A mixed methods study: Evaluating the relationship of project manager competencies and it project management methodologies

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A MIXED METHODS STUDY: EVALUATING THE RELATIONSHIP OF PROJECT MANAGER COMPETENCIES AND IT PROJECT MANAGEMENT METHODOLOGIES

by

Keith A. McDermott

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This thesis is dedicated to my husband. Thank you for all of your support, encouragement, and patience. I could not have accomplished this without you.
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I would like to acknowledge the guidance of my committee members. Your insights have proven invaluable and I have learned more about the field thanks to your assistance.
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LIST OF ABBREVIATIONS

APM – Agile Project Management
ASQ – American Society of Quality
CSM – Certified Scrum Master
EQ – Emotional Quotient
IQ – Intelligence Quotient
IRB – Institutional Review Board
IT – Information Technology
ITaP – Information Technology at Purdue
ITIL – Information Technology Infrastructure Library
LDQ – Leadership Dimensions Questionnaire
MQ – Managerial Quotient
PM – Project Manager / Project Management
PMBOK – Project Management Body of Knowledge
PMCD – Project Manager Competency Development (Framework)
PMI – Project Management Institute
PMI-ACP – Project Management Institute – Agile Certified Practitioner
PMO – Project Management Office
PMP – Project Management Professional
RUP – Rational Unified Process
GLOSSARY

APM [Agile Project Management] – “is a collection of PMLC [Project Management Life Cycle] models that can be used to manage projects whose goals are clearly specified but whose solutions are not known at the outset of the project” (Wysocki, 2013, p. 328).

competence – “A cluster of related knowledge, attitudes, skills, and other personal characteristics that affects a major part of one’s job…, correlates with performance on the job, can be measured against well-accepted standards, and can be improved by means of training and development” (Project Management Institute, 2007, p. 73)

life cycle – “A prescribed order of phases (smaller segments of an entire project) in which the phases contain specific deliverables that collectively deliver a result” (Brewer & Dittman, 2010, p. 523).

methodology – “a set of forms, guidelines, templates, and checklists that can be applied to a specific project or situation” (Kerzner, 2013, p. 91).

PMO [Project Management Office] - “An organizational entity with full-time personnel to provide a wide range of project management support and services across an entire organization” (Brewer & Dittman, 2010, p. 525).

Scrum – “A framework within which people can address complex adaptive problems, while productively and creatively delivering products of the highest possible value” (Sutherland & Schwaber, 2013, p. 3).

waterfall model – “A traditional approach to systems development that describes a development approach that is linear and sequential and that has distinct objectives for each phase. In this model, the output of one phase is the input for the next” (Brewer & Dittman, 2010, p. 529).
ABSTRACT

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Title: A Mixed Methods Study: Evaluating the Relationship of Project Manager Competencies and IT Project Management Methodologies
Major Professor: Jeffrey Brewer.

Determining skillsets that are particularly important to the development of an effective project manager can be useful for a variety of applications. These applications range from the hiring of a new project manager for an organization to continued training for current employees. Past research has called upon current project managers to rate what skillsets they see as important to the cultivation of an optimal or effective project manager. Additional research has expanded this idea to determine how skillsets vary between project managers and functional managers (El-Sabaa, 2001). While this research is certainly important, skillset grouping can be further explored. This thesis explored the question of if certain skills are more heavily favored depending on the project management methodology in-use by the target organization. This research looked at a wide geographical subset of PMI Chapters in the United States and attempted to find differences in project manager competencies and skills depending on the project management certifications each respondent held. Through this data, the researcher was able to find some interesting data related to the respondents and their expertise and background. The research concludes by presenting final conclusions found in the data and suggesting future research ideas.
CHAPTER 1. INTRODUCTION

This chapter begins with an introduction of the scope and significance of the research. The research question and statement of purpose are then defined. The chapter concludes by providing the boundaries of the study and defines key terms.

1.1 Scope

A key element in the success of a project manager is the possession of the correct skills for the profession. While a large number of skills are useful in all activities with which a project manager interacts, an overarching subset is most important. Determining which skills are most important requires analysis.

When implementing a project, a project manager will apply a specific methodology throughout the entire project lifecycle. In this research, commonly utilized methodologies will be divided into either agile or traditional varieties. Due to the vastly different implementation requirements of a methodology, certain skills can be more important than others for an agile versus traditional methodology. This research will determine what skills are most important for a project manager utilizing a given methodology category.

1.2 Significance

Past research has looked at what skills are most desirable for a project manager to possess. Understanding what skills are desirable or lead to higher project success rates can allow a project manager to better hone their skills. Additionally, the hiring of new project managers should focus on hiring candidates who demonstrate specifically desired skills.

As an organization evolves and selects a project management methodology better suited to their project types, the project manager should also evolve to better apply this methodology. However, specific skills may be more important when applying an agile methodology versus a traditional methodology, such as the waterfall methodology. As
methodologies evolve, they develop complex nuances that may require a higher level of one skill that may have not been as important when applying a simpler methodology.

According to the 2014 State of Agile Survey (VersionOne, Inc., 2015), Agile adoption by organizations is increasing year over year. Most notably, the data has shown that an increasing number of respondents are working in large organizations (VersionOne, Inc., 2015, p. 2):

But in 2014, approximately 35% of respondents had more than 5,000 people in their organization, and 20% worked in very large organizations with more than 20,000 people.

In addition to sheer adoption rates, organizations are taking advantage of an increasing number of the benefits which are realized by adoption of an agile methodology. The Survey listed the top gains to organizations as three main benefits. First, 87% of respondents stated an increased “ability to manage changing priorities” (VersionOne, Inc., 2015, p. 2). Second, the productivity of the team was noted by 84% of respondents. Finally, 82% of respondents noted that project visibility is a benefit.

Although past research has highlighted desired skills for project managers (Brewer & Dittman, 2010; El-Sabaa, 2001; Fisher, 2011; Keil, Lee, & Deng, 2013; Müller & Turner, 2010), there is little research that compares skills against the methodologies in use. Without this knowledge, a project management office could hire a project manager who has great potential, yet may not have the optimal skills to apply an agile methodology. Identification of these specific skills can allow a project manager to better focus their skills and be more efficient at utilizing their limited time and resources.

1.3 Statement of Purpose

Determining skillsets that are particularly important to the development of an effective project manager can be useful for a variety of applications. These applications range from the hiring of a new project manager for an organization to continued training for current employees. Past research has called upon current project managers to rate what skillsets they see as important to the cultivation of an optimal or effective project manager. Additional research has expanded this idea to determine how skillsets vary
between project managers and functional managers (El-Sabaa, 2001). While this research is certainly important, skillset grouping can be further explored.

This thesis will explore if certain skills are more heavily favored depending on the project management methodology in-use by the target organization. Project management methodologies have evolved over time. This project will divide the most common methodologies into either traditional or agile methodologies. The goal of this research is to determine if the skillsets required for an effective project manager vary in distribution based on the methodology in use. Further, the results of this research will assist in providing more targeted training to new and current project managers alike based on what methodology is deployed in a given organization.

1.4 Research Question

How do suggested skillsets for project managers vary, if at all, when utilizing agile versus traditional project management methodologies?

1.5 Assumptions

The following assumptions were inherent to the design of this study:

- There is a need to determine skillsets and competencies relevant to project managers who are implementing varied methodologies.
- Survey respondents will have enough time to thoughtfully complete the survey without rushing.
- Individuals selected for interviews will be willing to participate.
- Study participants will fully answer all questions.
- Study participants will answer all questions truthfully.
- Study participants will be sufficiently qualified to participate.
- The number of respondents was adequate to allow this study to continue.
- The survey tool, Qualtrics, will be fully available for the duration of the study.
1.6 **Limitations**

The following limitations were inherent to the design of this study:

- The survey will be distributed to members of various Project Management Institute (PMI) chapters in the United States.
- Project Managers who are in a target PMI chapter area, yet not a member of that chapter, will not be included in the survey distribution.
- Of the successful survey respondents, a limited number will be willing to participate in a follow-up interview phase.

