ORGANIZATIONAL TRUST AS AN ANTECEDENT OF AN ACCURATE PROJECT MANAGEMENT ESTIMATING METHODOLOGY

by

James Michael Wood

A Dissertation Presented in Partial Fulfillment

of the Requirements for the Degree

DOCTOR OF BUSINESS ADMINISTRATION

UNIVERSITY OF PHOENIX

August 2006

ORGANIZATIONAL TRUST AS AN ANTECEDENT OF AN ACCURATE PROJECT MANAGEMENT ESTIMATING METHODOLOGY

by

James Michael Wood

August 2006

Approved:

PHILLIP L. DAVIDSON, Ph.D., Mentor

ANN ATKINSON, Ed.D., Committee Member

ALETA D. BEST, Ph.D., Committee Member

Accepted and Signed: Phillip L Davidson 08/22/2006
Phillip L. Davidson, Ph.D., Mentor — Month, Day, Year

Accepted and Signed: Ann Atkinson 08/22/2006
Ann Atkinson, Ed.D., Committee Member — Month, Day, Year

Accepted and Signed: Aleta Best 08/22/2006
Aleta D. Best, Ph.D., Committee Member — Month, Day, Year

Dawn Iwamoto 9/13/06
Dawn Iwamoto, Ed.D.
Dean, School of Advanced Studies
University of Phoenix
Month, Day, Year

ABSTRACT

The construct of trust has been shown to influence organizational effectiveness in general. Project estimating has been identified as a key component of an effective project management methodology. This research explored the potential association between organizational trust and the accuracy of a firm's project management estimating methodology. Differing levels of organizational project management maturity and project manager competency were controlled so that estimating processes are evaluated among companies with similar levels of estimating process competency. The study reviews historical theories of organizational trust, the appropriate measures of that construct, and theoretical analyses applied to the practice of project estimating. With that framework, this research found a positive correlation between organizational trust and accurate project cost, schedule, and risk estimating.

ACKNOWLEDGMENTS

I wish to acknowledge the support of my doctoral committee, Dr. Aleta Best and Dr. Ann Atkinson, and especially the endless help, support, encouragement, and guidance from my doctoral mentor, Dr. Phil Davidson. I appreciate Dr. Tom Granoff for helping me navigate the statistical waters of this study. I also wish to express my deep gratitude to my peer mentor, my tireless motivator, and my good friend Trina Poe.

I am so very thankful for the help and encouragement provided by my colleagues and Learning Team members Rhodie Humbert, Manny Rodriguez, Eric Longino, Robert Kountz, Kathleen Radionoff, and Matt Saak. My close friends Sharon Smith, Dominick Blum, Suresh Babu Gadipudi, Jerry Cunningham, Jim Hinkle, and especially Danita Howe consistently provided me with priceless support and encouragement. I am extraordinarily grateful for these fine friendships.

Last, but far from least, I would like to especially thank those people that are the most important in my life--Tuni Dawson, Erna Donner, my mother Betty VonFeldt, and my wonderful children Kimberly and Vincent.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

As organizations expand the breadth and depth of domestic and global business, increased attention to the tenets of formalized project and portfolio management methodologies holds the opportunity for effectively utilizing scarce organizational resources toward that end. An organization must balance the demands inherent with the disparate projects that comprise its comprehensive organizational portfolio. With that balancing process, project risks, costs, and benefits are analyzed, prioritized, and weighed against each other. Those projects with the greatest benefit-to-cost ratio are likely to be selected for inclusion into the organizational portfolio. An effective portfolio becomes a method of realizing an organization's strategic plan.

A critical component of the evaluation process is understanding the total project costs, schedule, and risks that compose each of the projects and programs within the organizational portfolio. An accurate analysis of the portfolio is incumbent on developing a comprehensive evaluation of the estimated project costs, schedule duration, and anticipated risks. Likewise, an effective portfolio management process evaluates in-progress projects and programs. Strategic decisions are made to continue or terminate those project efforts based upon the estimated cost, time to completion, and project risks. In both instances, an accurate project management estimating methodology is required to illustrate a precise picture of the project status available for evaluation by organizational decision makers. Without an accurate project estimating foundation, the portfolio management process is fundamentally flawed. With inaccurate project estimates, poor

portfolio decisions will likely be made resulting in a less-than-optimal implementation of the organization's strategic plan.

From an organizational culture perspective, internal and external environmental influences continually place operational, strategic, political, and social pressures on the organizational decision-making process. Environmental influences directly affect organizational performance (Scott, 2003). External influences include those circumstances outside the sphere of organizational control. Internal environmental influences include pressures related to people, processes, organizational performance, and technology. Internal environmental influences that affect people issues are arguably the most difficult to identify, quantify, and manage. Workplace stressors such as long hours, mandatory overtime, and conflicts among coworkers are examples of internal environmental influences that affect worker performance (Berg, Kalleberg, & Appelbaum, 2003). Organizations are best served by managing internal environmental influences such as enhanced communication, organizational support, clear organizational values, and trust within the firm (Antoncic, 2001). Leaders must maintain awareness of the importance of these environmental influences.

Trust is a component of the internal organizational environment. Given that, the level of trust within an organization holds the potential of being an internal environmental influencer in the project evaluation process. A conflict-averse, collaborative, and synergistic team environment is predicated on a trusting internal workplace environment (Hattori & Lapidus, 2004). Trust can be an especially powerful influencing constraint.

Even in a perfect organizational environment, the intelligent, deliberate, and strategic allocation of resources is central to an effective portfolio management process (PMI, 2004). When internal environmental attributes of an organization negatively influence that effective allocation of resources, it is in the leader's best interests to act swiftly to mitigate the root causes of that dysfunctional management process. An organizational climate of distrust holds the potential to be such a negative influencer of effective portfolio management process. Scott (2003) argued that subordinates can selectively alter information in order to provide leaders the information they want to hear. People can subjugate an open and honest organizational dialogue at the expense of seeking personal rewards (Culbert & Schroeder, 2003). If that environment of distrust influences the project management estimating methodology, the effectiveness of the entire strategic planning process may be jeopardized. This research evaluated that influence by examining the correlation between organizational trust and project management estimating accuracy.

As with many organizational processes, several organizational conditions can influence the effectiveness of the project estimating process. For example, the project estimating process is dependent on the individual estimators (Whiteside, 2003a). Initially, a project manager may be asked to develop a project estimate with partial or incomplete information (McCray, Purvis, & McCray, 2002). Additional factors may influence the accuracy of a particular project estimate. Environmental influences notwithstanding, organizations of different levels of project management maturity may operate under differing levels of effectiveness with regard to their project management estimating methodologies. The accuracy of the project estimating process is dependent on the

quality of the estimating process, the size of the project being estimated, the complexity of the effort, the experience of the estimator (Bent, 2001), the information available at the time of the estimate, and the level of risk inherent with contingency development (Karlsen & Lereim, 2005). Each influencing factor holds the potential to produce inaccurate project information to the organizational decision makers.

This study surveyed project managers located within a major Rocky Mountain metropolitan area. A quantitative, correlational research methodology was employed to analyze and quantify the relationship between the independent variable, organizational trust, and the dependent variable, an accurate project management estimating methodology, in order to determine whether a relationship existed.

The study assumed that two additional factors have a relationship to an accurate project management process--organizational project management maturity and project manager competency. Those potentially confounding variables were controlled. One method of differentiating an organization's project management estimating effectiveness is by identifying the firm's organizational project management maturity. The researcher held the assumption that an organization with a more mature project management process estimates its work more accurately. In order to provide an accurate picture of the influences on project estimating, this study stratified organizations of similar project management estimating maturity characteristics by allowing project managers to self-identify an indicator of organizational project management maturity.

In addition to the potentially confounding factor of organizational project management maturity, it was assumed that the competency levels of project managers might influence the accuracy of project estimates. For example, a more technically

competent project manager may have a greater understanding of the complex implications of the estimating process. This potentially confounding variable was controlled. The Project Management Institute (PMI) issues the Project Management Professional (PMP) certification as a means of identifying project managers that have demonstrated technical project management competency (PMI, 2005). Those holding the PMP certification have demonstrated their project management competency through documented experience, education, and the successful completion of a comprehensive examination (Skulmoski, 2001). This study controlled for levels of project management competency by stratifying responses based on PMP certification.

The following variables were investigated in this study: (a) the independent variable organizational trust prevalent with the participant's firm as measured by Cummings and Bromiley's (1996) Organizational Trust Inventory-Short Form (OTI-SF), and (b) the dependent variable project estimating accuracy as identified by a self-reported categorization by respondent project managers. Levels of project management maturity were identified in order to stratify the participant's firms into similar estimating maturity characteristics. Similarly, project management competency was identified and stratified by identifying those respondents holding the PMI's PMP certification. The study data was subjected to statistical analysis, the results of which were utilized to formulate conclusions and recommendations.

Background of the Problem

Effectively prioritizing projects within an organizational portfolio directly and quantitatively reflects the strategic commitment of an organization toward its mission (Artto, Dietrich, & Nurminen, 2004). Srivannaboon and Milosevic (2004) argued that

"The essence of the project management strategy is to support the execution of the competitive strategy of an organization in delivering a desired outcome" (p. 177). To that end, leadership must allocate scarce resources toward a finite set of projects through a structured budgeting process (Keisler, 2004). Funding decision makers use project estimates as a key component of the cost benefit analysis to determine the attractiveness of a particular project initiative (Keisler, 2004). Similarly, a portfolio management decision to authorize the continuance of additional effort toward in-progress projects relies upon equally accurate project estimate-to-completion projections.

Accurate project management estimating is critical to an effective portfolio management process (Kerzner, 2003; Meredith & Mantel Jr., 2005; PMI, 2004; Toney, 2003). The responsibility to accurately estimate project activities is incumbent upon both team members and project managers (Kerzner). Obtaining those accurate project estimates presents a challenge even in a perfect organizational climate. In some instances, an objective method of determining project estimates is employed. Those objective techniques include parametric and project management software-based methods (PMI, 2004). In other instances, a more subjective estimating approach is taken. Those techniques may include analogous and bottom-up estimating methods (PMI, 2004). Project managers often struggle with securing accurate project estimates given limited time and project information (Karlsen & Lereim, 2005).

Both expected and unexpected risks confound individuals in projecting future outcomes (Karlsen & Lereim, 2005). Organizational influences, such as pressure by organizational leaders to perform, augment the difficulty of establishing accurate project estimates. Adding contingencies to project estimates is a common and appropriate

method to mitigate anticipated project risks (Kerzner, 2003; Meredith & Mantel Jr., 2005). However, as project team members develop those contingency estimates, the temptation to over-estimate--to add inappropriate contingencies--may be present (Karlsen & Lereim). Similarly, project team members may be under environmental pressures to under-estimate an activity, such as in the case of highly competitive project bidding processes (Flyvbjerg, Holm, & Buhl, 2002). Factors external to the project, such as organizational trust, may also influence this temptation to over-estimate or to under-estimate.

An effective project management methodology is a component of organizational effectiveness and is critical to the success of an organization (Morrison & Brown, 2004). Additionally, organizational trust influences the effectiveness of organizational performance (Shockley-Zalabak, Ellis, & Winograd, 2000). To add to the understanding of organizational effectiveness and performance, a study of the correlation between accurate project estimates and organizational trust is beneficial to both project managers and leaders responsible for strategic portfolio decisions. Leaders can use this knowledge to initiate positive change in the portfolio management process. Correspondingly, leaders can use results and conclusions of this study to enhance their knowledge of the importance of fostering a trusting organizational environment and to take action toward implementing initiatives to enhance the level of trust within their organizations.

Statement of the Problem

Effectively prioritizing the firm's portfolio reflects the commitment of an organization toward its mission and strategic plan. An ineffective portfolio management process may cost the organization through suboptimal project selection, lost

opportunities, and misguided resource and funding allocation. Individual agendas notwithstanding, leaders typically materialize their goals and objectives through the selection of projects structured to compile an organizational portfolio (Morris & Jamieson, 2004). Many organizations have more projects than they have resources available to perform the work (Cooper, Edgett, & Kleinschmidt, 2002). Leaders must allocate scarce funding and human resources toward a finite set of projects through a portfolio management and budgeting process (Cooper et al.). That budgeting process is dependent upon project estimates as a key component of the cost-benefit analysis (Keisler, 2004). Funding decision makers use project estimates as a key component of a cost-benefit analysis to determine the attractiveness of a particular project initiative. Organizations may be ineffectually managing their portfolios as a result of an inaccurate project management estimating methodology that may be influenced by a distrusting organizational environment.

Both project team members and project managers have a responsibility to estimate project activities accurately. Project team members encounter a myriad of organizational influences including pressures that affect the project estimating process. As project team members develop project estimates, influences external to the project, such as distrust in the organization, may result in the temptation to over-estimate or under-estimate cost, schedule, or risk factors. That imprecise estimating process may results in the temptation to add inappropriate contingencies to those project estimates. Similar influences may affect the estimates submitted by project managers. One of these external project factors, organizational trust, may be an unrealized influence on this temptation to embellish or misrepresent project estimates.

A study of the correlation between project estimating accuracy and organizational trust is beneficial to both project managers and leaders responsible for funding decisions. Individual projects within organizational portfolios are evaluated based on project estimates and are prioritized based on the ration of net present value to the estimated costs (Keisler, 2004). Companies may be losing money and opportunity as a direct result of inaccurate project estimates. Keisler identified an estimated 10-100% saving in organizational portfolio value as a result of improved decision-making analysis. Accurate project estimating is a key component of that decision-making process. Understanding the consequences of an organization's trust levels, with regard to project estimating, provides a tangible catalyst for changing the organization's trust environment.

Purpose of the Study

The purpose of this quantitative, correlation research study was to determine the extent with which organizational trust levels influence the accuracy of project estimates. This study examined organizational trust levels and their potential impact on the accuracy of the project estimating process within a variety of organizations located in a major Rocky Mountain metropolitan area. The conclusions and recommendations of this research provide leaders with enhanced knowledge of the implications that organizational trust holds on the effectiveness of their project management process.

Organizations are dependent upon sound strategic direction. A key component of the strategic planning process is the effective allocation of organizational funding. The primary method of organizational funding is through authorizing projects that align with the strategic direction of the firm based on an accurate assessment of the costs and

benefits of particular project initiatives within the organizational portfolio. A component of that cost-benefit analysis is the estimated project budget and schedule.

Trust plays a significant role in organizational dynamics (Lines, Selart, Espedal, & Johansen, 2005). As organizations migrate toward increasingly disparate project work teams, the need for increased levels of trust is inherent (Fukuyama, 1995; Lines, Selart et al.). This study examined whether levels of organizational trust influence project estimating accuracy.

This study quantified the implications of organizational trust on the project estimating process. To that end, a quantitative correlational study was performed with project managers within a major metropolitan area in the Rocky Mountain region of the United States.

Significance of the Problem

This study is significant to both scholars of leadership and to leadership practitioners. Leadership scholars have the benefit of integrating the findings of this study into the body of academic knowledge related to the constructs of organizational trust and project estimating. Leadership practitioners benefit for using the conclusions and recommendations of this study within the context of improving their organizational effectiveness. Both the theoretical and practical importance of this study is reviewed.

Significance to the Field of Study

Understanding the comprehensive costs and benefits of project ventures is an important component of a firm's portfolio management process (Cooper et al., 2002). Organizations employing a project-based organizational structure rely on an accurate project estimating methodology as a critical component of a project's cost-benefit

analysis. Accurate project cost-benefit profiles provide portfolio management decision makers with information to optimize operations through the selection of the projects that align best with the organization's strategic plan.

Many factors can affect the accuracy of the project estimating process and subsequently affect the precision of organizational portfolio management efforts. This study examined the relationship between organizational trust and the accuracy of the project estimating process. Results of this research add to the body of knowledge in the study of organizational trust, project management, and leadership.

Significance to Leadership

The importance of high levels of organizational trust is apparent from the literature review that follows. The importance of trust is anticipated to grow given the ubiquity of turbulent organizational environments, leading to the need for organizational practitioners to understand the implications of trust formation and sustenance (Ferres & Travaglione, 2003). Trust has been identified as an influencing factor within the dynamics of organizational leadership effectiveness (Lines et al., 2005). High trust organizations are more successful, innovative, and adaptive than those with low levels of trust (Shockley-Zalabak et al., 2000). Improving organizational trust can be accomplished through leadership action, especially through effective leadership communication (Mayfield & Mayfield, 2002). In summarizing the importance of trust with regard to leading organizations, Drucker (2005) posited the following, "Organizations are no longer built on force but on trust" (p. 107). Similarly, Kouzes and Posner (2002) argued that "at the heart of collaboration is trust…it's *the* central issue in relationships within and outside organizations" (p. 244).

