or performance. (Hard skills) (SQ1)
(1 being not at all important and 5 being very important)
10.1 Staffing plans
10.2 Project task and schedule plans
10.3 Cost estimation and budgeting plans
10.4 Communication plans
10.5 Progress monitoring (Status Reports)
10.6 Change controls
10.7 Risk management plans
10.8 Business Requirements

11. When managing projects, please rate the importance of the following skills to project success or performance. (Soft skills) (SQ1)
(1 being not at all important and 5 being very important)
11.1 Positive attitude – upbeat, honest, approachable
11.2 Leadership skills – committed to success, confident, charismatic
11.3 Good communication skills

11.4 Time management skills
11.5 Personal networking
11.6 Problem solving skills
11.7 Team building skills
11.8 Good negotiation skills

12. Rate the level of importance you believe that project management hard skills are in comparison to those of soft skills. (SQ1)
a.) Hard skills much more than soft skills b.) Hard skills somewhat more than soft skills c.) Equally important d.) Soft skills somewhat more than hard skills e.) Soft skills much more important than hard skills
[Open ended question] Explain why you believe this to be the case.

13. My project management hard skills have improved through CAPP sessions or learning from other experienced members. (SQ2)
a. Strongly agree b. Agree c. Neither agree nor disagree d. Disagree e. Strongly Disagree
[Open ended Question] How would you describe your hard skill learning experiences through CAPP?

14. My project management soft skills have improved through CAPP sessions or learning from other experienced members. (SQ2)
a. Strongly agree b. Agree c. Neither agree nor disagree d. Disagree e. Strongly Disagree
[Open ended Question] How would you describe your soft skill learning experiences through CAPP?

15. My understanding of organizational processes and how they affect my project performance has improved as a result of my involvement in CAPP sessions. (SQ4)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] How would you describe your learning of organizational processes through CAPP?

16. I believe that CAPP has influenced the maturation of the company's project management methodology. (SQ4)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] Explain why you believe this to be the case.

17. My understanding of techniques for improving project management in a complex project environment has increased as a result of my involvement in CAPP sessions? (SQ3) a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] Explain why you selected this answer.

18. My ability to identify hidden complexities within a project environment has improved as a result of my involvement in CAPP sessions? (SQ3)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all

[Open ended question] Explain why you selected this answer.

19. I find satisfaction in the social interactions and discussions at CAPP meetings and events. (RQ1, SQ7)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] How would you describe your social interactions and experiences through CAPP events?

20. My ability to participate in CAPP sponsored events helps to increase my level of job satisfaction. (RQ1, SQ7)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] Explain why you selected this answer.

21. I have been able to network with co-workers from other departments through my involvement with CAPP. (SQ6)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all

22. CAPP allows me to better understand the challenges and perspectives that my project manager colleagues are experiencing. (SQ6) a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all

23. I believe that senior management is being made aware of project management issues (challenges) through communications with CAPP. (SQ5)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all

24. I believe senior management supports CAPP and its objectives. (SQ5)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all

25. What are your reasons for being a member with CAPP (check all that apply)? (SQ7)
□ To obtain free PDUs needed for maintaining PMI certification.
□ To network with other project managers throughout the organization.
□ To learn best practices and other relevant learning opportunities.
□ To recommend improvements of the methods and processes used within the company.
□ For the camaraderie of the group.
□ To bring concerns to senior management.
□ Assist new project managers with learning the existing processes and techniques.
□ Keep members current on PMI and industry standards.
□ Promote discussions on current topics or practices.
□ Other:_____.

26. To what degree do you believe your involvement in CAPP improves your project management skills, productivity, or level of satisfaction in your job? (RQ1, SQ7)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] Explain why you believe this to be the case.

27. To what degree do you believe CAPP helps improve the project management skills, productivity, or level of satisfaction in the job of its members? (RQ1, SQ7)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] Explain why you believe this to be the case.

28. To what degree do you believe CAPP contributed in the overall project success rates within the organization? (SQ8)
a. Significantly b. Somewhat c. Not sure d. Very little e. Not at all
[Open ended question] Explain why you believe this to be the case.