1.7 **Delimitations**

The following delimitations were inherent to the design of this study:

- The survey and following interviews will be conducted over a limited amount of time with an expiration date.
- The survey and following interviews will not be comparing Project Managers to any other job title.

1.8 **Summary**

This chapter introduced the research by describing the scope and significance. Next, the chapter addressed the assumptions, limitations, and delimitations of the research. Finally, a list of key terms was provided.
CHAPTER 2. REVIEW OF RELEVANT LITERATURE

Project managers must possess a base set of competencies across a range of associated skills. These can include both hard skills and soft skills. However, what skills are best desired and in what order? Additionally, do skills and competencies vary based on the type of project, industry, or methodology in-use? A thorough analysis of past research will reveal important insights and also look at areas where this research can be further improved.

2.1 Project Manager Competencies

As a project manager, understanding what competencies are most desirable for project success can help guide and cultivate a project manager as well as assist in finding appropriate training opportunities. While much research agrees, Gillard (2009) determined that soft skills are more important than hard skills. Soft skills encompass a range of competencies, but can be thought of as people-skills. This can include interpersonal communication and conflict management among others. However, hard skills can be seen as the more technical skills. While this traditionally may be thought of solely as technical skills such as programming or deep systems thinking, hard skills can also include knowledge of project management processes. An example of a project management process would be a deep understanding of the process groups of the ten knowledge areas of the Project Management Body of Knowledge (PMBOK) (Project Management Institute, 2013).

Delving deeper into how leadership skills are desired in a project manager, other research (Müller & Turner, 2010) has found that leadership styles vary based on the complexity of a project. Projects that are found to be more complex require leadership styles that are more transformational. Transformational, in this sense, means that a project manager had high scores in all dimensions of the Leadership Dimensions Questionnaire (LDQ) utilized in the study. The LDQ will be further discussed later in this literature review. As project complexity decreases, so do the number of dimensions of the LDQ that a project manager must excel in.
Also found in much research was a variance in the number of participants in the sample and their diversity. El-Sabaa (2001) utilized a convenience sample of Egyptian Project Managers, but looked at a wide range of industries with a sample size of 85 project managers. The research results show that regardless of sector, human skills and conceptual and organization skills are much more important than technical skills. Also, project managers tend to have a much more varied career path with less longevity with a given company than functional managers. Keil, Lee, and Deng (2013) utilized a much smaller sample size of only 19 project managers from a single chapter of PMI (Project Management Institute). However, their research looked at what skills were most desired in the ideal project manager through several rounds of surveys as well as interviews. The work of Keil, Lee, and Deng (2013) confirms the work of El-Sabaa (2001) to identify people skills as among the highest desired skills of a Project Manager.

To create a baseline of which competencies and related skills are important to a generic project manager, a framework for competencies is necessary. To fill this need, PMI developed the Project Manager Competency Development (PMCD) Framework. The PMCD was first published in 2002. At the time, the PMCD grouped competencies by knowledge areas. In researching the second edition of the PMCD, PMI found that grouping competencies by process area was a more logical grouping method. The second edition of the PMCD was also updated to align with the third edition of the PMBOK. This research utilizes the second revision of the PMCD. A third edition was in development by PMI and was set to be released in late 2015, however no further information about this revision was available by the completion of this research. The third edition was to be updated to reflect updates in the field and to align with the fifth edition of the PMBOK.

The PMCD Framework categorizes project manager competencies into one of three core areas (Project Management Institute, 2007). Knowledge competencies look at what the project manager has learned about project management related to the PMBOK. Performance competencies relate to how well the project manager can apply the processes and procedures related to the PMBOK. Personal competencies instead define how one actually manages a project. The PMCD defines six units of personal
competencies: communicating, leading, managing, cognitive ability, effectiveness, and professionalism. While all are important, this research will focus primarily on the communicating and managing competencies.

According to the PMCD, a project manager who is competent in communicating “effectively exchanges accurate, appropriate and relevant information with stakeholders using suitable methods” (Project Management Institute, 2007, p. 26). Various performance criteria are defined by the PMCD including proactively engaging stakeholders, active listening, maintaining both formal and informal communication, and providing accurate and fact-based information. A total of 12 performance criteria were organized into four competency elements.

In addition to competencies related to communicating, managing competencies were chosen for this research. The PMCD defines the ideal project manager as one who “effectively administers the project through appropriate deployment and use of human, financial, material, intellectual, and intangible resources” (Project Management Institute, 2007, p. 30). The PMCD lists 12 performance criteria relating to three competency elements of conflict resolution, project team recruitment and development, and ensuring project success.

2.2 Traditional and Agile Methodologies

Traditional systems development methodologies have been in use since the beginning of systems and software development. In the beginning, these were as basic as just flow charts with added documentation to facilitate management needs. As time evolved, the waterfall systems development methodology was developed. Once system complexity began increasing further, the waterfall methodology advanced to become rapid development waterfall followed by staged delivery waterfall methodology. These took the linear waterfall methodology and added iterative and incremental components (Wysocki, 2013).

The traditional waterfall methodology is considered a heavy process. This is because waterfall is plan-driven and relies upon continuously improving processes and procedures. While not all processes contained in the PMBOK must be applied to each project, the basic framework should be applied to help guide the project toward a
successful outcome. Without following the basic framework, a waterfall-based project can quickly fall out of scope, or run over the allocated schedule or budget. While these processes provide much job security for the project manager, they also could burden the development team with unnecessary overhead.

As the systems development field has advanced, the waterfall methodology has become less practical for complex projects. Customer involvement was very low except at only the most major milestones which frequently caused major changes to the project scope. Agile systems development methodologies grew out of the need to correct these issues with traditional methodologies.

Agile methodologies have been around for a number of years. Takeuchi and Nonaka (1986) described the guiding principles surrounding many agile methodologies in their article “The new product development game.” However, as agile is becoming more mainstream, project managers are looking at how the project manager role fits into the various agile methodology frameworks. Agile teams want to focus more on the output of the project than on the documentation and processes (Boehm & Turner, 2004). Much of the mentality behind agile teams and agile software development is contained in a document called the “Manifesto for Agile Software Development” (Beck et al., 2001, ¶ 1-3):

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

**Individuals and interactions** over processes and tools  
**Working software** over comprehensive documentation  
**Customer collaboration** over contract negotiation  
**Responding to change** over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

The Manifesto was developed by a group of 17 software developers. In addition to creating the Manifesto, 12 principles expand on what it means to be an agile developer. These principles reiterate that an agile developer focuses on pleasing the customer by producing deliverable iterations in short timespans. Agile developers reject rigid processes, unnecessary documentation, and complexity. Several agile methodologies
exist including Scrum and XP (eXtreme Programming). In each of these, various roles are defined for the participants of a project.

2.2.1 Waterfall Model

The traditional waterfall model was first described in the paper “Managing The Development of Large Software Systems” by Winston Royce (1987). Royce’s paper, first published in 1970, describes how many customers and developers alike would prefer the software development models to only include an analysis phase and a coding phase. In order to ensure a successful product is created, additional steps are required to create the classic waterfall model. These additional steps include system and software requirements, program design, testing, and operations. Royce also believed in heavy documentation. Consequently, documentation is a required output of nearly every step.

![Waterfall model diagram](image)

*Figure 2.1 Waterfall model developed by Winston Royce (1987)*

As can be seen by the previous figure, the waterfall model is able to show a clear path from product inception to delivering the final product. This model is considered a heavy model as there is a large amount of managerial oversight and documentation. Additionally, the model is rigid and lacks the ability to adapt to almost any change in requirements. Lastly, the model has minimal involvement with the customer throughout the course of development. Due to this lack of involvement, the customer may have little
use of the final product or may require substantial changes to comply with ever-changing business objectives.