Conversely, significant organizational distrust can be attributed to organizational ineffectiveness (Mishra & Morrissey, 1990). Moreover, in 1997, a survey of nearly two-thirds of United States human resource managers identified mistrust of management as the most significant obstacle in employee or employer relations (McCune, 1998). Lewicki, McAllister, and Bies (1998) argue that organizations of the 21st century will see more high trust/high distrust conditions as firms organize around multiplex workplace environments and as work team interdependencies are extended. Likewise, as firms expand globally and increase reliance on virtual global work teams, trust will play an increased role within that group dynamic (Fukuyama, 1995; Ludwick, 2004). The increased utilization of virtual project teams and diversity among work teams requires a high level of mutual trust to ensure an effective working relationship (Jarvenpaa, Shaw, & Staples, 2004; Mayer, Davis, & Shoorman, 1995). The nature of the virtual team can result in a distrusting work environment (Piccoli & Ives, 2003). Positive levels of organizational trust have been found to contribute to enhancing organizational effectiveness (Rousseau, Sitkin, Burt, & Camerer, 1998; Shockley-Zalabak et al., 2000), job satisfaction (Shockley-Zalabak et al.), improved effectiveness of virtual teams (Brown, Poole, & Rodgers, 2004; Jarvenpaa et al., 2004), and reduced transaction costs (Cummings & Bromiley, 1996).

Leadership behavior provides the foundation for a trusting workplace environment, and it is incumbent upon a leader to initiate a trusting workplace environment (Whitener, Brodt, Korsgaard, & Werner, 1998). Leader actions and beliefs have influence on characteristic-based and process-based trust within organizations (Creed & Miles, 1996). Process-based trust originates from personal experience with an

interaction or the reputation of another. Characteristic-based trust embodies broad-based evaluations influenced by social similarity. In either situation, organizational trust can be built and must be initiated by organizational leaders (Creed & Miles).

Just as trust in leadership has become a growing concern for organizations, effective project management is becoming increasingly important as a basic organizational competency (Morrison & Brown, 2004). The significance of an effective project management framework within an organization is amplified by Hebert's (2002) observation that project management is a powerful leadership approach that extends beyond the project itself. The significance of project estimating on an effective project management process is clear. Business leaders depend on project estimates to know the cost of a project, its duration, and its guarantees for success (Whiteside, 2003b). Portfolio analysis relies on accurate project estimates in order to rank projects in a priority order of project value (Keisler, 2004). Preliminary project estimates are critical in the leadership decision-making and capital-funding allocation process (Trost & Oberlender, 2003). As the study of trust gains in importance with both scholarly and practical relevance (Morrow Jr., Hansen, & Pearson, 2004; Shockley-Zalabak et al., 2001), the implications of trust to the project management field is of increasing importance as well (Hartman, 2002).

DeMarco (2005) argued that the project estimating process is the most critical component of a successful project management process. He underscored the implications of over-estimating and under-estimating project costs, schedules, and risks. Under-estimates lead to increased project change, hurried decisions, inefficient resource allocation, and unrealistic project stakeholder expectations (DeMarco). Similarly, over-

estimates can result in underutilized resources, extended resource capacity, and overpriced project bidding (DeMarco). Cost and schedule estimates are more likely to be accurate if the estimators think that their opinions will be considered and valued (Hartman, 2002). With an understanding of these implications, leaders will benefit from deeper knowledge of influencing factors of an accurate project management estimating process. This study examined the potentially significant impact that organizational trust has on the accuracy of project management estimating methodologies.

Nature of the Study

This quantitative study evaluated the correlation between organizational trust and project management estimating accuracy within stratified organizations of similar project management maturity levels and project manager competency. This research strategy was appropriate as Creswell (2004) identified a quantitative, correlational study as an appropriate technique for analyzing the trends among relationships between measurable and observable variables. The research employed a convenience sample of project managers within a regional chapter of a professional project management association. A validated instrument assessed organizational trust within each respondent's firm. Respondents self-identified project management competency, organizational project management maturity, and their evaluation of the organization's project estimating accuracy. Details of the nature of the study follow in this section. Details of the research methodology are outlined in chapter 3.

A quantitative survey was the most appropriate tool for evaluation of the correlational statistics required to evaluate the relationship between the research variables (Creswell, 2004; Mertens, 2005). The PMP certification was used as a basis to measure

basic project manager competency. As a stratification strategy, survey respondents provided demographic data including whether they hold the PMI's PMP certification. Moreover, respondents answered questions aimed at identifying their organization's high-level project management maturity. Using Cummings and Bromiley's (1996) OTI-SF, measures of organizational trust were obtained from the respondents. Finally, project managers were asked questions regarding the effectiveness of their organization's project estimating methodology. With that information, a statistical analysis quantified the correlation between measured levels organizational trust and project estimating accuracy.

Surveying the respondent population was facilitated through convenience sampling of a project management professional association. The PMI is the largest professional organization dedicated to the project management profession. The PMI establishes local and regional chapters to segment local members throughout the world. The PMI has more than 200 chartered chapters in over 67 countries (PMI, 2005). The PMI's Mile-Hi Chapter is the ninth largest chapter within the PMI. The convenience sample was drawn from this chapter.

The Mile-Hi Chapter project managers were issued survey instruments at two local chapter meetings. Those participants were asked to provide demographic data and to respond to a series of 7-point Likert-type questions on the topics of organizational trust, project management characteristics within their firms, and project cost, schedule, risk, and overall estimating accuracy from their project manager perspective.

The independent variable, organizational trust, was evaluated from the perspective of the respondent's firm, as measured with Cummings and Bromiley's (1996) OTI-SF. Respondents provided opinions of their project unit toward the organization's

leadership unit. Questions with regard to interproject team relationships were outside the scope of this research and were not a component of this study.

The dependent variable, project estimating, was assessed by gathering additional information, through a series of 7-point Likert-type questions, supplemental to the OTI-SF survey instrument. This information was aimed at evaluating the accuracy of estimates with regard to project schedules, project costs, and project risks. In addition, a question was asked regarding the general determination of the subject firm's overall project estimating accuracy.

Project estimating accuracy, within an organization, may be influenced by variables other than organizational trust. These influences may include the level of detailed project information at the time of the estimate; the competency and experience of the estimator; the estimating software available; the risks involved in contingency determination (Karlsen & Lereim, 2005); as well as the quality of information related to scope, the uncertainty level, and the quality of the estimating procedure (Serpell, 2004). Controlling the majority of those influencing factors was beyond the scope of this research study. However, the maturity of a firm's organizational project management methodology encompasses the entire project management process, including its estimating processes. It was assumed that a confounding influence on the internal validity of the survey instrument was the potential that survey respondents may report from the paradigm of organizations with different levels of organizational project management maturity. As such, the analysis of this study controlled for this potential threat to validity by providing questions of organizational project management maturity characteristics.

Similar to the potentially confounding variable of project management maturity characteristics, one could argue that the competency of the project manager has a meaningful influence on the accuracy of the project estimating process. To control for that potential confounding variable, respondent project manager competency was identified by virtue of those respondents self-reporting the possession of an active PMP certification. The PMI issues the PMP certification as a method of designating that holders meet a minimum level of project management knowledge common to all PMPs (Smith, 2003). Project management competency was stratified by identifying those respondents holding the PMI's PMP certification.

Since the project managers responding to this survey had the potential to reveal negative information regarding their employers, survey integrity and confidentiality were critical. Confidentiality and respondent anonymity were ensured. The survey instrument was controlled such that respondents could respond only once, and all responses were guaranteed confidentiality.

In summary, this quantitative correlational study used the OTI-SF as a means of measuring organizational trust. Project estimating accuracy was measured thought the self-identification of respondent's experiences. Additional demographic data was collected in order to stratify potentially confounding variables and to provide a basis for secondary analysis.

Research Questions

This study focuses on identifying a correlation between organizational trust and the accuracy of the project estimating process. To arrive at that objective, a measure of organizational trust was evaluated against respondent information related to estimating accuracy, organizational project management maturity, and project management competency and corollary demographic data. This research was directed by the following research questions:

R 1: Is there a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers?

R 2: Is there a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers?

R 3: Is there a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project risk as reported by project managers?

R 4: Is there a statistically significant positive relationship between the measured levels of organizational trust and the accuracy of the project team's overall estimating process as reported by project managers?

Hypotheses

Creswell (2004) explained that hypothetical questions cannot be conclusively proven. As such, testing and rejecting the opposite argument of the hypothetical statement, through the testing of a null hypothesis, provides a basis for establishing a probability that the hypothetical statement is true (Creswell). This study followed that approach. The hypotheses and subsequent null hypotheses encompassing this study are as follows:

H_1: There is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_1: There is no statistically significant relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

H_2: There is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_2: There is no statistically significant relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

H_3: There is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project risk as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_3: There is no statistically significant relationship between measured levels of organizational trust and the accuracy of estimated project risk as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

H_4: There is a statistically significant positive relationship between the measured levels of organizational trust and the accuracy of the project team's overall estimating performance as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_4: There is no statistically significant relationship between the measured levels of organizational trust and the accuracy of the project team's overall

estimating performance as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

Theoretical Framework

Researchers in a variety of disciplines including psychology, economics, sociology, and organizational behavior have extensively studied the overarching construct of trust. This study of organizational trust falls under the following research areas: (a) management, (b) managerial and organizational cognition, (c) organization and management theory, (d) social issues in management, and (e) industrial psychology. Furthermore, this study distills the broad topic of trust to the specific study of the influence of organizational trust on the project estimating process. While the theoretical tenets of trust vary slightly by academic discipline, the overarching concept of trustworthiness is universal – one acting in an honest, open, and trustworthy manner by demonstrating the characteristics of ability, benevolence, and integrity (Mayer et al., 1995).

Integrating research on the influence of trust into the body of project management practices is appropriate (Hartman, 2002). This research study examined the influences organizational trust places on the accuracy of the project management estimating process. Organizational leaders can use the theoretical results of this study to determine whether deliberate efforts to improve organizational trust are warranted. Moreover, since changing organizational trust is a long-term venture, organizational leaders may elect to supplement those initiatives with specific project estimating contingency policies to compensate for an understood organizational deficiency in trust levels. While the

research-based study of the project management discipline is relatively young (Shenhar & Dvir, 2004) the intuitive value of understanding influencing factors associated with project management methodologies holds the potential for significance with project leaders and project management practitioners.

The study of project management falls under the following research areas: (a) management, (b) managerial and organizational cognition, (c) organization and management theory, and (d) operations management. The theoretical disciplines of organizational trust and the relatively new theoretical discipline of project management are brought together by identifying organizational trust as a critical component for establishing an accurate project management estimating methodology. This study established that correlation.

Definition of Terms

The following operational definitions for the terms below were employed in this study.

Methodology: An established, repeatable system of tools, techniques, practices, and/or procedures used to engage a process.

Organization: "Organizations are collectivities oriented to the pursuit of relatively specific goals and exhibiting relatively highly formalized social structures" (Scott, 2003, p. 27).

Organizational project management: "The application of knowledge, skills, tools and techniques to organizational activities and project, program and portfolio activities to achieve the aims of an organization through projects" (PMI, 2003, p. 5).

Organizational trust: With the context of an organizational setting, Cummings and Bromiley's (1996) definition of trust was used for this study and is as follows:

> Trust will be defined as an individual's belief or a common belief among a group of individuals that another individual or group (a) makes good-faith efforts to behave in accordance with any commitments both explicit or implicit, (b) is honest in whatever negotiations preceded such commitments, and (c) does not take excessive advantage of another even when the opportunity is available. (p. 303)

Portfolio: A compilation of projects and programs designed to work toward meeting the strategic objectives of an organization (PMI, 2004).

Program: A group of projects that align to specific strategic objectives and results in greater benefits to the organization when managed together than when managed separately. Some ongoing activities outside the scope of projects may be included in a program (PMI, 2004).

Project: "A temporary endeavor undertaken to created a unique product, service or result" (PMI, 2004, p. 5).

Project estimate: A quantitative assessment of anticipated resources, cost, time, risk, and effort needed for a project task or activity (PMI, 2004).

Project management: "The application of knowledge, skills, tools, and techniques to project activities to meet project requirements" (PMI, 2004).

Project management body of knowledge (PMBOK): The PMI issues an American National Standard Institute (ANSI) approved project management standard document entitled *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. The

project management body of knowledge encompasses the totality of project management knowledge (PMI, 2004). The PMBOK standard is a guide to that body of knowledge.

Project management maturity: The extent to which an entity performs generally accepted project management best practices (PMI, 2003).

Project manager: The person assigned to and responsible for achieving project objectives (PMI, 2004).

Project planning: The process of establishing the project scope, the project activities, the project management plan, and the project resources required to meet the project objectives (PMI, 2004).

Project team members: Those individuals directly responsible and accountable for the completion of project tasks and activities. For the purposes of this research, the term *project team* is synonymous with the term *work team*.

Assumptions

The study assumed that survey participants would respond honestly to the survey instrument as they considered the trust atmosphere within their organizations and self-reported the level of project management maturity and project estimating accuracy among their project teams. Furthermore, the study assumed that survey participants honestly self-identified demographic data, particularly their PMP certification status. The study mitigated self-reporting bias by providing clear and categorical descriptors of project management maturity, PMP certification status, and project estimating accuracy constructs.

Limitations

Some components of this study could not be controlled. The influences on the accuracy of the project estimating process are varied. Previous experiences and estimating skills of the estimator(s), internal and external performance pressures, and estimating software input are some factors that play a supplementary role in influencing the estimating process. The research does not address those corollary influencing factors. However, there are significant differences in project management practices between organizations of different project management maturity (Besner & Hobbs, 2004). Furthermore, one can reasonably assume that project manager competency plays an influencing role in project estimating accuracy. Ensuring that those confounding variables are controlled was accomplished this study.

The evaluation of organizational project management maturity characteristics was limited to the general process knowledge of the participant project managers. While considerable scholarly debate exists on appropriate measures of project management maturity, with this study the measures of this construct were limited to three high-level categories. An organization's project management was categorized into the following three general areas of organizational project management competency as perceived by the respondent: (a) project-level competency, (b) program-level competency, and (c) portfolio-level competency. While these three categories may limit the details of organizational project management maturity, the categories are adequate for generalized characterization (Andersen & Jessen, 2003). As such, this limited approach toward assessing organizational project management maturity was adequate for the purposes of this research.

For purposes of categorizing project manager competency, respondents were asked to self-identify if they possess an active PMP certification issued through the PMI. While additional competency assessments could have been employed, this self-identification method meets the needs of this research. Additional limitations to the study are as follows:

1. This study was limited to respondents who agreed to participate voluntarily.
2. This study was limited to the number of respondents surveyed and the amount of time available to conduct the study.
3. Validity of this study was limited to the reliability of the instrument used.
4. This study was limited by the level of honesty inherent with the survey respondents.

Respondents may have considered that some issues of trust or project management are important but do not appear on the survey instrument. Only issues identified as relevant to this research appeared on the survey questionnaire.

Delimitations

The researcher elected to use a convenience sample confined to surveying project managers associated with the Mile-Hi Chapter of the PMI. The PMI Mile-Hi Chapter draws its membership from the geographical area encompassing the Front Range of Colorado extending from the northern Colorado Springs area north to the Fort Collins region, including the greater Denver metropolitan area. The study was limited to those respondents that voluntarily elected to complete the survey instrument. Since the researcher stratified project managers by PMI's PMP certification, it was appropriate to limit the survey facility to a PMI chapter meeting setting.

As mentioned, the study controlled for general differences in project management maturity. As there is no validated instrument to accurately measure organizational project management maturity, survey results were stratified by a simple, high-level, self-identification of organizational project management maturity. A detailed evaluation of organizational project management maturity was outside the scope of this study.

Identifying project team members to specific projects within specific organizations would have prevented respondent anonymity and confidentiality. As such, project team members were not included except in cases where a project manager respondent answered survey questions based on previous experience in the role of as a project team member. To mitigate that delimitation, respondents were directed to complete the instrument from the perspective of their role as a project manager.

Summary

As outlined in the preceding chapter, the study of trust is complex and disparate among varied academic fields. Trust impacts the dynamics of interpersonal relationships, organizations, leader-follower interaction, and work team relationships (Mayer et al., 1995; McAllister, 1995; Mishra & Morrissey, 1990; Perry & Mankin, 2004). Following the research paths of interpersonal trust, organizational trust, and trust among work teams leads to the opportunity to identify trust implications among project teams and project managers and the organizations from which they function.

In contrast to the vast literature on trust, research on project management disciplines is in its infancy. The cost and schedule estimating process literature generally focuses on the inputs to these processes. Factors such as expert judgment, analogous estimating, reserve analysis, parametric estimating, and Delphi methods provide a

foundation for project scheduling efforts (PMI, 2004). Cost estimating processes include historical information, organizational cost modeling templates, analogous project lessons-learned, and project team knowledge (PMI). The project estimating literature generally focuses on the effectiveness of these processes and the effectiveness of software applications in possessing accurate cost and schedule data. The cost and schedule estimating literature provides little treatment for the external influencing factors present among project managers and project team members as they establish those cost, schedule, and risk estimates. Those limitations notwithstanding, this study assesses the environmental influence of organizational trust on those estimating processes.

Understanding the influences of trust in the project management discipline has gained increasing relevance among the leadership community (Hartman, 2002). The knowledge gained from this research can be used as a framework for leadership improvement actions that hold the potential to improve the portfolio management process and, subsequently, an organization's strategic performance.