Comments: Please use the space below to provide any comments you may have about CAPP or this study. This can include likes, dislikes, suggestions, experiences, opinions, or general observations.

_____

_____

_____

Appendix B – Interview Questions

1. What do you believe are the benefits, if any, of having a community of practice like CAPP? (SQ8)

2. What effect do you believe CAPP has been in informing and preparing members about organizational changes in processes, resources, and policies? (SQ4)

3. Do you believe that CAPP has had any influence (positive or negative) in the maturation of the company's project management methodology? (SQ4)

4. How effective do you believe CAPP has been in keeping senior management aware of project management issues? (SQ5)

5. Do you believe that senior management adequately supports CAPP and its objectives? (SQ5)

6. To what degree to you believe CAPP has been responsible in the overall project success rate of the company? (RQ1)

7. To what degree to you believe CAPP has been responsible in the overall teaching and adoption of the company's project management methodology? (RQ1, SQ8)

8. Do you believe that a CoP is or can be an effective form over other organizational learning methods? (SQ8)

Curriculum Vitae

Ronald P. Papa, Jr., PMP, ITIL, PhD. Candidate

EDUCATION:

WALDEN UNIVERSITY
Ph. D. Candidate in Information Systems Management, expected completion Fall, 2012
Dissertation Proposal (Defended July, 2011): *Exploring the Influence of Project Management Communities of Practice on Project Management Performance.*

OAKLAND UNIVERSITY, Rochester, MI
Post-Master's Certificate in Management Information Systems, 2003

WALSH COLLEGE, Detroit, MI
M. SC. In Finance, 1996

OAKLAND UNIVERSITY, Rochester, MI
B.A. in Communication, 1992

EXPERIENCE:

BAKER COLLEGE, Auburn Hills, MI 2011 – Present
Adjunct Instructor
Computer Animation/Web Design/Programming/Digital Media Design Advisory Board
Courses Taught: Systems Analysis and Design, Web Media Design, Introduction to HTML

COMERICA BANK, Auburn Hills, MI 1999 - Present
Assistant Vice President – Lean Six Sigma Black Belt Consultant/Project Manager/Sr. Systems Analyst
Training Facilitated: Lean Six Sigma Practitioner's Training, Project Management Symposium

MCA FINANCIAL CORPORATION, Southfield, MI 1998 - *1999*
Software Trainer/Help Desk Technician

ACCURATE DATA SYSTEMS, Southfield, MI 1997 – 1998
Systems Trainer

FLAGSTAR BANK, Bloomfield Hills, MI 1993 – 1997
Software Trainer and Technical Support

CERTIFICATIONS:

Lean Six Sigma Black Belt, 2012
ITIL v.3 Foundation Certification, 2008
Project Management Professional, 2007

PRESENTATIONS:

Presented "An Introduction to Lean" to the International Association of Administrative Professionals at Western Michigan University (September, 2011).

TECHNICAL SKILLS:

Software: MS Office • MS Project/Visio • Adobe Creative Suite • Minitab • Lotus Notes • Novell • Command Center • SQL

Methodologies: Lean Six Sigma • PMBOK • ITIL v.3 Foundation • TOGAF • SDLC • TQM • CMMI Zachman Framework • Gartner Enterprise Architecture Framework

Industry/Regulator Standards: ITIL • Sarbanes-Oxley Act • IEEE

Languages: HTML • XHTML • REXX • JAVA • Basic • KornShell

Networking: LAN • WAN • TCP/IP • VPN • DNS • ISDN

OTHER EXPERIENCE:

Project Management: Project Design/Deliverables, Risk Analysis, Quality Assurance

IT Management: Budget/Vendor Management, Release/Application Management, Needs Analysis, System Analysis/Design, Interface Design/Development

ASSOCIATIONS AND COMMITTEES:

Comerica's Association of Project Professionals – 2007 to Present – Chairman, Director.
Selfridge North Macomb Lions Club – 2005 to Present – Past President, Director.
Middle Branch Estates Homeowners Association – 2004 to Present – President.