2.2.2 Scrum

To better adapt to changing customer requirements, improve customer feedback throughout the development process, and allow organizations to more quickly adapt to change, a new paradigm of software development was required. Scrum, one such framework for agile software development, has enjoyed continuous success as the top agile software development methodology (VersionOne, Inc., 2015). According to research by VersionOne (2015), Scrum was used by 56% of respondents. The next highest used methodology found was a Scrum/XP hybrid and was used by 10% of respondents. Looking back to a 2010 survey by VersionOne, 58% of respondents were following Scrum with 17% following a Scrum/XP hybrid (VersionOne, Inc., 2010).

Scrum is a highly customer-driven software development framework. In a Scrum team, work is completed in month long iterations, or sprints. Each sprint begins with a planning meeting. During this meeting, the overall sprint goals are determined and the work to be performed is added to the sprint backlog. As development progresses during the sprint, work is completed from the backlog. After a sprint has completed, items remaining in the backlog may be transferred to subsequent sprints, or the functionality may be removed from the backlog. The basic framework of Scrum can be visualized using the following figure.
Unlike other software development frameworks, the customer, or product owner, is involved in a Scrum project throughout and is constantly presented with demos of output from the current sprint (Wysocki, 2013). Additionally, the product owner works collaboratively with the development team to determine if the current sprint output satisfies their requirements as the final product version.

Scrum describes three main roles: Scrum Master, Product Owner, and the Team (Chickering, 2013). The Product Owner role can be directly transferred to the traditional project role of the key project stakeholder. The Scrum Master is described as a role that removes barriers the Team is experiencing and to be the central point of communication between everyone involved. Additionally, the Scrum Master strives to ensure the Team is working as efficiently as possible. In many ways this is a direct translation of the role of a traditional project manager. Chickering (2013) agrees by pointing out that many skills of a project manager are relevant to the Scrum Master role.

2.3 Agile Project Management

After examining agile developer goals for projects, how do these goals align with those of a project manager? The project manager’s goals are primarily focused on ensuring the classic triple constraint is well managed. The triple constraint keys in on the
time, cost, and scope of a project (Brewer & Dittman, 2010). When these key metrics are well managed, the project has a greater chance of success. As an agile software development team is more focused on generating iterations of a project in a short time frame, the project manager can step in to ensure that the team is on-track. The project manager can also reduce the administrative overhead encountered by software developers utilizing less agile methodologies. By freeing the team to do what they do best, the project manager can simultaneously focus on relevant documentation of processes.

2.4 Data Gathering Methods

While much research has analyzed what skills are important to project managers from various research vectors, equally important is how the data was gathered. Although some researchers have used custom-designed surveys with follow-up interview processes, the use of a Leadership Dimensions Questionnaire (LDQ) has emerged as a standard survey tool (Geoghegan & Dulewicz, 2008; Müller & Turner, 2010).

The LDQ was developed by Dulewicz and Higgs (2005). The LDQ explores several dimensions of leadership and divides them into three main dimensions: emotional and social dimensions, intellectual dimensions, and managerial dimensions. Each dimension encompasses several competencies.

The emotional and social dimensions rate a respondent’s self-awareness, emotional resilience, intuitiveness, interpersonal sensitivity, influence, motivation, and conscientiousness. These dimensions can be summed as the soft skills of the project manager. The skills focus around the people in a team and how to best manage their needs and individuality.

Critical analysis, vision, and strategic perspective are all intellectual dimensions. These can be best thought of as the how the project manager can cope with change and overcoming obstacles during the lifecycle of a project. With sound vision and a well-honed ability to think strategically, a project manager can devise creative solutions to issues as they arise.

Finally, resource management, creating engaging communication, and empowering, developing, and achieving are all managerial dimensions. Rightly so, these dimensions can be best described as the base of the leadership style of the project.
When a manager, regardless of whether they are a project manager, is able to develop engaging communication and empower their team members to better themselves, the team can achieve great results.

Dulewicz and Higgs (2005) continue their research by building three profiles of leadership styles: goal oriented, engaging, and involving. As was referenced by Müller and Turner (2010), an individual who encompasses all of the 15 leadership dimensions will exhibit strong traits of all three styles. An individual who would be classified as having a somewhat lesser score of the dimensions would be a bit less goal oriented but still almost as engaging and involving. An individual with a low score on the LDQ could not be properly fit to a leadership style due to insufficient data in the study.

2.5 Summary

This chapter provided a summary of literature on the research area of project management competencies and project management methodologies. Past research into which skills are highest ranked provides a method to shape this research as well as future research into this topic. However, the literature review expanded on deficiencies in past research by beginning to look into the components of several popular methodologies. Finally, a brief background on the Leadership Dimensions Questionnaire was provided.
CHAPTER 3.  FRAMEWORK AND METHODOLOGY

This chapter defines the framework for the study into project manager competencies and project management methodologies. This chapter also defines the data sources used, the sample, and how the data was normalized.

3.1 Framework

This chapter defines the framework for the study into project manager competencies and project management methodologies. This chapter also defines the data sources used, the sample, and how the data was normalized.

3.2 Sample

The original sample of this study was intended to be members of a PMI chapter geographically close to Purdue University. During the data gathering phase of the study, the sample was changed to include a number of PMI (Project Management Institute) chapters from across the United States. The total population size of the survey distribution is not known due to how PMI chapters were contacted for survey distribution. This will be discussed further in Chapter 4 of this research. However, a roughly 5 - 10% response rate to the study survey was expected. It was further expected that the survey respondents would span a range of industries, but would focus on IT-based project managers.

Interviews of a subset of survey respondents were utilized as well. Due to a low response rate by potential interviewees, only two one-on-one interviews were conducted. The insights gained from these responses are discussed in Chapter 4 of this research.

3.3 Data Sources

The data sources for this study began with a survey distributed to the sample group. The survey questions primarily utilized a Likert Scale; however, the survey also featured questions utilizing a sliding scale to indicate percentages and some open-ended
questions as well. In addition, broad demographics were obtained through survey questions. Survey respondents must have managed either agile or non-agile for responses to be relevant to this study.

The survey was piloted to a group of project managers located in Purdue University’s central IT group – ITaP (Information Technology at Purdue). The results of the pilot allowed the survey questions to be refined for the target sample group.

A subset of the survey responses opted into follow-up one-on-one interviews. These interviews allowed a deeper discussion on their responses and the ability to gain further insights. Survey and interview responses were anonymized for publication.

Lastly, document analysis was performed to compare certification documents for agile project management certifications versus more generic project management certifications. Using these three data sources, triangulation will be obtained.

3.4 Researcher Bias

As researcher bias is possible in the formation of survey questions, all reasonable means were taken to reduce the likelihood of skewed survey responses due to survey design. The researcher gathered input from committee members to review all survey questions as well as input provided by the IRB.

The researcher has worked in a variety of information technology roles for over ten years. This experience was used to provide proper framing of the survey and interview questions to the information technology sector.

3.5 Tools and Analysis

This study utilized a mixed-methods methodology. This was achieved through the quantitative analysis of survey responses which utilized a Likert scale to begin to determine a correlation between project manager methodologies and competencies. Additionally, a qualitative analysis of open-ended survey and interview question responses was performed.
A software analysis package was originally to be used, but was deemed unnecessary due to a low interview response rate. Instead, non-quantitative data, such as interview responses, was analyzed by grouping like items together.

The survey was distributed using Qualtrics – a popular survey management platform. The platform supports a variety of question types and easy exporting of all survey data for further analysis. Microsoft Excel was used to analyze the data obtained from Qualtrics.

3.6 Coding

In the analysis of survey responses, coding was necessary. Coding looks at open-ended survey question responses and analyze which keywords occur most-often between respondents. By utilizing this method, a researcher bias in the analysis of such questions was avoided.

3.7 Generalizability

This study may have a limited generalizability due to the chosen sample. The sample was limited to PMI chapters where the PMI PMP certification was the primary project management certification held. Additionally, although a wide geographical range of the United States participated in the survey, the results may not be applicable to the remainder of the United States or another country.