In chapter 2, an overview of the literature associated with trust and the project management estimating methodology is provided. The literature review examines the research of (a) trust in general, (b) trust as a component of interpersonal relationships, (c) trust among work teams, (d) trust in the leader-follower relationship, and (e) organizational trust as a separate, measurable construct. The literature review presented in chapter 2 explores the research of project management estimating methodologies as well as research on organizational project management maturity assessment processes and project management competency. The literature review provides a foundation for the research presented in this study. Following that discussion, chapter 3 presents a

description of the research methodology. The findings of the study are presented in chapter 4, and conclusions derived from those results are presented in chapter 5.

CHAPTER 2

REVIEW OF THE LITERATURE

Chapter 1 presents an overview of the notion of a correlation between organizational trust and an accurate project estimating methodology. In support of the study, the following literature review highlights research related to the tenets of trust in general and organizational trust within the context of project teams specifically, including its evolution of study and its influences on project team behavior. Literature related to the advancement of project management research with regard to the project estimating processes as well as a review of processes established to measure of organizational project management maturity and project manager competency is reviewed. Finally, literature addressing the importance of trust in the project management process is reviewed.

Developing a comprehensive operational definition of trust is challenging in itself. For the purpose of this study, the review of the concepts of trust was condensed to the subtopics of interpersonal trust, trust among project teams, trust in leaders, and organizational trust. The literature review related to the differing components of trust provides the background to explore the organizational trust factors applicable to project teams.

Mayer et al. (1995) explored the importance of trust within both effective, basic communication interactions as well as trust within organizations. McAllister (1995) investigated the influence of trust in interpersonal interactions within the organization as well. The trust literature develops the importance of establishing and maintaining a trusting environment within the organizational context, the relationship between leaders

and followers, the relationship among members of work teams, and the interpersonal interactions between individual employees.

The literature related to trust underscores the importance of trust in a healthy organization. That need for trust can be seen in the effective interpersonal interactions between workers and supervisors. For example, trust has been correlated to positive worker productivity and morale (Willemyns, Gallois, & Callan, 2003). Furthermore, Roberts and O'Reilly (1974) discovered that distrust in a supervisor resulted in workers giving inaccurate information to that supervisor. Those consequences of interpersonal trust translate into the apparent need for trust between a project manager and project team members as well as between a project manager and project stakeholders. This study investigated whether the level of trust within an organization influences the accuracy of estimating information provided by project managers.

Since this study investigated the relationship between organizational trust and the accuracy of the project estimating methodology, a review of the historical foundation of the project management discipline is warranted. Almost any organized human endeavor requires some level of overt or implied project management. While not widely considered a formal management disciple until the mid-twentieth century, evidence of project management methods have been identified in nearly every civilization (Shenhar & Dvir, 2004).

Implementing a formal project management methodology, based on modern tools and techniques, has been in place within most organizations since the early 1960s. The evolution of project management practices over the past 40 years has lead to the development of the project management profession. As the project management field has

matured, organizations have improved their methods, practices, and capacity of project management, attaining various levels of sophistication in project management processes. Since organizations vary in their project management competency, one must take precautions when comparing organizational project management performance. In order to compare components of a project management methodology, such as the project estimating process, accurately among different organizations, an appropriate strategy was to compare characteristics of organizations of similar project management maturity attributes.

Regardless of the level of project management maturity, the practice of accurately estimating project tasks and metrics has always been an integral component of the formal project management methodology. Without accurate project estimates, project stakeholders lack the fundamental information needed to accurately assess project benefits, costs, and risks. Similar to the potentially confounding influence that organizational project management maturity has on the project estimating process, project manager competency may also alter the accuracy of the project management estimating process.

This literature review examines scholarly work related to the constructs of organizational trust and project management estimating. Research related to trust is comprehensively reviewed from the general definitions of trust to the specifics of organizational trust. The project management construct is reviewed from the literature related to the development of the field and the project management profession to the specific research related to the project estimating construct.

Trust

This research study examines trust as a component of the independent variable, organizational trust. This section of the literature review explores the notion of trust in general. The literature review will continue investigating the trust construct with reviews of the constructs of interpersonal trust, trust among project work teams, trust among leaders, and organizational trust.

The term *trust* has been cited in history as far back as the 13th century Middle English but has etymological origins to earlier expressions of loyalty and faithfulness (Mollering, Bachmann, & Lee, 2004). Scholars have struggled with developing a unified definition of trust (Leslie, 2004). From an academic and a practical standpoint, despite the considerable amount of research, the term trust is confusing, and the process of its development is not well understood (Sydow & Windeler, 2003).

Identifying a foundational definition for the term trust requires investigation of several literature sources. The concept of trust has been studied in a variety of academic fields including the disciplines of psychology, sociology, economics, and business. While researchers in those disparate fields assessed trust from slightly different contextual angles, general similarities arise in the context of this study.

While defining the construct of trust is challenging, the importance of trust is evident. Rotter (1971) argued that "the entire fabric of our day-to-day living, our social order, rest on trust" (p. 443). With his seminal research, Deutsch (1958) posited that some component of trust is evident in all interpersonal relationships. From a sociological perspective, trust can be traced as a core component of all social relationships, and distrust often breeds more distrust within relationships (Mishra & Morrissey, 1990).

Cook and Wall (1980) defined trust from a sociological perspective as the process of the assignment of good intention given a level of confidence with the words and actions of another. They argued that trust influences the behavior of the trustor toward the trustee.

Other researchers have investigated trust from an economic exchange perspective as a structured cognitive assessment of costs and benefits (Morrow et al., 2004). This economic analysis emphasizes a calculating approach of the trustor, garnering trust after assessing the trustee's self-interest to behave in a trustworthy manner. Some early researchers of trust defined the concept from a psychological perspective, as either an internal attribute of a solid moral value or as the relationship between an expected behavior of another and the risks associated with the resultant anticipated behavior not occurring. The slightly different definitions and foundations of trust, presented by different academic disciplines, underscore the difficulty of establishing an academic consensus on the definition of the trust construct.

Additional components of the trust equation include risk, the relationship between the trustor and the trustee, and the confidence in the trusting relationship. Deutsch's (1958) germinal work on trust identifies risk as a key component in the trust equation. Analysis of the risk of a behavior or action occurring is a prerequisite for a trusting event. That risk assessment characteristic is evident in most literature on trust. Driscoll (1978) discussed the relationship between the trustor, the entity bestowing the trust, upon the trustee, that entity receiving the trusting event. In essence, one establishes trust within the guise of interdependence and at the expense of risk (Rousseau et al., 1998). These factors provide additional complexity in the makeup of the trust construct.

A trusting environment in the workplace carries additional implications for the trust construct. Situational trust factors are often found in the workplace environment. Dirks and Ferrin (2001) proposed that workplace trust can be divided in two characteristic mechanisms--one where the trustor is influenced by the expectation held of the performance of the trustee and as a moderator of action based upon the relationship between the trustor and the trustee. Those scholars explained that trust is bestowed after the trustee accepts the challenge to trust, accepts the risks of entering a trust interaction, and validates that the trustee is worthy of the trust to be established.

The propensity toward risk and the perception of risk play an important role in the trust equation (Sitkin & Pablo, 1992). Prior to the perceived prerequisite trustworthiness of the trustee and the necessary risk event as antecedents to trust, the trustor must have an intent and willingness to trust. In addition to that propensity to trust, however; trust may be initiated based on the current situational issues confronted by the trustor (Driscoll, 1978; Rotter, 1971). Similarly, trust propensity acts on the decision for an individual to enter into a trusting behavior. While this attribute is considered a precursor to a trusting event, it cannot stand alone as a sole reason to blindly trust another (Mayer et al., 1995). These trust attributes play an important role in the workplace environment.

Trust can be segmented into the following three stages of development: (a) trust formation, (b) trust stability, and (c) trust decline (Rousseau et al., 1998). These authors categorized differing forms of trusts as (a) deterrence-based trust, (b) calculus-based trust, (c) relational trust, and (d) institution-based trust (Rousseau et al.). Three of those primary forms of trust—calculus-based trust, institutional-based trust, and relational trust--can be observed in the same trusting event with varying degrees of strength and

influence. These stages of development and categorization provide additional framing to understand the environmental and cognitive influences related to the trusting experience. In essence, the trustor deliberately accepts the vulnerability of risk through the expectation of behavior by the trustee (Rousseau et al.). The trustor is able to progress through the stages of trust development and the categories of the formation of trust while establishing the situational factors that further influence the decision to bestow or withdraw trust.

The characteristics of the trustee influence the decision of the trustor to engage in the trust act. A potential trustee that has an obvious opportunity for gain by being dishonest can be seen as less trustworthy by the trustor (Mayer et al., 1995). According to Mayer et al., three characteristics of the trustee seem to be required at some level in order to facilitate a trusting action: (a) benevolence, (b) ability, and (c) integrity. Benevolence is defined as the caring, affection, and goodwill bestowed from the trustee to the trustor prior to the trust action. Ability engulfs the skill and experience set maintained by the trustee. One with considerable perceived or experiential ability seems to garner higher levels of trust than those that are perceived as incompetent by the trustor. Integrity encompasses the norms and values that the trustor assumes, or knows, that the trustee possesses that align with the norms and values of the trustor (Mayer et al.). In summary, one's cognitive evaluation adds to the environmental and situational influences on a trusting position.

Confidence in the trusting interaction plays a significant role in the decision to bestow trust. Trust can be seen as the confident positive expectation of conduct by another and, conversely, distrust is viewed as confident negative expectation of conduct

(Lewicki et al, 1998). That confident expectation can be viewed as a sense of certainty that the trustee embraces with regard to an anticipated event. Both trust and distrust are actions taken by an individual in order to satisfy the need for certainty with the subject experience (Lewicki et al.).

Assessing the level of certainty associated with the trusting event is, in essence, a risk evaluation. Sheppard and Sherman (1998) proposed that trust entails accepting risks that are associated with the situational factors and the depth of the interdependence intrinsic to the relationship at hand. They categorize the depths of interdependence into four traits: (a) shallow dependence involving the risk of unreliability and/or indiscretion, (b) shallow independence involving the risk of ineffective coordination within the trusting relationship, (c) deep dependence involving the risk of cheating, and (d) deep interdependence associated with the risk of inaccurate anticipation (Sheppard & Sherman). Sitkin and Pablo (1992) took a similar approach in assessing the risk linked to a trusting event through three characteristic decisions: "(a) outcome uncertainty, (b) outcome expectations, and (c) outcome potential" (p. 10). These components add to the complexity of the trust evaluation.

The literature establishes that trust is an individual, risk-based assessment of the certainty that an event will occur given the characteristics of the relationship at hand. Given an individual's risk-based assessment of the certainty of an event occurring and an assessment of the interpersonal relationship between the trustor and the trustee, individuals have a tendency to overemphasize the extreme outcomes of risks despite the likelihood that those outcomes will not occur (Sitkin & Pablo, 1992). This study examined the potential consequences of a relationship of deep dependence (for example,

providing inaccurate or embellished project estimates) and outcome potential (for example, implied threat of job sanctions) within a project management setting.

Dependence and interdependence are not the only characteristics of the relationship that influence the trust decision. Mayer et al. (1995) defined several terms that are commonly used interchangeably with trust: (a) cooperation, (b) confidence, and (c) predictability. While each of these terms hold similar attributes of the trusting action, all three lack a required component of risk – a component inherent in a trusting action (Mayer et al., 1995). Lewicki et al.(1998) emphasized that trust is the "mechanism by which the risks associated with social complexity are transcended – risks that might otherwise stifle initiative" (p. 446). While risks hold the potential to constrict an initiative, a positive trusting atmosphere can subjugate that uncertainty.

Once trust is bestowed, the trustor assesses the current and potential future implications of the trust action. Dirks and Ferrin (2001) identified a summary model of trust that considered the cumulative consequences of trust in a relationship. As trust increases, increased cooperation and performance occur. Their model holds that trust moderates the components of the interactive process. The historic level of trust impacts future actions based upon the trustor's causal, risk-based experience with the trustee (Dirks & Ferrin; Rousseau et al., 1998).

As is evident with the disparate perspectives of the trust literature outlined above, one must establish an operational definition of trust for the purposes of this research. To that end, the following definitions clarify the context for which this study assesses trust. Mishra and Morrissey (1990) identified the trust as one's "belief in the integrity, character and ability of others" (p. 443). They further noted the importance in support and

confidence shown by leadership toward subordinates (Mishra & Morrissey). Interpersonal trust is defined by McAllister (1995) as "the extent to which a person is confident in, and willing to act on the basis of, the words, actions, and decisions of another" (p.25). Mayer et al. (1995) were the first to integrate the characteristics of both the trustor and the trustee in assessing the trusting action with the following definition:

> The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the availability to monitor or control that other party. (p. 712)

As previously mentioned, gaining a consensus on the definition of trust among trust scholars is nearly impossible. Trust is influenced, preceded, and sustained by a myriad of conditions and circumstances. Most agree that trusting behavior develops as a result of the integrity of the trustee, the circumstances of the situation or the relationship between the trustee and/or the trustor, and the perceived risk of the trusting event.

While these discussions of trust address interpersonal relationships, a definition of trust that encompasses organizational relationships is required for this study. As such, the operational definition of organizational trust that was used for the purposes of this research was Cummings and Bromiley's (1996) definition that:

> Trust will be defined as an individual's belief or a common belief among a group of individuals that another individual or group (a) makes good-faith efforts to behave in accordance with any commitments both explicit or implicit, (b) is honest in whatever negotiations preceded such commitments, and (c) does not

take excessive advantage of another even when the opportunity is available. (p. 303)

Interpersonal Trust

Trust, in its basic form, can be explained as the process of a trustor assuming the risk that the trustee will take action in a manner anticipated by the trustor. With a fundamental understanding of the construct of trust in place, this literature review focuses on the notion of trust between two or more people. In an interpersonal relationship, that exchange is founded by the historical experiences between the two parties.

Trust has been shown to be an integral component of the interpersonal relationship. People assume a risk behavior based on their risk propensity, their risk preferences, and their risk perceptions (Sitkin & Pablo, 1992). Interpersonal trust holds that there is an expectancy by a person or group that another person or group can be relied upon (Rotter, 1971). In addition, Rotter (1971) found that the propensity to trust is an individual characteristic based on the general expectancies of the level of trustworthiness demonstrated by the trustee.

As one experiences a successful trusting event, that encounter influences the future propensity to trust. Researchers have identified the tendency of trust to grow over time as the trustor gains experiential knowledge of the trustee (Lewicki et al., 1998). Other literature, however, challenges the notion that previous experience is a required component of trust by examining the process of initial trust formation in the stages of a relationship devoid of experiential knowledge of the behavior of the potential trustee. For example, McKnight, Cummings and Chervany (1998) explored the reasons individuals initially trust members of an organization despite having little to no history of interaction.

Their research discovered three categories of influence on the initial trusting process. First, personality-based trust is developed from one's initial upbringing and expands, through childhood, as a base of trusting experiences. Second, institutional-based trust encompasses the ramifications of structure and situational factors on the trusting decision-making process. Finally, cognition-based trust is grounded in the immediate assessment of the specific trust situation. The researchers argued that situational and structural beliefs influenced the disposition to trust and the subsequent trusting behavior during initial trusting events. If an individual does not have specific situational experience with which to establish an assessment to trust, he or she will simply rely on a basic faith in humanity (McKnight et al.).

As mentioned, moving from the general concept of trust to the more specific context of interpersonal trust refines the construct for the purposes of this study. Generalized trust initiates from situational factors, the propensity for risk that the trustor embraces, the integrity of the trustee, and the relationship between the trustor and the trustee. Transferring that notion of generalized trust to a more specific concept of interpersonal trust allows one to examine the cognitive and affective assessment of the interpersonal circumstances performed by the trustor. That examination leads toward the formation and application of trust within the environment of project teams. That segment of the literature review follows.

Trust Among Project Teams

Reviewing the general tenets of trust and interpersonal trust is an appropriate prerequisite for obtaining an operational definition of the construct of organizational

trust. Prior to examining the literature related to trust in leadership and organizational trust, a brief review of the research related to trust among project teams is appropriate.

This segment of the literature review discusses the implications of the construct of trust as it relates to teams. For example, empowered virtual work teams function best when leadership trusts the team with appropriate responsibility and authority and takes the time to establish a trusting relationship (Ludwick, 2004). Establishing a climate of group goal acceptance hinges on employee trust (Podsakoff, MacKenzie, & Boomer, 1996). Hence, a review of trust literature related to project teams is required.

Understanding the general dynamics of the project team is a precursor to understanding trust within the team. For the purposes of this research, the term *project team* was synonymous with the term *work team*. McCune (1998) performed a study of workers that showed that the employees considered themselves more trustworthy than their coworkers. Cook and Wall (1980) studied trust attitudes among blue-collar workers in the United Kingdom. They describe two dimensions of interpersonal trust among work teams that can be ascribed to relationships among peers and toward management: (a) bestowing confidence in the trustworthiness of the trustee and (b) confidence in the capabilities of the trustee. Mayer et al. (1995) identified mutual trust as a critical component of effective work teams. Work teams will generally trust those in-group members more often than out-group members, including their managers (Willemyns et al., 2003).

Moreover, Driscoll (1978) reviewed Gamson's (1968) seminal work regarding the impacts of trust on individual job satisfaction and on the acceptance of and potential influence of leadership decision making on work teams. Gamson discovered that work

groups with high trust tended to accept authorities and used persuasion to influence the leadership decision-making process. In instances of moderate trust, work groups continued to accept authority yet used positive inducements to influence decision makers. Finally, in work teams with low trust, Gamson, as cited by Driscoll (1978), discovered that those groups rejected authorities as biased and incompetent and resorted to coercion and negative sanctions to influence leadership.

The literature indicates that workplace atmosphere influences trust among project work teams. Individuals in high-trust environments generally solve goals in a cooperative manner. Conversely, those in a low-trust atmosphere do not behave in a cooperative manner (Dirks & Ferrin, 2001). Group cohesiveness has been identified as an organizational characteristic that holds the potential for "substituting, enhancing or neutralizing" the consequences of leader behavior as well as enhancing trust among the group (Podsakoff et al., 1996, p. 260). Interestingly however, Langfred (2004) discovered that a high trust team environment can be detrimental to team performance with self-managed, high autonomous work groups as the need for monitoring member performance is eliminated. Regardless of that anomaly, Langfred further emphasized the benefits of trust among work teams.

Leader behavior can influence follower actions and expectations. Followers may not act in a manner that meets the expectations of the leader if the leader is not in a position to offer rewards for that positive behavior (Podsakoff et al., 1996). Individuals assess the implications of risk events with regard to individual versus organizational rewards or sanctions (Sitkin & Pablo, 1992). Therefore, a work group with low trust may

set the stage for untrustworthy project estimate projections as the project teams evaluate the risk of punishment associated with failing to meet a committed project deliverable.

Evidently, trust in leadership has an influence on the dynamics of a project work team. Similarly, environmental conditions alter the trusting stance of a project team. Lewicki et al. (1998) identify the importance of trust as a foundational element of effective team collaboration. A healthy balance of trust and distrust, however, is important for effective work teams, ensuring that the blind trust in groupthink does not take hold (Lewicki et al., 1998). In the same way, some team functions require a distrusting frame of reference in order to perform the requisite functions such as software testing professionals, quality assurance inspectors, and auditors (Lewicki et al., 1998).

As this literature review integrates the concept of interpersonal trust with the concept of organizational trust, the construct of trust among project teams is developed. The concept of trust among work teams lays the foundation for the implications of trust among project teams and project managers. In summary, the influence of interpersonal trust integrates with the group dynamics of project teams to establish a trust environment unique to the project work group beyond that of general interpersonal trust.

Trust in Leaders

With an understanding of the scholarly work related to the constructs of trust and interpersonal trust, the literature review moves to an examination of the construct of trust among leaders. When discussing organizational trust, the initial challenge lies with securing an operational definition of the term *organization* as a separate entity to be trusted. One can resolve that confusion by evaluating trust between employees and the leaders rather than the ambiguous *organization* (Perry & Mankin, 2004). For the purposes

of this study, trust between project teams and the leadership unit defines the boundaries of the organizational trust construct.

Trust, integrity, and consistency among leaders has been identified as critical success components of organizations from as early as 400 B.C. as discussed in Sun-Tzu's military leadership handbook *The Art of War* (Sawyer, 1994). Similarly, trust has been identified within Biblical passages as an integral moral component of leadership (Toney, 2003). The evolution of trust as an integral component of leadership is revisited in the early 20th century management science research of Henri Fayol and Max Weber as cited by Wren (1994). However, a gap in the discussion of organizational trust and leadership trust exists between the late 1930s and the early 1960s. With the surge in corporate leadership scandals during the early 21st century, trust in the leadership unit has been revived as an important topic for scholarly research.

The importance of trust among leaders is apparent. McKnight et al. (1998) characterize the importance of trust in leaders by characterizing "the boss as the chief administrator of fairness in the workplace" (p. 479). Characteristics of trusted leaders include: (a) truthfulness, (b) certainly of promises, (c) reliability, and (d) openness (Perry & Mankin, 2004). Leaders that provide feedback to employees on task performance tend to be trusted more by those employees (Podsakoff et al., 1996).

With those trusting leadership characteristics identified, it is valuable to understand how a trusted leader influences followers. Roberts and O'Reilly (1974) found that trust in one's supervisor is related to job satisfaction and commitment to the organization. Similarly, trust in leaders has been found to be related to communication between leaders and followers (Roberts & O'Reilly; Roberts, Sweeney, McFarlin, &

Cheney, 2004). Initially, subordinates focus on leader behaviors that are relevant to them from a risk perspective (Bijlsma & van de Bunt, 2003). If the leader demonstrates a trustworthy stance with the initial interaction, the subordinates will broaden the conditions where they will trust the leader, leading to a positive expectation of trust (Bijlsma & van de Bunt). Leaders model appropriate behavior and, subsequently, employee trust and satisfaction are enhanced (Podsakoff et al., 1996). Groups with leaders that demonstrate characteristics that model appropriate behavior, are supportive, and encourage group goal acceptance are more trusted by the group than those leaders that do not exhibit those attributes (Podsakoff et al., 1996). Additionally, the credibility and the expertise of a leader are important considerations as followers determine the level of trustworthiness a leader possesses (Perry & Mankin, 2004). A trusted leader holds positive influence over the project work team.

The motivations of trust within leader and subordinate relationships have been explored more during the 1990s and 2000s. Mishra and Morrissey (1990) proposed that trust begins at the most senior levels of leadership and precipitates downward organizationally. Conversely, Perry and Mankin (2004) discovered that there is generally a higher level of trust between employees and lower-level supervisors than between employees and CEOs. Krishnan (2001) found evidence of a positive relationship between transformational leaders and a defined moral value system – including trustworthiness. Transformational leaders inspire motivation and trust among their followers (Tucker & Russell, 2004). While transformational leaders generally appear to work from a moral, trustworthy foundation, alternate leadership styles may display different trusting postures and foster negative, distrusting environments. Leaders that employ authoritarian or

coercive communication styles, for example, encounter reduced levels of employee-leader trust (Willemyns et al., 2003).

From a project management perspective, Herzog (2001) has concluded that lack of collaboration, including lack of trust, is a primary reason for project failure. Employees in a mistrusting work environment spend an inordinate amount of energy protecting themselves (Mishra & Morrissey, 1990). It appears that trust holds the potential to influence project success significantly at the level of the project team. In summary, leaders hold the responsibility and the opportunity to initiate trusting postures within their organizations.

Organizational Trust

This literature review has provided a foundation of scholarly understanding of the concepts of trust, interpersonal trust, trust among project teams, and trust in leaders. However, organizational trust lies at the foundation of this research study. The importance of organizational trust in the field of leadership is apparent from the literature. In introducing a special topic forum issue of the *Academy of Management Review* devoted completely to the topic of trust, Rousseau et al. (1998) posited that trust "may be a 'meso' concept, integrating micro level psychological process and group dynamics with macro level institutional arrangements" (p. 393).

Organizational trust implies a level of trust established between an individual and the aggregate experience with a variety of individuals within an organization (Perry & Mankin, 2004). Leadership actions influence that aggregate experience. Actions taken within an organization hold the potential to establish a framework for trust among employees as well. Additionally, layoffs and management turnover foster a sense of

organizational distrust (Perry & Mankin). Those leadership actions lay a foundation of trust for an organization. That foundation of organizational trust is core to this study.

While the literature shows that leaders influence levels of organizational trust, the influence of that trust seems to permeate throughout the organizational structure. The literature indicates that influences of trust among leaders and within organizations add to the interpersonal trust assessment developed by the trustor. As the importance of trust among leaders is important, trusting behavior in an organization is a precondition to improved employee performance and initiative (Hodson, 2004). While individuals establish their own trust and risk assessment postures, the organizational culture hold the potential to influence those positions (Sitkin & Pablo, 1992). Within an organization, the concept of fostering integrated trusting relationships provides the conditions that enhance positive implications on worker perceptions and attitudes, higher levels of cooperation, improved interpersonal behaviors, and increased organizational performance (Dirks & Ferrin, 2001). Clearly, the level of trust within an organization influences the trusting stance taken by the employees of the firm.

The literature supports that an individual's disposition to trust can be influenced by organizational circumstances. An individual's trust level can be translated into a level of trust toward an organizational system. Sydow and Windeler (2003) argued that, while interpersonal and interorganizational trust are separate constructs, the integration of those trust levels are apparent through an interplay of the organizational network practices of knowledge, trust, and control. Similarly, risk influences organizational trust. Sitkin and Pablo (1992) identified the following components of organization risk factors: (a) group composition, (b) cultural risk values, (c) leader risk orientation, and (d) organizational

control systems. Those influencing factors underscore the significance that trust has on effective organizational leadership.

With his seminal work, Kahn (1964) investigated the relationship between individuals and their roles within organizations. He explored the impacts of role conflicts on interpersonal relationships along with the consequences those conflicts had with regard to organizational effectiveness. A key consequence of that role conflict is decreased trust and reduced respect for and friendliness to coworkers (Kahn). While Driscoll (1978) defined the personality trait of the propensity to trust as global trust, he defined organizational trust as a situational factor rooted in job satisfaction and the trustor's approval in the level of participatory decision making. Other researchers have identified the importance of trust in the dynamics of organizational behavior. Cook and Wall (1980) examined the characteristics of interpersonal trust within the work environment. They identified a positive correlation between trust and organizational commitment and a positive correlation between trust and faith in management.

Trusting postures within and between members of the organization have an impact on the organizational attitudinal environment. Blunsdon and Reed (2003) contended that trust within the work relationship itself influences the trusting stance of the employee. Furthermore, the situational setting within an organization also influences levels of trust among employees (Dirks & Ferrin, 2001; Willemyns et al., 2003).

Given the components of trust that affect the organizational dynamics mentioned above, an operational definition of organizational trust was required for the purposes of this study. While definitions of trust are varied, scholars have narrowed the definition of organizational trust to similar frameworks. Within the context of economic exchange,

Fukuyama (1995) defined trust as "the expectation that arises within a community of regular, honest, and cooperative behavior, based on commonly shared norms on the part of members of that community" (p. 26). Organizational trust involves the expectations held within a network of relationships and behaviors in the context of an organizational setting (Shockley-Zalabak et al., 2000). Furthermore, Shockley-Zalabak et al. defined organizational trust "as positive expectations individuals have about the intent and behaviors of multiple organizational members based on organizational roles, relationships, experiences, and interdependencies" (p. 35). Finally, in the context of an organizational setting, Cummings and Bromiley's (1996) definition of trust is as follows:

> Trust will be defined as an individual's belief or a common belief among a group of individuals that another individual or group (a) makes good-faith efforts to behave in accordance with any commitments both explicit or implicit, (b) is honest in whatever negotiations preceded such commitments, and (c) does not take excessive advantage of another even when the opportunity is available. (p. 303)

As Cummings and Bromiley's definition aligns best with divergent organizational groups, such as project manager groups, leadership groups, and project teams, it was the operational definition of organizational trust considered for this study. In summary, as interpersonal trust acts play throughout the organizational setting, a culture of organizational trust is established. It was within the constructs of that organizational trust setting that this research focused.

Project Management

Drawing a correlation between organizational trust and project management estimating accuracy requires establishing operational definitions of project management terms as a well as a review of the project management literature. A brief history of the project management profession is presented as well as definitions of the constructs of project estimating, project management maturity, and the role and competency of the project manager. This section reviews project management terms and conditions within the context of the topics evaluated with this study.

From a historical perspective, some aspect of project management can be linked to organized activities with virtually every civilization (Shenhar & Dvir, 2004). As engineering capabilities increased, the breadth and depth of the supporting project management tools and techniques followed suit. The advent of modern project management began in the 1930s with the initiation of project cost and schedule metrics in the industrial setting (Hebert, 2002). Project management control techniques steadily increased in sophistication from the 1940s through the late 1950s.

The basic, modern project management profession has been in place since the 1950s (Wang, 2001). The influx of contractors and subcontractors performing defense and aerospace projects for the United States in the late 1950s and early 1960s necessitated increased rigor with regard to government oversight (Hebert, 2002). As a result of that need, the modern project management methodology was established (Kerzner, 2003). Shenhar and Dvir (2004) identified five generations of project management focus that aligned with the decades of the 1960s through the 2000s. The formal project management profession has grown significantly as a result. In fact, the

project management profession has been the fastest-growing professional field in North America during the last 30 years (Hebert). The decade of the 2000s will focus on the theoretical areas of adoption, strategic alignment, and globalization (Shenhar & Dvir). With the increased complexity and ubiquity of the project management profession, the need for professionally competent project managers has grown exponentially (Kendra & Taplin, 2004).

Understanding the construct of a project and project management was important for the purposes of this study. The PMI identifies a project as a temporary undertaking that produces a unique product or service (PMI, 2004). Over half of organizational activities involve projects (Shenhar & Dvir, 2004). The PMI defines project management as the application of tools and techniques to ensure that activities are employed to meet project requirements (PMI). The goal of project management is to coordinate project resources in order to complete projects on time, within the outlined quality parameters, and within budget (Kerzner, 2003; Meredith & Mantel Jr., 2005).

With knowledge of the definition of a project and project management, understanding the tools and techniques associated with managing projects is appropriate. The generally accepted modern project management methodology includes planning, organizing, directing, and controlling of project resources to achieve the scope of project objectives (Kerzner, 2003; Meredith & Mantel Jr., 2005; PMI, 2004). To achieve those objectives, project management processes of initiating, planning, controlling, executing, and closing are executed (PMI).

A key component of the project planning process requires the development of a project plan. A project plan defines the processes for executing, monitoring, controlling,

and closing projects (PMI). A critical component of developing a project plan requires, among other things, a process of estimating schedule, risk, and cost requirements for project activities within the parameters of the identified quality requirements (Nemati, Todd, & Brown, 2002). It was within the context of this project estimating process that this study focused.

Project Management Maturity

With an understanding of the concept of project management, an evaluation of the notion of project management maturity among organizations is appropriate (Morrison & Brown, 2004). Project management maturity is defined by the PMI (2003) as the extent to which an organization performs generally accepted project management best practices. Skulmoski (2001) cited Isabelle Saures' definition of organizational project management maturity as the level an organization embraces project management. Furthermore, he cited Hartman and Skulmoski's contention that organizational project management maturity measures the degree to which project managers are permitted to manage their projects successfully. In general, as a firm increases its organizational project management maturity, the more likely the firm will enjoy improved project performance (Skulmoski).

Research related to project management maturity is in its infancy (Skulmoski, 2001). Assessing project management process maturity is a derivation of classic process maturity concepts (Cooke-Davies & Arzymanow, 2003) evaluating whether a process is stable at a defined level of competency--its process maturity. For example, Cooke-Davis and Arzymanow cited the Carnegie Mellon Software Engineering Institute developed software capability maturity model that evaluates software development processes as a

method of determining organization's level of process maturity. With that maturity evaluation process, software development organizations are evaluated and categorized into five categories of process maturity: (a) initial, (b) repeatable, (c) defined, (d) managed, and (e) optimized (Cooke-Davies & Arzymanow). Consumers of the software capability maturity level assessment enjoy a fundamental understanding of the level of software development the assessed organization is capable of performing. Using similar assessments to evaluate organizational project management capability and maturity is equally valuable. For example, when assessing information systems project performance and methodology, Purvis, McCray, and Roberts (2004) identified the maturity of the information system organization as a mitigating factor in their analysis.

Variances in project management maturity hold similar constraints. In order to compare one organization's project estimating process accurately with another, one should consider the confounding implications that the organization's project management maturity may have on the organization's estimating process.

The maturity of a firm's project management capability can be quantified and thus normalized for the purposes of this study. Components generally evaluated when performing an assessment of project management maturity include project management methods, knowledge, competencies and processes as well as organizational operations and management practices (Pennypacker & Grant, 2003). Developing a project management maturity assessment process has been determined as a defensible method for measuring and analyzing the strengths and weaknesses of organizational project management practices (Ibbs, 2001). However, over 30 methods to measure project management maturity have been made available to project organizations (Hillson, 2003).

During the late 1990s, the PMI began an effort to standardize the methods for assessing organizational project management maturity (Pennypacker & Grant). That initiative has resulted in the Organizational Project Management Maturity Model (OPM3) as a method to establish an organization's project management capability.

Moreover, project management maturity can be assessed through evaluation of organizational culture, staff skill and experience levels, project implementation methods as well as the project management methodologies employed (Hillson, 2003). A key in evaluating changes in an organization's project management maturity is to use consistent assessment methodologies, samples and evaluation techniques (Pennypacker & Grant, 2003). This research study used the general theoretical components of the OPM3 standard assessment process in order to normalize the participant firm's project management maturity characteristics. However, no single project maturity model is appropriate for all maturity evaluations (Skulmoski, 2001). One method of testing for project management maturity involves asking questions regarding project management knowledge, project management attitude, and actual project practice (Anderson, 2003). With that approach, a fundamental assessment of project management maturity can be qualitatively categorized into three levels of maturity: (a) project management, (b) program management, and (c) portfolio management (Anderson, 2003). The potentially confounding variable of project management maturity can be controlled by using that assessment strategy within the context of this study.