3.8 Summary

This chapter provided an overview of the research framework and methodology. The data sources and sample group were defined. Additionally, the chapter defined how the data was normalized to provide consistent and reliable results.
CHAPTER 4. FINDINGS AND CONCLUSIONS

This chapter will discuss the results of the survey as well as insights gained from the individual interviews conducted and the certification document analysis. Finally, conclusions will be drawn from the data obtained and provide suggestions for future research on this topic.

4.1 Survey Instrument

This section describes specifics of the survey instrument and its distribution. Information regarding the survey audience is then provided. Finally, analysis is given on the data obtained from the survey instrument.

4.1.1 Survey Distribution

This study initially was to be distributed to the members of a specific PMI (Project Management Institute) chapter geographically close to the researcher’s location. However, after encountering barriers to distribution, all PMI chapters in the United States were queried regarding their willingness to assist with the survey distribution.

In total, 143 PMI chapters were listed on the PMI website as of June 2016 when the survey distribution was assessed. The researcher visited the site listed for each PMI chapter and gathered data on how to best contact each individually. Five PMI Chapters were not contacted due to website issues with their contact forms. One chapter was also not contacted due to the primary language of the chapter not being English. The target audience for the survey, due to limitations of the researcher, had to be primarily English speaking. With the previously listed exclusions, 137 chapters were individually contacted regarding their willingness to distribute the survey instrument for this research.

Four total PMI chapters positively replied their consent to distribute the survey instrument to their chapter members in a variety of forms. These distribution methods ranged from a post announcing the survey on the chapter website, to announcements on slide decks at chapter meetings, to direct emails to chapter members by chapter communication directors. The researcher, by analyzing the locations of some survey
responses, also assumes that there may be more chapters that distributed the survey without providing a positive response.

The survey respondents span a wide geographical range of the United States. PMI chapters which confirmed distribution to their members include chapters from New Jersey, Pennsylvania, Texas, and Hawaii. Survey responses were also gained from other regions of the United states, although in smaller numbers.

4.1.2 Exclusion Criteria

The survey concluded with a total of 88 partial and complete responses. Of these, 72 respondents completed the entire survey and these responses are being used for all portions of data analysis. Another eight partially-completed survey responses are being included for analysis in applicable portions. Finally, eight survey responses are being excluded completely.

Eight survey responses are being included in the data analysis despite not being fully completed. Three responses are being included in the demographics portion of data analysis. However, these three respondents did not complete any further sections of the survey. One respondent had completed all sections of the survey but did not complete the last page of the survey. The last page of the survey simply asks for additional comments and allows the respondent to fully complete the survey. One respondent completed most sections of the survey except for sections asking about the Project Manager Competency Development (PMCD) Framework and control questions. Finally, another three responses are being included, but had only completed the demographics and Leadership Dimensions Questionnaire (LDQ) sections of the survey. Despite the above constraints on these eight partially completed responses, they are still able to give valuable informative for the completed sections.

Eight total survey responses are being excluded in their entirety from the survey data for the following reasons. Three responses were excluded as they were test responses by the researcher over the course of the active survey. Five responses were excluded as the respondents had accepted the consent form but did not complete any other portions of the survey.
4.1.3 Survey Layout

The survey began by asking basic demographics and respondent background which are being aggregately reported to protect anonymity. Several questions were then asked to have respondents rate themselves on components of the LDQ. The survey then asked respondents about the projects they had managed in the past. Finally, respondents were asked to rate themselves against a selection of components of the PMCD (Project Manager Competency Development) Framework (version 2). After the survey respondents were invited to participate in one-on-one interviews to gain further insights into their responses. The full survey is provided in Appendix A at the end of this thesis.

4.1.4 Respondent Demographics

Looking at demographics, while the majority of respondents were male (64%), 34% were female with 2% providing no response. The majority of respondents were aged between 35-64 years old with fairly even distribution between the three age ranges defined of 35-55, 45-54, and 55-64. There were a small number of respondents in the age range of 25-34 and a smaller number who were 65 or over.

![Figure 4.1 Respondent age distribution]
Respondents’ experience with IT project management ranged anywhere from zero to 35 years. Looking at individual responses, years of project management experience does not directly relate to the age of the respondent. While a respondent who is in the 24-35 age range obviously cannot have 20 or more years of project management experience, a respondent who is 65 or older may have had project management experience less than five years in length.

It is important to provide a disclaimer on IT project management experience held by respondents. The survey question was worded: “Please enter how many years of IT Project Management experience you have?” As such, some responses may include experience in project management in general due to confusion over wording. The researcher could have worded the question better to eliminate this ambiguity and confusion.

![Figure 4.2 Years of IT Project Management experience per respondent age group](image)

The preceding graph visualizes the project management experience of each respondent relative to the age grouping of the respondents. By combining both the project management experience data and the age grouping data, we can see that while the
experience with IT project management does increase with age, those who are younger have a relatively equal amount of experience with IT project management than their older counterparts. This could be attributed to younger generations having greater exposure at earlier stages of their lives with more integrated technology than older generations.

Respondent experience with IT project management methodologies does not become more pronounced until the 55 to 64 and 65 or over age ranges.

Respondents represented a diverse range of industries. While 44 of the 79 respondents who completed this question choose an industry sector they worked on which was listed on the survey, 35 respondents listed a different sector. The majority of respondents indicated they work in Technology (20 respondents) with Utilities as the second highest sector with 9 respondents. The proceeding chart shows the number of respondents for each sector specified in the survey results.

![Figure 4.3 Respondent Sectors](image-url)
Respondent certifications where mainly centered around the Project Management Professional certification from PMI. This result was expected as the survey was distributed to PMI chapters. However, while it was expected for a subset of respondents to have an Agile certification, the actual results here were surprising to the researcher. PMI released the first revision of their Agile certification, the PMI-ACP (Project Management Institute Agile Certified Practitioner) in 2011. Despite this, no respondents held this certification. Instead, the majority of respondents who indicated they held an Agile-related certification were Certified Scrum Masters (CSM). The CSM certification focuses on a specific Agile methodology whereas the PMI-ACP can be related to many Agile methodologies. The PMI-ACP touches on several Agile methodologies such as Scrum, Kanban, and others. The figure below highlights the distribution of certifications of the respondents. It is important to note that respondents were able to select more than one certification as it is possible to hold more than one at any given time.

![Certifications held by respondents](image)

**Figure 4.4** Certifications held by respondents

Agile certifications, for the context of this research, are defined as being one of the following – SAFe, IC Agile, or a Certified Scrum Master (CSM) certification. One respondent held the SAFe (Scaled Agile Framework) Practitioner certification, while one
other held an IC Agile certification. However, seven respondents held the CSM certification making it the most popular agile certification listed. Despite this popularity, only eight total respondents (or 10% of the total respondents), held one or more agile certification. Traditional project management certifications are limited to the PMP (Project Management Professional). 65 respondents held the PMP certification.

For the remainder of the respondents, eight had no listed certifications. Seven respondents held six-sigma certifications, however this is a process-improvement certification so is being excluded. Also, several respondents held certifications which, while useful in IT careers, are not being classified here as a traditional or agile project management certification. These include certifications from the American Society for Quality (ASQ) and ITIL certifications. ITIL (Information Technology Infrastructure Library) is more related to IT service management than IT project management.

4.1.5 Leadership Development Questionnaire

After querying the respondents on demographics, respondents were asked to rate themselves, using a Likert Scale, on components of the Leadership Development Questionnaire (LDQ). The LDQ, as described in the literature review, rates respondents on three main groupings – EQ (Emotional and Social Quotient), IQ (Intellectual Quotient), and MQ (Managerial Quotient). The survey asked respondents each sub component of the LDQ to provide a total of 15 LDQ dimensions. Table 4.1 shows these results for the seven respondents who held agile project management certifications and the sixty-four respondents who held traditional project management certifications.