Project Manager Competency

This literature review has examined the constructs of trust from a general overarching term down to the specific construct of organizational trust. The review

continued with an evaluation of the concepts of project management and organizational project management maturity. The literature review continues with an examination of the construct of project manager competency.

While an organization may possess a high degree of project management maturity, the competency of the project manager can also influence project success (Gillard & Price, 2005; Skulmoski, 2001). Similarly, the performance of a competent project manager can be hindered by ineffective and immature organizational project management policies, procedures, and practices (Skulmoski). As such, it was appropriate to stratify the analysis of both the perceived levels of organizational project management maturity and project manager competency within the context of this study.

The PMI (2004) defines the project manager as "the person assigned by the performing organization to achieve project objectives" (p. 369). Quantifying the competency of a project manager, among disparate organizations and industries, was a challenge. No nationally or internationally recognized professional licensing process exists for the project management profession (Hodgson, 2002). As such, a less objective source of licensing or certification of project managers was needed for the purposes of stratifying sample respondents based on competency.

The PMI issues the PMP certification as a method of measuring professional knowledge and for designating that holders meet a minimum level of competency as related to the project management knowledge common to all project management professionals. The PMI (2005) holds that the PMP certification is a "globally recognized, rigorous, education, and/or professional experience and examination-based professional credentialing program that maintains ISO 9001 certification in Quality Management

Systems" (para. 1). The PMI's PMP certification demonstrates that the holder has specific knowledge and skills related to project management (Skulmoski, 2001). Carbone and Gholston (2004) identify the PMP certification as "one of the most widely recognized project management credentials" (p. 11).

To be eligible to earn the PMP credential, one must meet specific educational and project management experience requirements. Applicants for the PMP examination must provide a detailed summary of project work history and education related to the project management field. Current requirements call for a minimum of a baccalaureate degree, 4500 hours of documented project leadership experience over 60 months as well as a minimum of 35 hours of project management education within 8 years of applying for the examination. In addition, PMP applicants agree to adhere to a code of professional conduct. The final step toward earning the PMP credential is successfully completing an intensive, 4-hour, multiple-choice examination. The PMP examination is designed to objectively evaluate and measure the applicant's ability to apply the project management body of knowledge within the context of the following project management domains: (a) project initiation, (b) project planning, (c) project execution, (d) project monitoring, and control, (e) project closure, and (e) professional and social responsibility (PMI, 2005). Additionally, PMP certification examination components include scope management, risk management, time management, conflict management, cost management, schedule management, human resource management, and quality management (Smith, 2003).

Once certified as a PMP, the PMI requires the holder to maintain that credential by meeting continuing certification requirements. Those continuing certification requirements are a method of demonstrating a constant commitment to the field of

project management (PMI, 2005). Continuing certification requirements include several continuing education components. PMPs must maintain minimum levels of continuing education in order to keep their PMP credential in an active status.

PMI's *Project Management Body of Knowledge* (PMBOK) defines a project team as the project manager, the project management team and, at times, the project sponsor (PMI, 2004). For the purpose of this study, the evaluation of the experiences of project managers was considered separate from those of the project work teams and project sponsors.

In summary, the researcher appreciates that the accuracy of the project estimating processes could be influenced by the competency of the project manager leading the estimating effort (Cooke-Davies & Arzymanow, 2003). As such, project manager competency was controlled for the purpose of this study. As no formal, governmental licensing methodology exists to license project management professionals, the PMI's PMP certification were used as the best available indicator to stratify project managers by competency levels.

Project Estimating Methodology

This section of the literature review moves from understanding project management, organizational project management maturity, and project manager competency to a review of project estimating methodology. The PMI (2004) defines an estimate as a quantitative assessment of a likely outcome or amount "usually applied to project costs, resources, effort, and durations" (p. 360). Cost and schedule metrics are common tools used to assess the status of a project (PMI). A common approach toward analyzing project management metrics is to evaluate project cost, schedule, and risk

estimates against actual costs, schedule, and risk data. In order to accurately assess the actual performance of a project, current data must be compared to accurate estimating data (PMI).

Several formal methods are used to establish project estimates (Hamilton & Westney, 2002). These methods include order-of-magnitude, analogy, parametric modeling, expert judgment top-down, and bottom-up approaches (Kerzner, 2003; Kinsella, 2002; PMI, 2004), as well as capacity factoring end-product units (Dysert & Pickett, 2005). In the bottom-up budgeting process, those estimates are generally established by project managers and project work teams (Kerzner). Additionally, project managers will often use instinct or intuition to develop or validate a project estimate (Purvis et al., 2004). However, the method of employing intuition often leads to a poor estimate and, hence is a less than optimal approach (McCray et al., 2002; Snow & Keil, 2002).

With these divergent estimating methods available, the project manager is generally faced with the responsibility of ensuring the accuracy of project estimates. Bent (2001) identified six factors that influence the accuracy of project estimates: (a) process definition, (b) estimator experience, (c) time allowed for the estimating process, (d) process conditions, (e) current business and labor conditions, and (f) team experience and inputs. When employing intuition to develop project estimates, the estimator is likely to take either an optimistic or a pessimistic view of the project capability. As such, since the estimate may be focusing on pessimistic capabilities, a possibility exists for deliberately overestimating a project estimate.

Research supports the above contention. Snow and Keil (2002) assessed the levels of optimism among project managers associated with software development projects. They discovered that project managers often reported more optimistic project status reports to project stakeholders than the facts of the project supported. In a similar discovery, both project members and project stakeholders held more optimism regarding project status when the reporting was delivered by a respected project team member (Purvis et al., 2004). These research findings demonstrate that project reporting, such as estimating project progress, could be influenced by factors other than quantitative project data. As such, the project manager may allow external cognitive influencing factors to alter project estimating information.

The overall goal of the project estimating process is to develop accurate projections of anticipated project cost, schedule, and risk requirements (PMI, 2004). That fact notwithstanding, the research demonstrates that factors other than project data may influence project estimates. The level of organization trust may play a contributing and influencing role in that process.

A similar issue involves situations of deliberately underestimating the costs of a project. Flyvbjerg et al. (2002) reviewed the tendency of project planners to underestimate project costs deliberately in order to deceptively gain project funding. The Flyvbjerg et al. study investigated the political pressures employed upon large public works project estimators so that publicly funded projects were presented as more cost effective than they actually were. The authors assessed deliberately deceptive project estimating practices rather than simply identifying optimistic forecasts. They discovered that projects studied with the above scenario resulted in actual costs approximately 28%

above the project estimates. The characteristics of deceptive cost estimates in those scenarios were consistent across the globe and over a review period of nearly 70 years (Flyvbjerg et al.). Similar misrepresentation can be encountered when an organization misrepresents project facts as a method to enter into a new market (Eden, Ackermann, & Williams, 2005). Once again, the research demonstrated that the project estimating process could be influenced by factors external to the confines of the quantitative project data.

It is appropriate to investigate whether project managers or project team members deliberately alter project estimates for reasons unrelated to project facts. As a strategy to guard against cost overruns, project managers commonly build exaggerated contingencies into project cost forecasts (Nemati et al., 2002). Individuals that find themselves in unfavorable circumstances tend to enter into riskier behavior as they likely assess that they have little to lose (Sitkin & Pablo, 1992). Purvis et al. (2004) discovered that project managers will alter project estimates upward even in the face of contradictory statistical information. These researchers also discovered that project team members rarely underestimate cost or schedule requirements for a project. They discovered that the project teams tended to add project cost buffers more than schedule buffers. Project team members are often provided with unrealistic targets for project cost and schedule expectations. As such, research shows that the project team members distrust the initial targets established for project cost and schedule (Purvis et al., 2004).

Estimating contingency is an additional component of the project management estimating process (Kerzner, 2003; Meredith & Mantel Jr., 2005; PMI, 2004). Estimating contingency is added to the total project estimate as a method of compensating for

historical experiences of under-estimating or over-estimating (Bent, 2001; Ripley, 2004). The extent of the contingency has been identified as being a function of (a) design requirements, (b) the estimating process, (c) estimator experience, (d) schedule probability, (e) technology, (f) infrastructure requirements, (g) project progress at the time of the estimate, and (h) materials committed at the time of the estimate (Bent). The level of organizational trust was not included in Bent's analysis.

The literature supports that a myriad of influences affect the project estimating process used by project managers and the project team. Project managers indicated that they are either rewarded or reprimanded as a result of project cost or schedule performance (Purvis et al., 2004). Dirks and Ferrin (2001) proposed that low trust can be expected to foster retribution while high trust may mitigate retribution. Read (1962) put forward the notion that trust moderates behavior to the extent that workers, in certain situations, withhold negative information when they do not have a trusting relationship with their manager. Thus, in a distrusting organizational environment, where project managers face the potential of reprimand for poor project cost or schedule performance, one could conclude that a reasonable behavior would be for the project manager to withhold negative information--to misrepresent project estimates. When confronted with an organizationally risky decision that leads to rewards or punishments, the organizational climate plays a role in that decision-making process (Sitkin & Pablo, 1992). Given the critical nature of the project estimating process, the tendency of project estimators may be to place more emphasis on negative projections and to misrepresent project estimates deliberately.

Assessing Trust as It Relates To Project Estimating

As identified earlier, one component of the trust process encompasses a risk and uncertainty evaluation. Project estimators provide estimates based on a myriad of conditions including uncertainty of project information (Eden et al., 2005). This research explored whether an influencing component of the project estimating process may be the organization's environment of trust. The Construction Industry Institute (1993) evaluated 262 projects to discover a correlation between high trust and low project costs and, similarly, low trust and high project costs. The researchers concluded that trust has an impact on project effectiveness. Since one can generally trust the leader but distrust the consequences of a particular situation (Lewicki et al., 1998), it holds that a project estimator may be inclined to distrust the consequences of providing an inaccurate project estimate. As a compensatory measure, the project estimator may include an inappropriate project contingency to buffer negative repercussions of an inaccurate estimate. Similarly, the literature reviewed circumstances where project estimators faced organizational pressure to develop unrealistically low project estimates in order to secure public contracts in order to win a bid. The organizational environment may influence estimators as it relates to trust.

Summary

The chapter 2 literature review explores research related to the constructs of trust in general, interpersonal trust, trust in leaders, and trust within project teams. That review laid the foundation for the review of literature related to the construct of organizational trust. With the construct of organizational trust established, the literature review examined research of project management and project estimating. The researcher has

elected to stratify analysis of the influence of project management maturity on project estimating accuracy. The literature review examined literature related to that construct. Similarly, the study assumed that project management competency has a confounding influence on the project estimating process. As such, the researcher elected to control project management competency by stratifying the analysis of responses by active PMP certification holders. The literature was reviewed as it relates to that construct as well. Finally, research was reviewed with regard to the notion of trust as it related to the project management estimating process. The literature review contributed to this study by providing a foundation to identify the constructs related to organizational trust and project estimating accurately.

Chapter 1 described the intent of this study to explore the correlation between organizational trust and an accurate project estimating methodology. The chapter 1 summary provided a review of the significance of this research to the field of project management and to leadership scholarship as well. Chapter 3 will present a detailed description of the research methods used during this study. Chapter 4 will describe the subsequent research findings. Chapter 5 will close this study with research conclusions and recommendations.

CHAPTER 3

RESEARCH METHODOLOGY

Chapters 1 and 2 introduced the research study and a presented a comprehensive overview of the relevant research literature. This study was intended to add to the scholarly body of knowledge through identifying any relationship between organizational trust and an accurate project estimating methodology. To that end, a quantitative, correlational study was performed on a sample of project managers working in organizations within a metropolitan area in the Rocky Mountain region of the United States. Those project managers were asked to assess their firm's project management estimating accuracy. Concurrently, the respondents were administered the OTI-SF in order to asses levels of organizational trust within their firm's leadership. The following chapter outlines the details of the research methodology planned for this study.

Research Design

The research employed a quantitative, correlational research approach. Figure 1 summarizes the research approach. Due to the specific nature of and caveats contained within the research questions, the ability to segregate and isolate individual variables was constricted. To remedy this issue, a correlational research design was established employing a voluntary response survey administered to a multistage stratified sample of the object population.

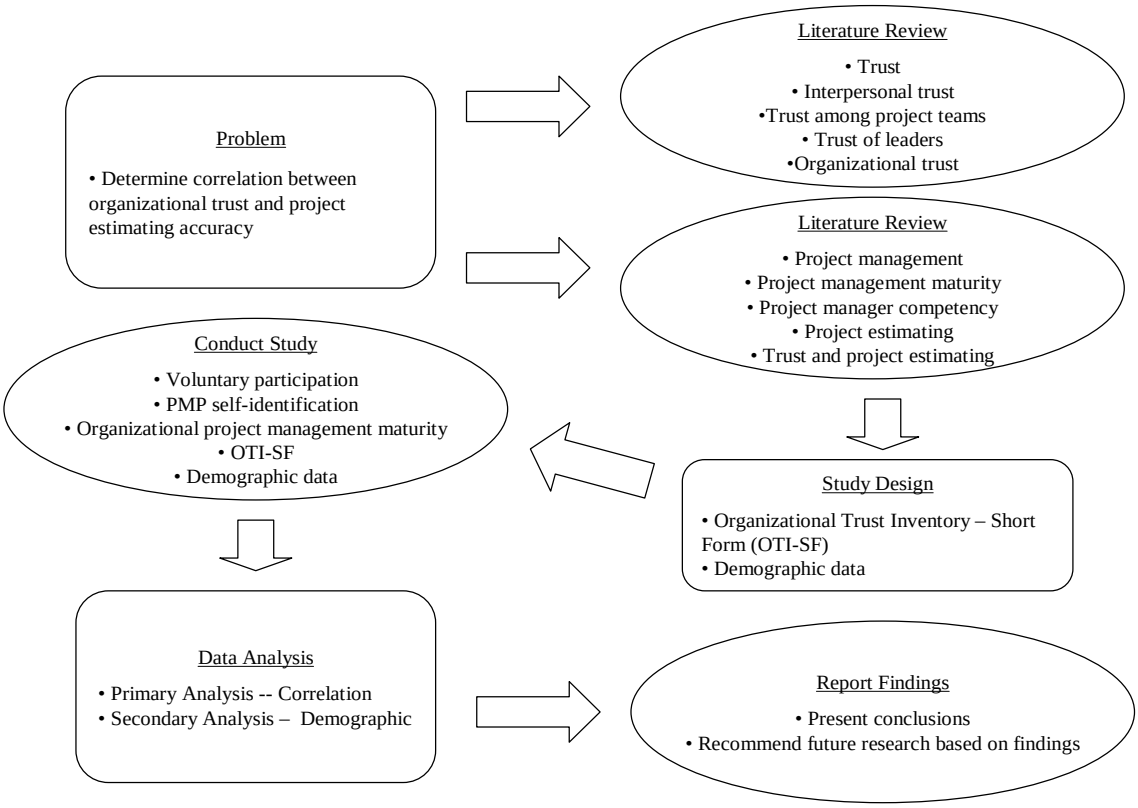

Figure 1. Graphic depiction of the research process.

The PMI of Newton Square Pennsylvania is the world's largest professional organization dedicated to the project management profession with a total membership of over 200,000 members worldwide (PMI, 2005). The Mile-Hi Chapter, based in Denver, Colorado is the ninth largest single chapter with the PMI organization. The Mile-Hi Chapter has approximately 2500 active members. These 2500 members comprised the general population group for this proposed study. The Mile-Hi Chapter holds monthly meetings as a forum for educational and networking opportunities. Approximately 150 Mile-Hi Chapter members attend the monthly chapter meetings. A convenience sample of

project management professionals attending a monthly Mile-Hi Chapter meeting was performed.

Respondents were asked to answer general demographic questions and to complete the survey instrument. Demographic questions gathered information related to respondent age, gender, education, and employment tenure. Additionally, the respondents were asked to self-identify whether they held an active PMP certification. Moreover, a self-identified, high-level assessment of the respondent firm's organizational project management maturity was requested. With that demographic data collected, the Cummings and Bromiley's OTI-SF was administered as an assessment of the incumbent levels of trust within the respondent's organization. In addition, the respondents were asked to self-identify the level of project estimating accuracy with regard to cost, schedule, risk, and overall estimating accuracy within the projects they manage. Responses to the survey data were statistically analyzed to determine the existence of correlation.

Appropriateness of Design

As mentioned previously, the study used a quantitative, correlational research design. Creswell (2004) identified a quantitative design as appropriate for studies that contain data that are measurable and observable and that describe a relationship among variables. A correlational study is suitable as a method of analyzing the relationship between variables in order to identify trends (Leedy & Ormond, 2004). While it is understood that the correlational study is appropriate for determining whether variables are related and the nature of that relationship, it is also understood that correlations do not imply causation (Leedy & Ormond).

In order to control select, potentially confounding variables, a correlational research approach was performed employing a voluntary response survey administered to a multistage stratified sample of the object population. When appropriately administered, stratified sampling is appropriate as that approach presents an unbiased approximation of the population parameters (Cooper & Schindler, 2003). Employing a multistage stratified sampling strategy within a quantitative, correlational research design was appropriate for this study.

Research Questions

The following research questions were examined:

R 1: Is there a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers?

R 2: Is there a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers?

R 3: Is there a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project risk as reported by project managers?

R 4: Is there a statistically significant positive relationship between the measured levels of organizational trust and the accuracy of the project team's overall estimating process as reported by project managers?

Population

The general population of this study included all active members of the Project Management Institute (PMI) Mile-Hi Chapter. The total population of the Mile-Hi Chapter was estimated to be 2500. The sample population of active members available to be surveyed was expected to be approximately 150 people. The target number of participants completing the survey instrument was 90. Demographic characteristics of the reference population were collected with the survey instrument. Multiple regression analysis was performed to determine whether the general demographic data were related to the outcome variables.

Informed Consent

Each participant of this research study was informed that participation was voluntary. Prior to engaging the survey instrument, the research participants were provided with the informed consent document presented in Appendix B. After reviewing the informed consent document, participants electing not to continue with research study were permitted to return the instrument and encounter no future obligations.

Sampling Frame

The research used a convenience sample of attendees to the PMI's Mile-Hi Chapter April 2006 chapter meetings. A convenience sample is appropriate when no requirement for a representative sample exists (Leedy & Ormond, 2004). Since this study compared respondent information to each other, there was no requirement for representative sampling. Cooper and Schindler (2003) identified purposive sampling as an appropriate nonprobability method for conforming certain criteria to select sample characteristics. A judgment sampling method is a method of purposive sampling that

permits the researcher to identify samples by select criterion (Cooper & Schindler). In order to stratify PMP certification and general organizational project management maturity characteristics, a purposive, judgment sampling strategy was implemented with this study.

As part of the demographic data collection, respondents were asked to self-identify whether they hold an active PMP certification. Additionally, respondents were requested to categorize their organization's project management maturity characteristics through definitions primarily focused on project, program, or portfolio management characteristics. Analysis of project estimating accuracy was stratified based on those responses.

As discussed previously, a convenience sample of attendees of a PMI Mile-Hi Chapter meeting was the basis of the sampling strategy. The average attendance to PMI Mile-Hi Chapter meeting ranges from approximately 130-150 people (R. Kois, personal communication, April 12, 2006). Approximately 75% of those attendees hold an active PMP certification. By comparison, approximately 87% of the approximately 221,000 global PMI members have earned the PMP certificate (PMI, 2006). While the United States Department of Labor (2006) reports more that 5,900,000 individuals with a management occupational code within the United States, no accurate data exists in the literature that quantifies the number of non-PMI project managers in the world.

In order to encourage a high level of participation in the study, the researcher offered a small incentive for individuals completing the research instrument. With these caveats and strategies, the researcher expected to receive approximately 90 valid survey responses. In fact, 91 valid surveys were collected by the researcher.

Confidentiality

The identity of the participants and the participant organizations remained confidential throughout the course of this research study. The associated data sets remained confidential as well. The survey instruments were developed to ensure that confidentiality. Paper-based surveys were distributed and collected through the assistance of research assistants. No information was retained that identifies the individual respondents or the respondent organizations.

Geographic Location

The study was limited to project managers belonging to the PMI's Mile Hi Chapter based in Denver, Colorado. Membership to this PMI chapter is comprised of project managers and leaders from the greater Denver, Colorado metropolitan area including the major metropolitan communities of Boulder, Colorado Springs, and Fort Collins, Colorado.

This population was selected primarily because of the convenience to the researcher. The selection was appropriate because the Mile-Hi Chapter is the ninth largest chapter of the largest professional project management association in the world. The population represents a reasonable cross section of the active, professional project manager community within the subject Rocky Mountain metropolitan region (R. Kois, personal communication, April 12, 2006). In addition, the Mile-Hi Chapter historically supports research initiatives and the chapter leadership supported this research effort. Finally, the researcher is a member of the chapter and had convenient access to the target population.

Instrumentation

Participants were provided with a survey packet that included a consent form, the survey instrument, and questions regarding respondent demographic information. The survey instrument consisted of Cummings and Bromiley's OTI-SF, and questions related the respondent's assessment of their organization's level of project cost, schedule, risk, and overall estimating accuracy. The OTI-SF is an appropriate tool to measure organizational trust. The demographic data collected included information regarding age, gender, the highest level of education received, length of employment with their current organization, whether they possessed a PMP certification, and their assessment of their organization's project management maturity level.

Organizational Trust Inventory-Short Form

Cummings and Bromiley developed the Organizational Trust Inventory (OTI) as a method to measure (a) the degree that an individual or group is perceived as doing what they say they will do, (b) the degree that an individual or group negotiates honestly preceding a commitment, and (c) the degree that an individual or group demonstrates fairness and avoids taking excessive advantage of situations that negatively affect the other party (Charnitski, 2002). Cummings and Bromiley established a working definition of the organizational trust construct within the context of organizational theory (METRIC, 2005). With the Organizational Trust Inventory-Long Form (OTI-LF), the authors developed a definitional matrix of trust as a belief with three dimensions of trust--(a) keeps commitments, (b) negotiates honestly, and (c) avoids taking excess advantage--measured against three components of belief--(a) an affective state, (b) a cognitive state, and (c) as intended behavior (Cummings & Bromiley, 1996). This matrix ensured that the

dimensions being measured were represented by the components of the OTI-LF (METRIC, 2005).

Cummings and Bromiley's OTI-SF (1996) is a 12-item validated instrument that is a condensed version of the 62-item OTI-LF. The OTI-SF developed as a shorter, but equally accurate instrument to measure the construct of organizational trust. This validated instrument provides an accurate representation of the general trust levels within an organization (Charnitski, 2002) as it measures trust between individuals and organizational units. The OTI-SF only measures the affective state and the cognitive state of trust. The OTI-SF measures those components across three separate, but correlated dimensions of their operational definition of trust as the:

> (a) belief that an individual or group makes good-faith efforts to behave in accordance with any commitments both explicit or implicit, (b) belief that an individual or group is honest in whatever negotiations (more generally, any interaction) preceding such commitments, and (c) belief that an individual or group does not take excessive advantage of another even when the opportunity is available. (p. 304)

The OTI-SF employs a 7-point Likert-type scale for gathering responses ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Some questions are negatively worded, and some have reversed scoring. The 12 survey question responses were totaled, and the higher numbers indicate higher levels of organizational trust. To support that contention, Charnitski (2002) evaluated the OTI-SF and determined that the instrument presents "a clear picture of the general nature of trust within the institution" (p. 133).

Additional Questions

In addition to the 12 survey questions presented with the OTI-SF, additional survey questions assumed that the respondent project managers understand influencing factors behind project team estimating processes. Respondents were asked to provide general demographic information in addition to providing data of project management maturity and PMP certification.

The dependent variable project estimating accuracy was identified through self-reporting by the survey respondents. Four supplemental questions to the OTI-SF asked the respondents to provide their assessment of project estimating accuracy related to schedule, cost, risk, and overall estimating performance. Respondents were asked to self-identify their evaluation of project estimating accuracy against the respondent's perception of industry average estimating performance, based on a 7-point Likert type scale ranging from 1 (*poor*) to 7 (*excellent*).

As identified previously, organizational project management maturity was used as one category for stratifying survey responses. Organizational project management maturity was identified under three generalized categories – project management, program management, and portfolio management. Anderson and Jessen (2003) identified those three general categories for establishing an accurate, qualitative assessment of project management maturity as the ladder of maturity. The first level of project management maturity is described as project management. At this level, the management of individual project goals is the primary focus. At Andersen and Jessen's project management level, managers focus on individual project team efforts aimed at specific project goals under the constraints of predetermined schedule and resource parameters.

The second level of Andersen and Jessen's (2003) ladder of maturity is program management. At the program management level, organizations perform "the effective management of all the projects under the umbrella of the program" (p. 459). The final ladder of Andersen and Jessen's ladder of maturity is portfolio management. Organizations performing at this highest level of project management maturity, manage do not always share common objectives, and "the managerial approach must be wider, and include a balanced view on how to distribute scare resources between competing desires" (p. 459). Once provided with those summary definitions, survey respondents were asked to characterize their organizations into one of the above categories of organizational project management maturity.

Data Collection

Data for this research was collected using a voluntary response survey issued to a convenience sample of project managers associated with a professional project management association chapter located in a major metropolitan area in the Rocky Mountain region of the United States. The researcher received approval from the Mile-Hi Chapter President to administer the survey to the membership as documented in appendix C.

Respondents manually completed the survey instrument, providing demographic data, along with information regarding PMP certification and a categorization of organizational project management maturity. In addition, responses to the OTI-SF and responses related to project estimating accuracy were collected. The quantitative data was manually entered into statistical software to assist in analysis.

Data Analysis

The purpose of this study was to explore the correlation between organizational trust and an accurate project estimating methodology. Correlational analysis was performed using a statistical software program. The instrument variables were analyzed using the Pearson product moment correlation coefficient (Pearson *r*) for evaluating the strength of the relationship. Using the Pearson *r* is appropriate for evaluating interval-scaled data (Lind, Marchal, & Mason, 2002). Likert-type scales with integer anchors can be accurately evaluated as interval measurements. Creswell (2004) explained that, "Interval scales provide 'continuous' options to questions with assumed equal distances between options. These scales may have three, four, or more response options. The popular Likert-type scale ("strongly agree" to "strongly disagree") illustrates a scale with theoretically equal intervals among responses" (p. 172). The research data can be accurately evaluated as interval scaled since the research instrument used a 7-point Likert-type scale with integer anchors. The nonparametric test, Spearman's rank correlation coefficient (Spearman's rho), was also performed as a method of corroborating findings generated from the Pearson's *r* analysis. Since the results were very similar, the more powerful Pearson *r* findings are presented.

Secondary analysis included multiple regression analysis performed to compare the cost, schedule, risk, overall, and aggregate estimating accuracy scores against the organizational trust score while controlling for the respondent age, gender, education, or organizational tenure, PMP certification, and project management maturity demographic data. Analysis was performed to examine the relationship between organizational project management maturity or PMP certification and organizational trust. The impacts of the

assumptions predicating the stratification of project manager competency and organizational project management maturity were analyzed as well.

Validity and Reliability

The reliability of the research instrument has been demonstrated by the instrument authors and additional researchers. Cummings and Bromiley (1996) performed psychometric properties evaluation on the components of the OTI-LF with a study of employees and students that the University of Minnesota (*n*=323). Reliability for dimension 1 (keeps commitments) ranged from .84 - .96 in structural equations modeling (SEM). Reliability in dimension 2 (negotiates honestly) ranged from .78 - .94 in SEM among the affective state, cognition, and intended behavior. Reliability in dimension 3 (avoids taking excessive advantage) ranged from .88 - .92 in SEM (Cummings & Bromiley).

Since the OTI-LF consists of 62 questions, Cummings and Bromiley (1996) elected to design the OTI-SF. The OTI-SF is a derivation of the OTI-LF with three distinct differences (a) since the intended behavior items demonstrated lower item-to-factor correlation, they were removed from the OTI-LF; (b) those items with the highest item-to-factor correlation were retained with the OTI-SF; and (c) redundant wording items were removed maintaining a minimum .70 item-to-factor correlation (Cummings & Bromiley). As a result, the OTI-SF maintained a Bentler's comparative fit index of .98 and a highly correlated composite reliability of .94 for dimension 1 (keeps commitments), .94 for dimension 2 (negotiates honestly), and .90 for dimension 3 (avoids taking excess advantage (Cummings & Bromiley). Employing the definitional matrix of trust as a belief

when developing items within the OTI provides additional support of the content validity of the measure (METRIC, 2005).

Additional research has been performed to validate the OTI-SF. Roberts et al. (2004) performed an exploratory factor analysis to validate the strength of the three organizational trust constructs within the OTI-SF. The authors determined a three-factor solution explaining 74.6% of the variance (p. 5). Roberts et al. further tested the OTI-SF construct measures for reliability through Chronbach Alpha calculations. Each of the three measures produced Alphas greater than .70. The current study performed Chronbach Alpha calculations to evaluate internal reliability of the OTI-SF scores and the project estimating scores as well.

An effective research design was required to ensure the validity of the study. Creswell (2004) identified four primary threats to the validity of a research study, (a) threats to statistical conclusion validity, (b) threats to internal validity, (c) threats to construct validity, and (d) threats to external validity. This study was designed to mitigate threats to validity for each of the above categories.

Statistical conclusion validity was secured by using a reliable organizational trust instrument, ensuring an appropriate sample size, and using the Pearson product-moment correlations as a suitable statistical test. Threats to internal validity were lessened by controlling the process for respondent participation. Respondents volunteered for participation in the study so no selection biases were introduced. Research assistants ensured that each research participant was issued and responded with only one survey instrument. The design of the study required that respondents immediately complete the survey instrument thus reducing procedural threats to validity.

The research design mitigated threats to construct validity by using the reliable and valid OTI-SF coupled with clearly defined demographic questions and unambiguous evaluations of project estimating accuracy constructs. The researcher and both research assistants were cautious to avoid influencing participant responses. Threats to external validity were reduced by selecting an appropriate setting for obtaining the research data. The researcher has been an active member of the PMI Mile-Hi Chapter since 1997. Based on the experience of the researcher, monthly chapter meetings are well attended and the number of chapter meeting attendees needed to meet the target convenience sample size was expected for the April chapter meetings. Since the Mile-Hi Chapter is the ninth largest PMI chapter in the world, it was reasonable to assume that the general chapter population was an adequate representation of the PMI community. While the research design was limited to the major Rocky Mountain metropolitan region, that assumption supports the ability to generalize this study's results to the project management community at large.

In summary, Cummings and Bromiley's OTI-SF possess acceptable psychometric properties with regard to reliability and internal and external validity. The OTI-SF reliably and validly measures the construct of organizational trust between work departments or units. The OTI-SF component of the instrument issued for this research directed respondents to assess organizational trust from the perspective of the project manager against trust of the leadership unit. Moreover, respondents were asked to report project estimating accuracy, on a 7-point Likert-type scale, as compared to their understanding of industry averages. Accurate demographic data was collected using unambiguous demographic questions. With a valid and reliable organizational trust

instrument and self-reported, distinct categories for project estimating, the instrument was appropriate for use in this research study.

Summary

Chapter 3 presented the research methodology employed with this study. The quantitative, correlational study was aimed at determining whether a relationship exists between organizational trust, as measured by the OTI-SF, and an accurate project estimating methodology. Responses were stratified by project manager competency and by organizational project management maturity. As such, those potentially significant confounding variables were controlled. The preceding chapter discussed the research design as well as the appropriateness of that design. The sampling strategy was outlined, as was a discussion of the OTI-SF instrumentation being used. Data collection and data analysis strategies were discussed and validity and reliability data for the OTI-SF was presented. Chapter 4 will analyze the data obtained from the survey process and report the results on the correlation between organizational trust and project estimating accuracy. Chapter 5 will conclude this study by providing an interpretation of the research findings as well as providing conclusions derived from the analysis, highlights of the leadership and social implications of the findings, and recommendations for additional research.

CHAPTER 4

FINDINGS

This chapter provides the findings of the research statistical analyses. These findings include a presentation of descriptive statistics of the research sample and a statistical analysis of the research questions and hypotheses. Finally, chapter 5 will examine the impacts of the assumptions, limitations, and delimitations on the study and the researcher will offer recommendations for additional research based on the lessons learned from this study.

In review, the purpose of this quantitative, correlation research study was to determine the extent to which organizational trust levels influenced the accuracy of project estimates. This study examined organizational trust levels and its potential impact on the accuracy of the project estimating process within various organizations located in a major Rocky Mountain metropolitan area. Ninety-one project managers participated in this study.

Data Collection

Prior to engaging in the process of sampling the target population, the researcher performed a pilot study using a set of non-PMI affiliated project managers. The purpose of the pilot study was to assess the usability and readability of the survey document and to establish a methodology for research data collection, data entry, and data management. Six individuals were asked to participate in the pilot study. Each pilot study participant received an informed consent form, the survey instrument, and verbal instructions regarding the researcher's expectations for completing the pilot survey. Pilot study participants were asked to provide feedback regarding the usability and readability of the

survey instrument. While all comments received from the pilot study participants were minor in nature, those that were not directly associated with the OTI-SF were integrated into the final survey instrument. Those comments directly associated with the OTI-SF were disregarded to maintain the validity and reliability of the OTI-SF component of the instrument. Because of the pilot study, the researcher was able to establish an effective process for data collection and management.

The researcher collected data from attendees of the PMI's April 2006 Mile-Hi Chapter meetings. Since the Mile-Hi Chapter is the ninth largest PMI chapter in the world, and it encompasses a large geographic area, monthly chapter meetings are held on consecutive nights in two separate locations. The April 2006 meetings were held in Ft. Collins, Colorado and in Denver, Colorado. The researcher attended both of these chapter meetings in order to collect a more accurate sample of the target population.