Table 4.1 provides the mean and standard deviation data twice. First (as the numerator), the data is shown for respondents who were classified as having a traditional project manager certification. Second (as the denominator), data is shown for those who held an Agile project management certification. By seeing both sets of data together, we are able to attempt to draw conclusions from this data.
Table 4.1 LDQ Dimensions for traditional and agile project managers

<table>
<thead>
<tr>
<th>IQ (Intellectual Quotient)</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(IQ1) Critical analysis and judgement</td>
<td>4.5 / 4.00</td>
<td>0.53 / 0.00</td>
</tr>
<tr>
<td>(IQ2) Vision and Imagination</td>
<td>4.31 / 4.00</td>
<td>0.66 / 0.58</td>
</tr>
<tr>
<td>(IQ3) Strategic perspective</td>
<td>4.20 / 3.71</td>
<td>0.72 / 1.11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MQ (Managerial Quotient)</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MQ1) Resource management</td>
<td>4.11 / 3.86</td>
<td>0.69 / 0.69</td>
</tr>
<tr>
<td>(MQ2) Engaging Communication</td>
<td>4.42 / 4.43</td>
<td>0.64 / 0.53</td>
</tr>
<tr>
<td>(MQ3) Empowering</td>
<td>4.03 / 4.00</td>
<td>0.85 / 0.58</td>
</tr>
<tr>
<td>(MQ4) Developing</td>
<td>4.14 / 4.43</td>
<td>0.81 / 0.53</td>
</tr>
<tr>
<td>(MQ5) Achieving</td>
<td>4.05 / 4.29</td>
<td>0.76 / 0.76</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EQ (Emotional Quotient)</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(EQ1) Self-awareness</td>
<td>4.16 / 4.14</td>
<td>0.62 / 0.69</td>
</tr>
<tr>
<td>(EQ2) Emotional resilience</td>
<td>4.17 / 4.14</td>
<td>0.77 / 0.69</td>
</tr>
<tr>
<td>(EQ3) Intuitiveness</td>
<td>4.13 / 4.29</td>
<td>0.75 / 0.49</td>
</tr>
<tr>
<td>(EQ4) Interpersonal sensitivity</td>
<td>4.23 / 4.29</td>
<td>0.75 / 0.76</td>
</tr>
<tr>
<td>(EQ5) Influence</td>
<td>3.86 / 3.86</td>
<td>0.83 / 0.90</td>
</tr>
<tr>
<td>(EQ6) Motivation</td>
<td>4.30 / 4.29</td>
<td>0.73 / 0.49</td>
</tr>
<tr>
<td>(EQ7) Conscientiousness</td>
<td>4.56 / 4.43</td>
<td>0.61 / 0.53</td>
</tr>
</tbody>
</table>

The data on the next page is a visualization of traditional versus agile survey respondents. By visualizing the data, the results of the raw data from Table 4.1 become more clear. While the results show some interesting results, they are not statistically significant. The peaks of each result for traditional and agile are within the standard deviation for the other result.
We can see that while most of the dimensions of the LDQ are nearly identical for both traditional and agile PMs, there are differences in the IQ dimensions favoring the traditional PMs. These differences can allow us to infer that perhaps LDQ IQ dimensions are more important for traditional project managers than agile project managers. One possible reason for this is that the iterative process of agile may allow for the details of a project to emerge more over time versus how much of a project must be worked out completely during the planning phase for a traditional project. Traditional projects are able to handle changes, but not as fluidly and with more potential consequences or delays than during the execution of agile project management methodologies. As such, project managers need to attempt, with the team’s help, to remove more potential issues and better define the entire project scope in the planning stages more so with traditional methodologies than with agile methodologies.

*Figure 4.5* LDQ Results for traditional and agile project managers
4.1.6 Project Manager Competency Development (PMCD)

The Project Manager Competency Development (PMCD) Framework (version 2) was also utilized in the survey. Respondents were asked to rate themselves on a Likert Scale against a small subset of all PMCD components. Table 4.2, below, shows us the results of the survey for the 5 respondents who held agile project management certifications and the sixty-one respondents who held traditional project management certifications.

As with the LDQ results, results from respondents who held traditional project management certifications are shown in the numerator for the mean and standard deviation. Results from respondents who held agile project management certifications are shown in the denominator.

<table>
<thead>
<tr>
<th>Communicating</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C1) Actively listens, understands, and responds to stakeholders</td>
<td>4.36 / 4.80</td>
<td>0.66 / 0.45</td>
</tr>
<tr>
<td>(C2) Maintains lines of communication</td>
<td>4.39 / 4.80</td>
<td>0.74 / 0.45</td>
</tr>
<tr>
<td>(C3) Ensures quality of information</td>
<td>4.39 / 4.40</td>
<td>0.67 / 0.55</td>
</tr>
<tr>
<td>(C4) Tailors communication to audience</td>
<td>4.30 / 4.40</td>
<td>0.74 / 0.89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Managing</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(M1) Builds and maintains the project team</td>
<td>4.05 / 4.20</td>
<td>0.80 / 0.45</td>
</tr>
<tr>
<td>(M2) Plans and manages for project success in an organized manner</td>
<td>4.15 / 4.20</td>
<td>0.70 / 0.84</td>
</tr>
<tr>
<td>(M3) Resolves conflict involving project team or stakeholders</td>
<td>3.95 / 4.40</td>
<td>0.85 / 0.55</td>
</tr>
</tbody>
</table>

The data in Table 4.2 shows us that respondents who hold Agile project management certifications rated themselves higher on most components of the PMCD.
selected for this study. However, while the values are indeed higher, they are not statistically significant.

*Figure 4.6* PMCD results for traditional and agile project managers

The chart above shows the data in a more visual format. What this shows us is that respondents who hold agile certifications may have higher or more developed skills related to communicating and managing a project than respondents who do not hold agile certifications. The three most prominent PMCD components are C1 (Actively listens, understands, and responds to stakeholders), C2 (Maintains lines of communication), and M3 (Resolves conflict involving project team or stakeholders).

While the results are again not statistically significant, we can see that Agile PMs seem to have high scores on most of the PMCD qualities selected for this study. Thinking about agile certifications and methodologies, these results may make logical sense. In the case of Scrum, the Scrum Master is in constant communication with the Scrum team with daily stand-up meetings, and continuous iterations of the project progression. As such, communication with the project team may be more integral with
agile methodologies than with traditional. As well, while conflict management and resolution is certainly important for all projects regardless of methodology, mitigating conflict early can help ensure an agile team, such as a Scrum team, stays focused on the current sprint, which can help ensure future sprints are also able to be delivered on-time.

4.1.7 Additional Results

Three additional survey questions were posed to the survey respondents to assist in gaining further insights into what types of projects they work on, and how successful those projects may have been.

The first question asked respondents to categorize the projects they have worked on depending on the project management methodology in use. The provided categories were: Traditional (Waterfall), Agile (RUP, Scrum, etc.), and finally Hybrid (Adaptive Project Framework, INSPIRE, etc.). 74.5% of respondents indicated that they manage projects using traditional project management methodologies. Agile methodologies accounted for 24.7% of responses, while hybrid methodologies accounted for 20.9% of responses. Due to browser incompatibilities with the survey instrument, respondent responses could have gone beyond 100% total between the three categories.

The second question asked to respondents was to categorize the projects they have worked on by project size. The provided categories were: Small (duration of less than six months), medium (duration of six to twelve months), and large projects (duration of twelve or more months). The majority of respondents here, 51.8%, answered that their projects were large projects. 37.3% of respondents stated they work on small projects with 31.9% having worked on medium-size projects. Again, due to browser incompatibilities with the survey instrument, respondent responses could have gone beyond 100% total between the three categories.

Finally, a question was asked to have respondents classify their project success in one of two ways. First, how many projects were considered a success by meeting the originally defined scope, time, and cost constraints? These constraints are commonly referred to as the triple-constraint or the Iron Triangle. 71.9% of respondents indicated their projects met all three triple constraints. Second, how many projects were considered a success by the customer despite not meeting one or more scope, time, or
cost constraint? 74% of respondents indicated their projects were still defined a success by the customer regardless of the triple constraint. Despite how close these two values were, the raw data itself showed a very wide variety of responses. Some respondents indicated that their projects only met the triple constraint as little as 10% of the time despite being declared a success by the customer 90% of the time. Conversely, some respondents indicated their projects were defined a success by customers as little as 3% despite being declared a success by the triple constraint 97% of the time.

4.1.8 Survey Result Validation

The last section of the survey consisted of five control questions. These five questions re-iterated previously asked questions in order to validate that the responses given were consistent. However, analyzing the data shows that a large number of respondents did not answer questions consistently. The following chart shows the percentage of control questions that were answered the same as their originally stated version.

Figure 4.7 Questionnaire responses confirmed positively
The results of the control questions show that although valuable data was obtained, respondent responses were not necessarily consistent through the course of the entire survey. This may be due to other obligations while respondents were taking the survey, or potentially different views after having thought about questions further.

4.2 **One-on-One Interviews**

After respondents had completed the survey, they were offered to opt-in to a follow-up interview. The interviews were conducted over the phone to gain further insights into some of the responses provided during the survey. The surveys were recorded using Google Voice and then manually transcribed by the researcher for analysis.

A relatively small response rate was projected as the interviewees would be a subset of those who had actually completed the survey itself. In total, nine survey respondents opted into the phone interview portion of the study. However, of those nine survey respondents, only two actually replied to an email consenting to participate in the interview phase of the study. The questions asked of the interviewees is provided in Appendix B, at the end of this thesis.

Due to the low response rate of consent for the interview section of the study, the results are not able to provide statistical significance to back up the survey results. Despite this fact, the interviews were still able to provide a few perspectives on how competencies and skills come into play when project managers manage projects utilizing both traditional and agile project management methodologies.

The two interviewees consisted of both genders, different age ranges, and different industries. Both interviewees represent the East Coast of the United States. These diverse demographics help to add value to the responses which were received.

4.2.1 **Interview Findings**

While the interviews were low in number, the responses are still valued and can tell us much. One respondent discussed about the shift from a technical role to a project management role and the difficulties in that transition. Another talked about the shift in project management over their years of experience. Both provided insights into how their
personalities and skills helped ensure success in the projects that they managed, along with some problems encountered along the way.

Both interviewees held a PMP certification, although each held a different second certification. One was a Certified Scrum Master while the other had a Six Sigma certification. As well, both interviewees had managed both traditional and agile projects during their career. The interviewees both started their careers in non-project management technical roles and shifted over to becoming project managers after having worked as project team members.

The interviews provided the opportunity to ask each person about their skills and what they think contributes to their individual success as a project manager. Interviewees were first asked what contributed to their success in managing traditional, or waterfall-based, projects. An item which stood out is the ability to ensure the project team is aware of what is required next and to ensure the team is acclimated to the repetition. Consistency was also described as a useful skill. Consistency here refers to the ability to be consistent in applying the methodology and ensuring the team is aware of what is required and at what stage of the development process. Lastly, soft skills were an important skill in order to communicate effectively with the team.

Despite the skills listed above which were helpful in managing traditional projects, a few skills were identified which the interviewees felt were not as useful or may have detracted from project success. One item is that project managers can try to solve issues themselves. While project managers should solve some issues, mainly related to items which the project team may not tasked for, such as budgeting, the project team should be utilized to solve the technical issues at which they excel. Additionally, impatience was identified as a potential detractor. The waterfall methodology especially can take a long time before anything tangible is created. One interviewee described a project in which a year had passed and the only tangible output was a completed project charter.

After discussing traditional methodologies and related skills, interviewees were asked to discuss the skills which helped or hindered their implementation of agile methodologies. Two main concepts were discussed by the interviewees which were helpful with agile methodologies – self-organization, and enthusiasm. Self-organizing
teams is a core concept of many agile project management methodologies. This concept refers to the project manager role becoming more hands-off - letting the team do more themselves while the project manager handles things like budget, communication, and items which the project team may view as “administrivia”. Enthusiasm refers to an ability to motivate the project team to be fully invested in the endeavor and enthused on what needs to be done.

Conversely, the interviewees provided some notions of what skills they needed to change for success with agile methodologies. One respondent described having “to practice … not having an opinion”. By not having an opinion on what the team was working through, they stated that this let them be more hands off while the team was self-organizing, as is dictated in Scrum teams.

4.2.2 Additional Interview Findings

To close the interview, the respondents were asked their opinion on two additional questions. First, each were asked if they found project success defined differently if using traditional versus agile methodologies. One interviewee discussed how “success criteria you set is set by stakeholder.” While this is true of both methodologies, agile allows you to change requirements throughout moreso than with traditional methodologies. The team is able to start with an idea of what is wanted and “incrementally build towards that end product.” This ties into what was described by the other interviewee. They talked about how agile allows for more critical components of the end-product to be delivered much quicker. The customer is able to then “feel like they actually got something.” The remaining functionality of the product can then be built out in future iterations.

Finally, respondents were asked if their training was sufficient or if they felt like they could have used more on their path to agile project management. One respondent felt that although more agile training would have been useful, it would have been most effective if it was for the entire organization and not just for those in project management. This aligns with most texts – that agile must be an organization-wide mindset embedded into their culture to be most effective. The other respondent felt that they were
sufficiently trained both through on the job learning, as well as having obtained a PMP and becoming a Certified Scrum Master.

4.3 Comparisons of Certifications

As an additional method of data to look at skills recommended versus project management methodologies, the researcher reviewed certification material for the PMP (Project Management Professional) and CSM (Certified Scrum Master) certifications. The majority of survey respondents indicated they held a PMP certification. Of those who specified agile certifications held, the CSM stood out as the prominent agile certification.

As the survey was distributed to PMI chapters, the researcher was surprised to find that no respondents indicated they held the PMI-ACP (Project Management Institute – Agile Certified Practitioner) certification. This certification has existed since 2011 and in 2015 was last updated. The PMI-ACP also does not focus on just one agile methodology, as the CSM does, but rather introduces several agile methodologies including Scrum, Kanban, and others. Despite this breadth of Agile methodologies covered in the PMI-ACP, CSM still stood out. This does, however, align with findings discussed earlier from VersionOne (2015) which stated that 56% of respondents were using Scrum as their agile methodology.

As the PMP and CSM were determined to be the two most popular certifications among respondents, the next step was to analyze documentation for each. By analyzing such documents, further insights may be gained into potential differences in skills and competencies recommended, if such differences do exist.

Representing the PMP certification, the PMBOK v5 was selected as the document of choice. As discussed earlier in this work, the PMBOK is the de facto guide to the PMP and is regularly updated by PMI to reflect changes in the field. While reviewing the PMBOK, there were hints found which tied back to the PMCD (Project Manager Competency Development) Framework.

The PMBOK lists competencies and skills which are deemed important to the PMP certification and project management field in general. In regards to competencies, the PMBOK simply mentions the three overarching competencies contained in the
PMCD: knowledge, performance, and personal. However, as was found by analyzing the PMCD, these three competencies contain a vast range of individual skills and associated metrics.

The PMBOK further discusses several interpersonal skills which PMI has found to be most relevant to making a project manager effective. In total, eleven skills were listed and described in the PMBOK including leadership, team building, motivation, communication, influencing, decision making, political and cultural awareness, negotiation, trust building, conflict management, and coaching. However, of these eleven skills, it is important to compare them against the results of the survey LDQ and PMCD sections. The LDQ found that traditional project managers had slightly higher scores related to critical analysis and judgement, strategic perspective, vision and imagination, and resource management. These seem to most closely correlate to the leadership and decision making skills identified by PMI for inclusion in the PMBOK. Looking at the PMCD, there were no metrics in this survey component in which the traditional respondents held a higher score than respondents who held agile certifications.

The CSM, however, required two documents to provide more insight into recommendations for how a CSM should function. Many books have been written about Scrum and how to implement it, but apart from a short 17-page guide aptly titled “The Scrum Guide”, there was no comparable text such as the PMBOK found for Scrum. To complement “The Scrum Guide” (Sutherland & Schwaber, 2013), the text “Essential Scrum: A Practical Guide to the Most Popular Agile Process” (Rubin, 2012) was selected to gain more information into what makes a Scrum Master.