The Mile-Hi Chapter President authorized a table at each chapter meeting for the purpose of distributing and collecting the research material. The researcher used the support of two different research assistants. One research assistant aided the researcher at the Ft. Collins chapter meeting location. A second research assistant helped the researcher at the Denver chapter meeting location. The researcher and the research assistant physically distributed the survey instrument to those chapter meeting attendees that approached the table. Potential respondents were offered two lottery tickets as a token of appreciation for completing the survey and as a tool to increase survey participation. The survey collection process resulted in a 100% return rate for surveys issued and an approximate participation rate of 65% for those individuals attending the chapter meetings. In summary, those responding to the survey represented a convenience

sample of those PMI Mile-Hi Chapter members that happened to attend the April chapter meetings. The findings of those surveys follow.

Findings

Table 1 displays the frequency counts for selected variables. Respondent ages ranged from 21 years old to over 61 years old (*Mdn* = 45.5 years). Gender was equally split between men (49.5%) and women (50.5%) respondents. Most (90.2%) of the respondents had earned a college degree, and 50.6% of the sample had earned a graduate level degree. The number of years in the organization ranged from not currently being employed to 15 or more years (*Mdn* = 4.0 years). Two-thirds (68.1%) of the respondents possessed an active PMP certification. The respondents were equally distributed across the three levels of the organizational project management maturity spectrum used for the study.

Table 1

Frequency Counts for Selected Variables (N = 91)

		n	%
Age [a]			
	21 - 30 years	4	4.4
	31 - 40 years	24	26.4
	41 - 50 years	38	41.8
	51 - 60 years	23	25.3
	61 years or older	2	2.2
Gender			
	Male	45	49.5
	Female	46	50.5
Education			
	High school or equivalent	2	2.2
	Some college	5	5.5
	Two-year college degree	2	2.2
	Four-year college degree	36	39.6
	Masters degree	43	47.3
	Doctoral degree	3	3.3

[a] Age: *Mdn* = 45.5 years

Table 1

Continued

		n	%
Years in organization			
	Not currently employed	2	2.2
	Less than one year	20	22.0
	One to less than three years	14	15.4
	Three to less than five years	13	14.3
	Five to less than ten years	23	25.3
	Ten to less than fifteen years	7	7.7
	Fifteen years or more	12	13.2
PMP Certification			
	Yes	62	68.1
	No	29	31.9
Project management maturity level			
	Project	28	30.8
	Program	33	36.3
	Portfolio	30	33.0

Table 2 displays the psychometric characteristics for the derived scales. Both scales had acceptable levels of internal reliability: trust (alpha = .94) and aggregated accuracy (alpha = .83).

Table 2

Psychometric Characteristics for Derived Scales (N = 91)

Scale	Number of Items	*M*	*SD*	Low	High	Alpha
Organizational Trust Score [a]	12	4.74	1.22	1.83	6.92	.94
Aggregated Accuracy [b]	4	3.86	1.08	1.25	6.75	.83

[a] Scale Metric: 1 = *Strongly Disagree* to 7 = *Strongly Agree*
[b] Scale Metric: 1 = *Poor* to 7 = *Excellent*

Hypothesis One

H_1 posited that there is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency. Table 3 displays the Pearson product-moment correlations used to associate the project cost accuracy rating with the organizational trust score. This correlation was calculated for the entire sample (N = 91) as well as for subsamples of respondents based on the three levels of project management maturity and whether the respondent possessed the PMP certification. For the entire sample, the correlation between project cost accuracy and organizational trust was significant (r = .22, p = .04). All five subsample correlations were positive and ranged from r = .12 to r = .31 (r_{Mdn} = .21). The findings in table 3 provide support for H_1.

Hypothesis Two

H_2 posited that there is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency. In a similar analysis approach as with H_1, table 3 displays the Pearson product-moment correlations used to associate the project schedule accuracy rating with the organizational trust score. For the entire sample, the correlation was significant ($r = .31$, $p = .002$). All five subsample correlations were positive and ranged from $r = .29$ to $r = .31$ ($r_{Mdn} = .30$). The findings in table 3 provided support for H_2.

Hypothesis Three

H_3 posited that there is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project risk as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency. In a similar analysis approach as with H_1, table 3 displays the Pearson product-moment correlations used to associate the project risk accuracy rating with the organizational trust score. For the entire sample, the correlation was significant ($r = .33$, $p = .001$). All five subsample correlations were positive and ranged from $r = .27$ to $r = .40$ ($r_{Mdn} = .34$). The findings in table 3 provide support for H_3.

Hypothesis Four

H_4 posited that there is a statistically significant positive relationship between the measured levels of organizational trust and the accuracy of the project team's overall estimating performance as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency. In a similar analysis approach as with H_1, table 3 displays the Pearson product-moment correlations used to associate the project overall accuracy rating with the organizational trust score. For the entire sample, the correlation was significant (r = .34, p = .001). All five subsample correlations were positive and ranged from r = .28 to r = .43 (r_{Mdn} = .32). The findings in table 3 provided support for H_4.

Table 3

Correlations for Trust Score with Accuracy Scores. Total Sample and Selected Subsamples (N = 91)

	Total Sample	Project Management Maturity			PMP Certification	
		Low [a]	Medium [b]	High [c]	Yes [d]	No [e]
Project Cost Accuracy	.22 **	.12	.31 *	.14	.21	.24
Project Schedule Accuracy	.31 ****	.30	.31 *	.29	.31 ***	.29
Project Risk Accuracy	.33 *****	.40 **	.27	.34 *	.35 ***	.32 *
Project Overall Accuracy	.34 *****	.43 **	.32 *	.30	.36 ****	.28
Aggregated Accuracy	.37 *****	.36 *	.38 **	.33 *	.37 ****	.34 *

* p = .10. ** p = .05. *** p = .01. **** p = .005. ***** p = .001.
[a] Organizational Project Management Maturity = Project (n = 28)
[b] Organizational Project Management Maturity = Program (n = 33)
[c] Organizational Project Management Maturity = Portfolio (n = 30)
[d] Have PMP Certification (n = 62)
[e] No PMP Certification (n = 29)

Additional Findings

An aggregated project estimating accuracy score was calculated by averaging the four estimating accuracy ratings (cost, schedule, risk, and overall). In a similar analysis approach as with H_1, table 3 displays the Pearson product-moment correlations used to associate the aggregated accuracy rating with the organizational trust score. For the entire sample, the correlation was significant (r = .37, p = .001). All five subsample correlations were positive and ranged from r = .33 to r = .38 (r_{Mdn} = .36).

A series of five multiple regression models were developed to compare the five project estimating accuracy scores with the organizational trust score after controlling for the six background factors. These five models were for project cost accuracy (table 4), project schedule accuracy (table 5), project risk accuracy (table 6), overall project estimating accuracy (table 7) and aggregated project estimating accuracy (table 8). A one-way Analysis of Variance (ANOVA) test demonstrated no relationship between organizational project management maturity or project manager competency and organizational trust.

Table 4 displays the multiple regression model predicting project cost accuracy. The overall model was significant (p = .007) and accounted for 20.4% of the variance in the dependent variable. Examination of the direct relationship with PMP certification and the cost accuracy score shows that no significant relationship exists after controlling for the other independent variables (p = .48). Similarly, no significant relationship exists between project management maturity levels and cost accuracy scores after controlling for the other independent variables (p = .12). Inspection of the beta weights found male project managers to give significantly higher project cost accuracy ratings than did the females (p = .007). After controlling for the other six variables, organizational trust was positively correlated with project cost estimating accuracy (p = .008).

Table 4

Prediction of Cost Accuracy Based on Selected Variables (N = 91)

	B	*SE*	β	*p*	*sr*	sr^2
Intercept	1.50	1.33		.26		
Age	0.20	0.17	.13	.23	.12	.01
Gender [a]	-0.77	0.28	-.28	.007	-.27	.07
Education	0.29	0.16	.20	.08	.18	.03
Years in Organization	0.10	0.08	.12	.26	.11	.01
PMP Certification [b]	0.23	0.32	.08	.48	.07	.00
Project Management Maturity	-0.29	0.18	-.16	.12	-.15	.02
Organizational Trust Score	0.33	0.12	.28	.008	.27	.07

Full Model: F (7, 83) = 3.03, p = .007. R^2 = .204.
[a] Gender: 1 = *Male* 2 = *Female*
[b] PMP Certification: 1 = *Yes* 2 = *No*
sr = Semipartial (part) correlation

Table 5 displays the multiple regression model predicting project schedule estimating accuracy. The overall model was significant (p = .01) and accounted for 19.2% of the variance in the dependent variable. A review of the direct relationship with PMP certification and the schedule accuracy score shows that no significant relationship exists after controlling for the other independent variables (p = .28). Likewise, no significant relationship exists between project management maturity levels and schedule accuracy scores after controlling for the other independent variables (p = .89). Inspection

of the beta weights found male project managers to give significantly higher project schedule estimating accuracy ratings than did the females (p = .02). After controlling for the other six variables, trust was positively correlated with project schedule estimating accuracy (p = .001).

Table 5

Prediction of Schedule Accuracy Based on Selected Variables (N = 91)

	B	*SE*	β	*p*	*sr*	sr^2
Intercept	1.01	1.32		.45		
Age	0.17	0.16	.11	.31	.10	.01
Gender	-0.68	0.28	-.25	.02	-.24	.06
Education	0.18	0.16	.13	.26	.11	.01
Years in Organization	0.05	0.08	.06	.58	.06	.00
PMP Certification [b]	0.35	0.32	.12	.28	.11	.01
Project Management Maturity	-0.02	0.18	-.01	.89	-.01	.00
Organizational Trust Score	0.43	0.12	.38	.001	.36	.13

Full Model: F (7, 83) = 2.81, p = .01. R^2 = .192.
[a] Gender: 1 = *Male* 2 = *Female*
[b] Certification: 1 = *Yes* 2 = *No*
sr = Semipartial (part) correlation

Table 6 displays the multiple regression model predicting project risk estimating accuracy. The overall model was significant (p = .03) and accounted for 16.9% of the variance in the dependent variable. Inspection of the direct relationship with PMP

certification and the risk accuracy score shows that no significant relationship exists after controlling for the other independent variables (p = .84). Similarly, no significant relationship exists between project management maturity levels and risk accuracy scores after controlling for the other independent variables (p = .62). Examination of the beta weights found male project managers to give significantly higher project risk estimating accuracy ratings than did the females (p = .03). After controlling for the other six variables, organizational trust was positively correlated with project risk estimating accuracy (p = .001).

Table 6

Prediction of Risk Accuracy Based on Selected Variables (N = 91)

	B	*SE*	β	*p*	*sr*	sr^2
Intercept	2.18	1.19		.07		
Age	0.03	0.15	.02	.86	.02	.00
Gender	-0.55	0.25	-.23	.03	-.22	.05
Education	0.11	0.14	.08	.45	.08	.01
Years in Organization	-0.02	0.07	-.03	.78	-.03	.00
PMP Certification [b]	0.06	0.29	.02	.84	.02	.00
Project Management Maturity	0.08	0.16	.05	.62	.05	.00
Organizational Trust Score	0.40	0.11	.39	.001	.37	.14

Full Model: F (7, 83) = 2.42, p = .03. R^2 = .169.
[a] Gender: 1 = *Male* 2 = *Female*
[b] Certification: 1 = *Yes* 2 = *No*
sr = Semipartial (part) correlation

Table 7 displays the multiple regression model predicting overall project estimating accuracy. The overall model was significant (p = .002) and accounted for 23.9% of the variance in the dependent variable. Examination of the direct relationship with PMP certification and overall project estimating accuracy score shows that no significant relationship exists after controlling for the other independent variables (p = .29). Likewise, no significant relationship exists between project management maturity levels and overall project estimating accuracy scores after controlling for the other

independent variables (p = .95). Inspection of the beta weights found male project managers to give significantly higher overall project estimating accuracy ratings than did the females (p = .001). After controlling for the other six variables, organizational trust was positively correlated with overall project estimating accuracy (p = .001).

Table 7

Prediction of Overall Accuracy Based on Selected Variables (N = 91)

	B	*SE*	β	*p*	*sr*	sr^2
Intercept	1.92	1.18		.11		
Age	-0.06	0.15	-.04	.68	-.04	.00
Gender	-0.83	0.25	-.33	.001	-.32	.10
Education	0.21	0.14	.16	.14	.14	.02
Years in Organization	0.01	0.07	.02	.87	.02	.00
PMP Certification [b]	0.30	0.29	.11	.29	.10	.01
Project Management Maturity	-0.01	0.16	-.01	.95	-.01	.00
Organizational Trust Score	0.42	0.11	.40	.001	.38	.14

Full Model: F (7, 83) = 3.72, p = .002. R^2 = .239.
[a] Gender: 1 = *Male* 2 = *Female*
[b] Certification: 1 = *Yes* 2 = *No*
sr = Semipartial (part) correlation

Table 8 displays the multiple regression model predicting the aggregated project estimating accuracy score. The overall model was significant (p = .001) and accounted for 27.3% of the variance in the dependent variable. Examination of the direct

relationship with PMP certification and the aggregate project estimating accuracy score shows that no significant relationship exists after controlling for the other independent variables (p = .32). Similarly, no significant relationship exists between project management maturity levels and aggregated project estimating accuracy scores after controlling for the other independent variables (p = .65). Inspection of the beta weights found male project managers to give significantly higher aggregate project estimating accuracy ratings than did the females (p = .001). After controlling for the other six variables, organizational trust was positively correlated with aggregate project estimating accuracy (p = .001).

Table 8

Prediction of Aggregated Accuracy Based on Selected Variables (N = 91)

	B	*SE*	β	*p*	*sr*	sr^2
Intercept	1.65	0.98		.09		
Age	0.08	0.12	.07	.50	.06	.00
Gender	-0.71	0.21	-.33	.001	-.32	.10
Education	0.20	0.12	.17	.10	.16	.02
Years in Organization	0.03	0.06	.05	.59	.05	.00
PMP Certification [b]	0.24	0.24	.10	.32	.09	.01
Project Management Maturity	-0.06	0.13	-.04	.65	-.04	.00
Organizational Trust Score	0.39	0.09	.44	.001	.42	.18

Full Model: F (7, 83) = 4.45, p = .001. R^2 = .273.
[a] Gender: 1 = *Male* 2 = *Female*
[b] Certification: 1 = *Yes* 2 = *No*
sr = Semipartial (part) correlation

Summary

Chapter 4 analyzed the data obtained from the survey process. The findings indicated that organizational trust is related to project estimating accuracy. Higher trust correlates with more accurate project estimating. Demographic data showed a median respondent age of 45.5 years with ages ranging from 21 years old to over 61 years old. Approximately the same number of females and males participated in the study. A high percentage of respondents reported earning a college degree, and more than half indicated

that they had earned a graduate level degree. Tenure with the organization ranged from currently being unemployed to 15 or more years. Two-thirds of the respondents reported that they maintained an active PMP certification. The respondents reported organizational project management maturity equally across the three levels of maturity.

The psychometric characteristics for the derived scales were analyzed using a Chronbach Alpha evaluation. Both the organizational trust scale and the aggregate project estimating scale had acceptable levels of internal reliability. The only demographic variable that demonstrated a statistically significant correlation to organizational trust scores was gender. Males reported significantly higher project accuracy scores than did females.

The results indicated a positive correlation between organizational trust and project estimating accuracy in all estimating categories including (a) cost, (b) scheduling, (c) risk, (d) overall estimating, and (e) an aggregate total of estimating accuracy scores. The findings indicated that neither project manager competency nor organizational project management maturity influenced project estimating accuracy scores. Chapter 5 will conclude this study by providing an interpretation of the research findings as well as providing conclusions derived from the analysis, highlights of the leadership and social implications of the findings, and recommendations for additional research.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter synthesizes the previous literature with the findings discovered in this study to present a new perspective for leaders with regard to the value and implications of organizational trust in the project estimating process.

Discussion of the Findings

The purpose of this study was to determine whether a correlation exists between organizational trust and the accuracy of project estimates. While the literature identified the importance of trust in interpersonal, leadership, and organizational settings, no research was discovered that specifically addresses the correlation between organizational trust and project management estimating accuracy. To investigate this potential correlation, research questions were composed to examine whether there is a statistically significant, positive relationship between measured levels of organizational trust and (a) the accuracy of estimated project costs, (b) the accuracy of estimated project schedule, (c) the accuracy of estimated project risk, and (d) the accuracy of the project team's overall estimating process. Research hypotheses aligned with these research questions. Each of those hypotheses predicted a positive relationship between organizational trust and project estimating.

The study surveyed project managers with a reliable and validated organizational trust instrument along with questions related to their personal and organizational demographics and the estimating performance of the projects they lead. The findings of this study supported the research hypotheses that a positive correlation between organizational trust and accurate project estimating of cost, schedule, risk, and overall

project estimating accuracy exists. The study demonstrated that the higher the level of organizational trust, the more accurate the project estimates. Similarly, the lower the level organizational trust, the less accurate the project estimates.

Research Question One and Hypotheses

The first question this study answered was whether there is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers. The hypotheses supporting this research question are as follows:

H_1: There is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_1: There is no statistically significant relationship between measured levels of organizational trust and the accuracy of estimated project costs as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

The research findings demonstrated that a statistically significant positive relationship does exist between organizational trust and an accurate project cost estimating process regardless of PMP certification or the level of organizational project management maturity. HO_1 was rejected. H_1 was supported.