Unlike the PMBOK, the two documents chosen to represent CSM did not explicitly list out optimal competencies and skills. However, Rubin did list several responsibilities of the Scrum Master in the “Essential Scrum” text. These include being a coach, a servant leader, being a process authority and interference shield, and being an impediment remover and change agent. Furthermore, Rubin described several characteristics or skills important to a Scrum Master. These characteristics include being knowledgeable, questioning, patient, collaborative, protective, and transparent. The skills required for these responsibilities are about as diverse as those required for proper implementation of the PMBOK.
The survey results had found that respondents with agile certifications scored higher on the PMCD section for three main components. On the “Communicating dimensions”, actively listening, understanding, and responding to stakeholders, and maintaining lines of communication were found to be more important. Additionally, the managing component of resolving conflict involving the project team or stakeholders was rated higher among respondents with agile certifications. These three items correlate most closely to the Scrum Master responsibilities of being an impediment remover, and being an interference shield. These two roles help protect the team against a variety of items which can be detrimental to the team’s workflow. This can include managing disputes, answering questions from outside sources, and removing barriers to success for the Scrum team.

Comparing the documentation for both certifications, similarities and differences are both found. The terms used in the PMBOK are more explicit while the terms used by Rubin are less specific and can include multiple skills. Regardless, both include important skills such as leadership, communication, influencing, and negotiation. With CSM, the terms used are changed, yet are similar. As an example, the PMBOK describes influencing, while this could be described as questioning with CSM.

The skills listed by the PMBOK are all more closely related to that of someone who is in a role which has a team under them that they are providing guidance to the team by providing direct leadership and guidance on what the team should be doing at what time and with what output. Conversely, the skills and characteristics of Scrum are all centered around bringing the team closer together while helping remove their barriers to success and providing small suggestions to help coax new ideas out of the team to enable them to solve issues themselves where appropriate. To summarize, the CSM and PMBOK skills are similar. However, a CSM implements these skills in a manner which provides less interference to the team.

4.4 Final Conclusion

The research conducted targeted three different data sources. The survey data gained insights into the project management field from a diverse range of individuals from a wide geographical region of the United States. The follow-up interviews, while
small in quantity, were able to provide more specific insights from two survey respondents. Finally, the documentation analysis for two methodologies looked into what was recommended for skills for both Scrum and the PMP. Through these three data sources, triangulation can be obtained.

The survey data shows us interesting demographic information for the respondents including age, company sector, IT project management experience, and certifications held. As well, interesting results related to how process success is defined from two different viewpoints were found. Despite the research showing that agile project managers do have higher scores on the PMCD components of Communication (C1, C2) and Conflict Resolution (M3), the related components of the LDQ Engaging Communication (MQ2) and Empowering (MQ3) yielded nearly identical scores between respondents who held traditional versus agile certifications. Only the related LDQ component of Developing (MQ4) showed a higher score for respondents with agile certifications than those with traditional certifications.

The individual interviews and documentation analysis also yielded interesting results and insights. Both showed certain skills listed, however the interviews did not show any substantial differences between respondents. Both interviewees focused more on how the goal of agile was to provide more autonomy to the team. This is echoed in the document analysis.

In conclusion, while components of the research, specifically in the survey data, do show agile and traditional project management certification holders having higher scores in different skill sets, conflicting results are shown in other data points. As such, this research concludes by determining that there is no significant set of skills which are more preferred over another for project managers regardless of which project management methodology is being used. However, all respondents except one who held agile certifications also held the PMP. Therefore, it is recommended to obtain the PMP certification and supplement the PMP with a relevant agile-related certification, whether that is CSM, PMI-ACP, or one more relevant to the methodology in use by the target organization.
4.5 Future Research

The researcher would like to see this research to be expanded in several ways. First, the questions relating to how project success is rated by the customer versus the triple constraint, or Iron Triangle, provided interesting results that could be explored further. Specifically, what factors contributed to the difference in defined project success? An additional point in which the research could be expanded would be in the survey audience. As the number of respondents who held agile certifications was quite low, it would be interesting to see if the results change if the survey was instead distributed to respondents who were more focused on an agile methodology – such as groups of Certified Scrum Masters.
APPENDIX A. SURVEY

The following 13 pages contain the survey instrument used in this research.
Default Question Block

Research Participant Questionnaire Consent Form
Project Manager competencies and their relation to traditional and agile project management methodologies
Keith McDermott
Purdue Polytechnic Institute
Purdue University
IRB#: 1603017354

What is the purpose of this study?
This study attempts to collect information about differences in competencies in project managers based on the project management methodologies they utilize in their management of projects.

What will I do if I choose to be in this study?
You will be taken through a questionnaire which will first ask basic demographic questions as well as general questions regarding your project work. You will also be asked to rate yourself against fifteen leadership dimensions and seven competency components of the Project Manager Competency Development Framework (Second Edition).

This questionnaire is expected to take less than 20 minutes.

At the end of the questionnaire you will be given the opportunity to opt-in to a potential follow-up one-on-one phone interview to further explore the responses of this questionnaire. This follow-up phone interview is completely voluntary.

How long will I be in the study?
You will only be in the study long enough to complete this questionnaire, unless you also opt to participate in a potential follow-up one-on-one phone interview.

What are the possible risks or discomforts?
The risks of this interview are no greater than you would encounter in daily life or during the performance of routine physical or psychological exams or tests.

Are there any potential benefits?
You may learn more about how your personal competencies influence or affect your project management style.

Will I receive payment or other incentives?
There is no payment compensation for participation in this study. However an executive report based on the findings
from this research will be presented to the group and directly to you, if requested.

**Will information about me and my participation be kept confidential?**

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). All questionnaires will be concealed, and no one other than the primary investigator and research advisor listed below will have access to them. The data collected will be stored in the HIPAA-compliant, Qualtrics-secure database until it has been deleted by the primary investigator.

**What are my rights if I take part in this study?**

Your participation in this study is voluntary. You may choose not to participate or, if you agree to participate, you can withdraw your participation at any time without penalty or loss of benefits to which you are otherwise entitled by closing your internet browser.

**Who can I contact if I have questions about the study?**

If you have questions, comments or concerns about this research project, you can talk to one of the researchers. Please contact the primary investigator, Keith McDermott, at keithmcd@purdue.edu or 765-496-6390. You may alternatively contact the research advisor for this project, Jeff Brewer, at jbrewer@purdue.edu or 765-496-6838.

If you have questions about your rights while taking part in the study or have concerns about the treatment of research participants, please call the Human Research Protection Program at (765) 494-5942, email (hrp@purdue.edu) or write to:
Human Research Protection Program - Purdue University
Ernest C. Young Hall, Room 1032
155 S. Grant St.,
West Lafayette, IN 47907-2114

**Documentation of Informed Consent**

I am over the age of 18 years old. I have had the opportunity to read this consent form and have the research study explained. I have had the opportunity to ask questions about the research study, and my questions have been answered. I am prepared to participate in the research study described above.

I have read, understood, and printed a copy of, the above consent form and desire of my own free will to participate in this study.

- [ ] Yes
- [ ] No

Thank you for participating in the following survey. To begin, we will collect some basic demographic information.

What is your current age?
Less than 19
20 to 24
25 to 34
35 to 44
45 to 54
55 to 64
65 or over

What is your gender?

- Male
- Female
- No answer

What is your Job Title?

E.g.: Project Manager, Program Manager, Portfolio Manager, etc.

Please enter how many years of IT Project Management experience you have:

Please select which certifications below you currently hold:

- PMP (PMI - Project Management Professional)
- CAPM (PMI - Certified Associate in Project Management)
- PMI - ACP (PMI - Agile Certified Practitioner)
- Six Sigma
- PRINCE2
What industry sector is your company in?

- Education
- Finance
- Health care
- Technology
- Transportation
- Utilities
- Other (Please specify)

Please rate how you feel each of the following intellectual dimensions of leadership (IQ) apply to yourself in your leadership of projects.

For example: If you strongly believe you have the ability to see the potential future impact of a vision or changes to the vision, you would select "5."

<table>
<thead>
<tr>
<th>Critical analysis and judgment</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to make good judgements based on available information and reasonable assumptions</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Vision and imagination</th>
<th>1</th>
<th>2</th>
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</tr>
</thead>
<tbody>
<tr>
<td>The ability to see the potential future impact of a vision or changes to the vision</td>
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<tr>
<td><strong>Strategic perspective</strong></td>
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<tr>
<td>The ability to see how one’s vision applies to the business goals and overall strategy</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Please rate how you feel each of the following managerial dimensions of leadership (MQ) apply to yourself in your leadership of projects.

For example: If you strongly believe that you have the ability to efficiently and effectively coordinate and gather project resources, you would select "5."

<table>
<thead>
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<th></th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td><strong>Resource management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The ability to efficiently and effectively coordinate and gather project resources</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engaging communication</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>The ability to use active communication and tailor communication method to each target audience</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tbody>
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<th>2</th>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Empowering</strong></td>
<td></td>
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</tr>
<tr>
<td>The ability to build a team who are driven and passionate with their work</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tbody>
</table>

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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Developing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The ability to better others on the team by providing feedback, coaching, and training</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Achieving</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>---</td>
</tr>
<tr>
<td>Ability to take risks to make decisions that are likely to positively impact core business issues</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Please rate how you feel each of the following emotional and social dimensions of leadership (EQ) apply to yourself in your leadership of projects.

For example, if you strongly believe you have the ability to consistently perform regardless of the situation, you would select "5."

<table>
<thead>
<tr>
<th>Self-awareness</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to be aware of one's own feelings and manage them constructively</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emotional resilience</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to consistently perform regardless of the situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intuitiveness</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to make and execute a sound decision even with incomplete or vague information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interpersonal sensitivity</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to keep an open mind to others and actively respond to thoughts or criticisms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Influence</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to persuade others to change after listening to their perspective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>------------</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>The ability to be self-driving for results even in spite of rejection or questioning</td>
<td>🗑️</td>
<td>🗑️</td>
<td>🗑️</td>
<td>🗑️</td>
<td>🗑️</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conscientiousness</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to remain committed to a goal and solve a business issue with an ethical solution</td>
<td>🗑️</td>
<td>🗑️</td>
<td>🗑️</td>
<td>🗑️</td>
<td>🗑️</td>
</tr>
</tbody>
</table>

Please indicate what percentage of the projects you manage fit into each methodology category below:

<table>
<thead>
<tr>
<th>Methodology Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Project Management (Waterfall)</td>
<td>0</td>
</tr>
<tr>
<td>Agile Project Management (RUP, SCRUM, etc)</td>
<td>0</td>
</tr>
<tr>
<td>Hybrid Project Management (Adaptive Project Framework, INSPIRE, etc)</td>
<td>0</td>
</tr>
</tbody>
</table>

Please indicate what percentage of the projects you manage are large, medium, or small project sizes:

<table>
<thead>
<tr>
<th>Project Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Projects (Duration of less than six months)</td>
<td>0</td>
</tr>
<tr>
<td>Medium Projects (Duration of six to twelve months)</td>
<td>0</td>
</tr>
</tbody>
</table>
Large Projects  
(During of twelve or more months)  

Please indicate what percentage of your projects were considered a "success."

First, what percentage would be considered a success by meeting the originally-defined scope, time, and cost constraints?

Second, what percentage were considered a success by the customer despite not meeting or or more scope, time, or cost constraint?

<table>
<thead>
<tr>
<th>Scope, Time, Cost Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

Customer-declared Success Rate

---

**Project Manager Competency Development (PMCD) Framework (Second Edition)**

The PMCD contains three areas of competence. Each area contains several competencies.

The theory of the PMCD is that all project managers have a varied range of personal, performance, and knowledge competencies. However, these three competency areas can be developed to better expand one’s overall competency.

Personal competencies look at how you are able to actually manage the project itself. Performance competencies relate to how well you can apply the processes and procedures related to the Project Management Body of Knowledge (PMBOK). Finally, the knowledge competencies look at how much you know about the processes and procedures of the PMBOK itself.

This research is primarily focusing on two specific personal competencies detailed in the following two questions.
Please rate how you feel each of the following elements of the personal competency -
Communicating - apply to yourself in your leadership of projects.

For example, if you strongly believe that you actively listen, understand, and respond to stakeholders, you would select "5."

<table>
<thead>
<tr>
<th>Actively listens, understands, and responds to stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieved by actively listening, understands explicit and implicit content, and responds/acts to expectations, concerns, and issues</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>o</td>
</tr>
<tr>
<td>Maintains lines of communication</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Achieved by projectively engaging stakeholders, effectively distributing information, and maintaining both formal and information communication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ensures quality of information</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieved by using proper sources and providing validated, accurate, and factual information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tailors communication to audience</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieved by providing relevant information using the right communication method for the target audience and their environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please rate how you feel each of the following elements of the personal competency - **Managing** - apply to yourself in your leadership of projects.

For example, if you strongly believe that you can and do build and maintain a project team, you would select "5."

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>
Builds and maintains
the project team
Achieved by identifying and selecting talent, ensuring expectations and responsibilities are clear, and maintaining a positive attitude and work-life balance

Plans and manages for project success in an organized manner
Achieved by using best practices, organizing project information with appropriate levels of detail, and clearly identifying scope, roles, expectations, and tasks of the project

Resolves conflict involving project team or stakeholders
Achieved by ensuring team and stakeholders are aware of team rules while recognizing and resolving conflict

Please rate how you feel each of the following phrases describes yourself in your project management role:

For example, if you strongly believe you provide engaging communication to your team, you would select "5."

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have a strong strategic perspective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I provide engaging communication to my team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
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<td>4</td>
<td>5</td>
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<td>------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>I am able to perform consistently under pressure</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>I projectively engage stakeholders and maintain both formal and information communication</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>I am able to ensure expectations and responsibilities of my team are clear while maintaining a positive attitude and work-life balance</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Finally, please provide any additional comments which you feel may be relevant to this questionnaire.


Thank you for your participation in this questionnaire!

If you are interested in receiving a report of the results of this survey, please enter your email address below.

This is completely voluntary and not a requirement of participation in all previous portions of this questionnaire.


If you would like to have the opportunity to participate in a limited number of one-on-one phone interviews to help gain further insights to the responses of this questionnaire, please provide your email address below.

This is completely voluntary and not a requirement of participation in all previous portions of this questionnaire.
Please continue to submit your responses and complete this questionnaire.

IRB No.: 1603017354

Powered by Qualtrics
APPENDIX B. ONE-ON-ONE INTERVIEW QUESTIONS

Think back on projects you have worked on in the past.

Thinking about the projects which utilized a traditional project management methodology:

1. Which of your personal skills help the most to achieve a project success?
2. Were any personal skills not as useful on these types of projects?
3. Were the clients/users satisfied with the outcome of the project?
4. Do you encounter any barriers to success which impede your ability to apply your personal skills on traditional project management methodologies (such as waterfall)?

Now thinking about the projects which utilized an agile project management methodology:

1. Which of your personal skills help the most to achieve a project success?
2. Were any personal skills not as useful on these types of projects?
3. Where the clients/users satisfied with the outcome of the project?
4. Do you encounter any barriers to success which impede your ability to apply your personal skills on agile project management methodologies (such as SCRUM)?

Now think about comparing yourself in managing traditional versus agile project management methodologies:

1. Do you find project success defined differently if utilizing traditional versus agile project management methodologies? If yes, please provide examples.
2. Did you have to change or improve specific personal skills to manage one type of methodology versus the other?
3. Would additional training have helped you better adapt your skills to execute an agile project management methodology versus a traditional methodology such as waterfall? If yes, do you have specific training you believe could have helped?

Thank you for your participation in this study. A report of the findings of this study will be provided to you, if requested, once the data collection and analysis has completed.
REFERENCES