Research Question Two and Hypotheses

The second research question this study answered was whether a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers. The hypotheses supporting this research question are as follows:

H_2: There is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_2: There is no statistically significant relationship between measured levels of organizational trust and the accuracy of estimated project schedule as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

The findings verified that a statistically significant positive relationship does exist between organizational trust and an accurate project schedule estimating process regardless of PMP certification or the level of organizational project management maturity. HO_2 was rejected. H_2 was supported.

Research Question Three and Hypotheses

The third research question this study answered was whether a statistically significant positive relationship between measured levels of organizational trust and the

accuracy of estimated project risk as reported by project managers. The hypotheses addressing this research question are:

H_3: There is a statistically significant positive relationship between measured levels of organizational trust and the accuracy of estimated project risk as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_3: There is no statistically significant relationship between measured levels of organizational trust and the accuracy of estimated project risk as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

The research found that a statistically significant positive relationship does exist between organizational trust and an accurate project risk estimating process regardless of PMP certification or the level of organizational project management maturity. HO_3 was rejected. H_3 was supported.

Research Question Four and Hypotheses

The final research question this study answered was whether a statistically significant positive relationship exists between measured levels of organizational trust and the overall accuracy of project estimating as reported by project managers. The hypotheses addressing this research question are:

H_4: There is a statistically significant positive relationship between the measured levels of organizational trust and the accuracy of the project team's overall estimating performance as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

HO_4: There is no statistically significant relationship between the measured levels of organizational trust and the accuracy of the project team's overall estimating performance as reported by project managers within stratified organizations of similar project management maturity levels and among project managers of similar competency.

The study found that a statistically significant positive relationship does exist between organizational trust and the overall project estimating process regardless of PMP certification or the level of organizational project management maturity. HO_4 was rejected. H_4 was supported.

Summary of Findings

The findings of this research show consistency with prior related literature with regard to the correlation between trust and organizational and leadership effectiveness. The benefit of increased levels of trust is apparent in organizational settings (Fukuyama, 1995; Lines et al., 2005). The literature supports the relationship between organizational and leadership trust and effective organizational processes (Burton, Lauridsen, & Obel, 2004; Martin, 2006) and leader-member exchanges (Beatty & Brew, 2004; Sherwood & DePaolo, 2005; Sparrowe & Liden, 2005; Weichun, May, & Avolio, 2004). The literature further supports the notion of trust as a critical component of an effective team dynamic

(Henttonen & Blomqvist, 2005; Lehtonen, 2004; Pauleen, 2003). As organizational trust increases, the accuracy and quantity of information provided increases (Droege, Anderson, & Bowler, 2003). Similarly, this research demonstrated that as organizational trust increases, the accuracy of project estimating increases.

Although less extensive than the trust literature, project estimating literature supports the fact that estimates can be influenced by several confounding factors. For example, although complicated project estimating algorithms such as Monte Carlo simulation hold the promise for accurate project estimating (Perrott, 2004), project estimates generally rely on less quantitative, mathematical processes such as the expert judgment of the estimator (Eden et al., 2005; Rothwell, 2005) and on the least reliable input of the project estimating process (Dekkers, 2005). Similar to those components of effective organizational functions, this research discovered that increased organizational trust has a tangible correlation with accurate project cost, schedule, and risk estimating accuracy.

This study found that organizational trust is related to an accurate project estimating methodology. Literature contradicting this discovery is limited as is literature that demonstrates a negative correlation between trust and effective interpersonal, team, leadership, or organizational effectiveness. In a qualitative study of teacher colleague interaction, Hargreaves (2002) noted that trust did not correlate with positive teacher relations. However, the lack of trust was a significant factor in negative interactions among that sample population. Similarly, little literature exists to argue against the impacts of trust on accurate project estimating. Contrary to the notion that organizational trust holds significant influence in the accuracy of project estimates, Trost and

Oberlender (2003) discovered that the top three antecedents to accurate project estimating were (a) basic process design, (b) team experience and cost information, and (c) time allowed to prepare for the cost estimate. One possible explanation for these differences is that organizational trust was not a significant construct examined as a correlating factor in their research.

While the study controlled for the potentially confounding variables of project manager competency and organizational project management maturity, other demographic factors may influence the project-estimating construct. This study collected demographic data for additional analysis. The sample population consisted of an evenly distributed demographic of age and gender. The sample population had a high level of education with 90.1% of the respondents possessing a 4-year college degree or higher. Over 50% of the respondents had a master's degree or higher. The findings indicate that there were no significant correlations between age, gender, education, and years of service in the firm and organizational trust. Rotter (1971) investigated research exploring the impact of demographics on trust levels and found few significant correlations. Likewise, there were no significant correlations between age, education, and years of service in the organization and project estimating accuracy. There was, however, a significant correlation between gender and project estimating accuracy as male respondents reporting higher levels of project estimating accuracy.

The researcher assumed that project manager competency might influence project estimating accuracy. As such, the study was designed to offer the opportunity to stratify responses by PMP certification. The survey asked respondents to self-identify whether they held an active PMP certification. The sample population consisted of 68.1% of the

respondents holding an active PMP certification. The research data indicated no significant correlation between PMP certification and project cost schedule, risk, overall, and aggregated estimating accuracy. However, among those respondents that possess the PMP certification, the study data demonstrated a significant correlation between organizational trust and project schedule, risk, overall, and aggregate estimating accuracy. Among those respondents that did not possess the PMP certification, the study data demonstrated a significant correlation between organizational trust and project risk, and aggregate project estimating accuracy.

The sample size (29) of non-PMP respondents may have contributed to the apparent lack of a statistically significant correlation among the other estimating accuracy subsample categories. However, all of the subsample correlations between both PMP and non-PMP data were in the positive direction. Overall, there was no statistically significant correlation between PMP certification and project estimating accuracy. PMP certification was not a confounding variable within this study.

Comparably, the researcher anticipated that organizational project management maturity would have an influence on the accuracy of project estimating. The researcher expected that increased levels of organizational project management maturity would result in increased project estimating accuracy. The survey asked respondents to self-identify the maturity level of their organization's project management process. Results of that self-reported data aligned to a general indication of the organization's project management maturity level (Andersen & Jessen, 2003). The sample population was evenly distributed among organizational project management maturity with 30.8% at the project management level, 36.3% at the program management level, and 33.0% at the

portfolio management level. Those respondents indicating that their organizational project management maturity was at the lowest scale (the project management level) reported a statistically significant correlation between organizational trust and accurate risk estimating, overall project estimating accuracy, and aggregate estimating accuracy. Those respondents indicating that their organization was at the medium level of organizational project management maturity (program management level) had a statistically significant correlation between organizational trust and cost estimating accuracy, schedule estimating accuracy, overall project estimating accuracy, and aggregate project estimating. Those respondents indicating that their organization was at the highest level of organizational project management maturity (portfolio management level) had a statistically significant correlation between organizational trust and risk estimating and aggregate project estimating.

The organizational project management maturity subsample sizes ranged from 28 to 33. Those subsample sizes may have contributed to the failure to demonstrate a statistically significant correlation among the other estimating accuracy categories. However, all of the subsample correlations between organizational project management maturity and project estimating accuracy were in the positive direction. Overall, there was no statistically significant correlation between organizational project management maturity and an accurate project estimating methodology. Organizational project management maturity was not a confounding variable within this study.

This research study adds to the scholarly body of knowledge by drawing a correlation between organizational trust and accurate project estimating. The research underscores the importance of organizational trust in relation to organizational activities.

The importance of project estimating has been discussed previously. Although Trost and Oberlender (2003) identified alternate antecedents of an accurate project estimating methodology, those researchers did not investigate the specific organizational trust construct. This research supports the hypotheses that increased organizational trust is related to more accurate project estimating performance and, conversely, decreased organizational trust correlates with reduced project estimating accuracy.

Conclusions

The results of this research demonstrate that trust is significant in the organizational setting in general and in the project estimating process in specific. Scholars, researchers, leadership policy makers, and project manager practitioners have the opportunity to leverage this research toward future examination, policy development, and practical applications of the implications of the study constructs. Trust has a direct relationship to accurate project estimating. Project estimating accuracy has a direct implication on the organizational portfolio management process. Moreover, that process has a direct influence on organizational effectiveness. The leadership implications are clear--trust is an important component of the organizational bottom-line.

Leaders often resist addressing people management issues, failing to realize the importance of managing relationships and understanding the consequences of their actions. This research adds to the scholarly and practical body of knowledge demonstrating that ethical, honest, transformational leadership has tangible benefits to an organization. Leadership policy makers have the opportunity to use the findings of this research to direct specific attention toward the development and maintenance of organizational trust within their firms and among their organizational leadership unit.

Accurate project estimates are a critically important component of portfolio management process. Leaders can point to this research to demonstrate the ramifications of organizational trust on project estimating accuracy and the subsequent influence on an effective portfolio management practice. That correlation provides justification for taking action toward improving organization trust, perhaps by implementing trust training and development actions for the leadership team. Organizations are further recommended to measure organizational trust periodically in order to gauge the effectiveness of organizational trust improvement initiatives and to measure post hoc results of trust improvement actions.

Project management practitioners have the opportunity to use the results of this research in their daily activities. Project managers now have quantitative data that demonstrates the correlation between organizational trust and project estimating accuracy. As project managers find themselves in organizational settings with lower trust levels, they can be alert to the fact that their project estimates may be inaccurate. As such, additional compensatory actions may be warranted. Furthermore, project managers now have the knowledge that organizational trust building initiatives, at the project team level, are beneficial leadership exercises with direct consequences to their project management role and to project effectiveness. Finally, project managers have the opportunity to use the findings of this research to inform the organizational leaders of the potential consequences of degraded organizational trust in the project setting. The project managers have the quantitative data that supports influencing change in organizational trust levels from the bottom up.

Recommendations

This study examined research questions related to the relationship between levels of organizational trust and the self-reported accuracy of (a) estimated project costs, (b) estimated project schedules, (c) estimated project risks, and (d) the project team's overall estimating process. Rather than relying on project manager self-reports of estimating performance, future research could explore the correlation between organizational trust and specific, quantitative cost/schedule variance through examination of organizational earned value analysis data. Since accurate earned value compilation is a relatively rare practice in the project management community, a case study would be an appropriate future research methodology. That research strategy would result in an in-depth examination of a firm with accurate and precise project cost and schedule variance data to compare against quantitative organizational trust data. Similarly, future research questions aligned with an experiential, quantitative study could reveal changes in organizational trust levels and estimating accuracy before and after a treatment is administered. This strategy could add to the understanding of causation with regard to organizational trust manipulation and its influence on project estimating accuracy.

This research study was delimited to a convenience sample of project managers attending specific chapter meetings of the PMI. Future researchers could broaden the reach of the study and expand the sample population to examine geographic cross-sections of the project management community. Moreover, this study was delimited to project managers. Future research could benefit from investigating responses of project team members as well. The findings of this research study unexpectedly indicated that male respondents enjoyed significantly higher estimating accuracy than did female

respondents in all project estimating accuracy categories. Further research on this discovery is appropriate as well.

The nature of the responses to the quantitative instrument may have restricted survey responses and, hence, limited the breadth of research findings. Future research employing a qualitative study may reveal additional corollary factors of accurate project estimating methodologies. An ethnographic case study or a mixed-methods research design could be an appropriate strategy for future research.

Summary

Within the organizational setting, trust is crucial. The literature demonstrates that trust holds significant implications for organizational and leadership effectiveness. Teams and individuals function more effectively in an atmosphere of trust. Likewise, an effective and accurate project management process is an important component of leading an organization. An accurate project estimating process is a key component of an effective project management methodology.

This research explored the relationship between organizational trust and the accuracy of organizational project management estimating processes. This study reviewed the historical theories of organizational trust and the literature related to the practice of project estimating. Within that structure, organizational trust as an antecedent to an accurate project management estimating methodology was demonstrated.

REFERENCES

Andersen, E. S., & Jessen, S. A. (2003). Project maturity in organizations. *International Journal of Project Management, 21*, 457-461.

Antoncic, B. (2001). Organizational processes in intrapreneurship: A conceptual integration. *Journal of Enterprising Culture, 9*(2), 221-236.

Artto, K. A., Dietrich, P. H., & Nurminen, M. I. (2004). Strategy implementations by projects. In D. P. Slevin, D. I. Cleland & J. K. Pinto (Eds.), *Innovations. Project management research 2004* (pp. 103-122). Newtown Square, PA: Project Management Institute.

Beatty, B. R., & Brew, C. R. (2004). Trusting relationships and emotional epistemologies: A foundational leadership issue. *School Leadership & Management, 24*(3), 329-356.

Bent, J. A. (2001). Evaluating and calculating contingency. *AACE International Transactions, Risk.02*.

Berg, P., Kalleberg, A. L., & Appelbaum, E. (2003). Balancing work and family: The role of high-commitment environments. *Industrial Relations, 42*(2), 168-188.

Besner, C., & Hobbs, B. (2004). An empirical investigation of project management practice: In reality, which tools do practitioners use? In D. P. Slevin, D. I. Cleland & J. K. Pinto (Eds.), *Innovations. Project management research 2004* (pp. 337-352). Newton Square, PA: Project Management Institute.

Bijlsma, K. M., & van de Bunt, G. G. (2003). Antecedents of trust in managers: A "Bottom up" Approach. *Personnel Review, 32*(5), 638-664.

Blunsdon, B., & Reed, K. (2003). The effects of technical and social conditions on workplace trust. *International Journal of Human Resource Management, 14*(1), 12-27.

Brown, H., Poole, M. S., & Rodgers, T. (2004). Interpersonal traits, complementarily, and trust in virtual collaboration. *Journal of Management Information Systems, 20*(4), 115-137.

Burton, R. M., Lauridsen, J., & Obel, B. (2004). The impact of organizational climate and strategic fit on firm performance. *Human Resource Management, 43*(1), 67-82.

Carbone, T. A., & Gholston, S. (2004). Project manager skill development: A survey of programs and practitioners. *Engineering Management Journal, 16*(3), 10-16.

Charnitski, C. W. (2002). *Gauging the readiness of an institution of higher education to implement change in its distance education program in ways that are consistent with the paradigm of organizational agility.* Unpublished manuscript, Philadelphia.

Construction Industry Institute. (1993). *Cost-trust relationship*. U.S.A.: Construction Industry Institute.

Cook, J., & Wall, T. (1980). New work attitude measures of trust, organizational commitment and personal need non-fulfillment. *Journal of Occupational Psychology, 53*(1), 39-52.

Cooke-Davies, T. J., & Arzymanow, A. (2003). The maturity of project management in different industries: An investigation into various management models. *International Journal of Project Management, 21*, 471-478.

Cooper, D. G., & Schindler, P. S. (2003). *Business research methods* (8th ed.). Boston: McGraw-Hill Irwin.

Cooper, R. G., Edgett, S. J., & Kleinschmidt, E. J. (2002). Optimizing the stage-gate process: What best-practice companies do. *Research Technology Management, 45*(6), 43-49.

Creed, W. E. D., & Miles, R. E. (1996). Trust in organizations. A conceptual framework linking organizational forms, managerial philosophies, and the opportunity costs of controls. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations. Frontiers of the theory and research* (pp. 16-38). Thousand Oaks, CA: SAGE.

Creswell, J. W. (2004). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd ed.). Upper Saddle, NJ: Prentice Hall.

Culbert, S. A., & Schroeder, S. J. (2003). Getting hierarchy to work. In S. Chowdhury (Ed.), *Organization 21C*. Upper Saddle River, NJ: Prentice Hall.

Cummings, L. L., & Bromiley, P. (1996). Organizational trust inventory (OTI). Development and validation. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations. Frontiers of theory and research* (pp. 302-330). Thousand Oaks, CA: SAGE.

Dekkers, C. A. (2005). Creating requirements-based estimates before requirements are complete. *Journal of the Quality Assurance Institute, 19*(4), 10-13.

DeMarco, A. A. (2005). Six steps to project success. *Cost Engineering, 47*(9), 12-14.

Deutsch, M. (1958). Trust and suspicion. *Journal of Conflict Resolution, 2*, 265-279.

Dirks, K., & Ferrin, D. (2001). The role of trust in organizational settings. *Organization Science, 12*(4), 450-467.

Driscoll, J. (1978). Trust and participation in organizational decision making as predictors of satisfaction. *Academy of Management Journal, 21*(1), 44-56.

Droege, S. B., Anderson, J. R., & Bowler, M. (2003). Trust and organizational information flow. *Journal of Business & Management, 9*(1), 45-59.

Drucker, P. F. (2005). Managing oneself. *Harvard Business Review, 83*(1), 100-109.

Dysert, L. R., & Pickett, T. W. (2005). So you think you're an estimator? *Cost Engineering, 47*(9), 30-35.

Eden, C., Ackermann, F., & Williams, T. (2005). The amoebic growth of project costs. *Project Management Journal, 36*(2), 15-27.

Ferres, N., & Travaglione, T. (2003). *The development and validation of the workplace trust survey (WTS): Combining qualitative and quantitative methodologies.* Paper presented at the Asia-Pacific Researchers in Organization Studies (APROS), Mexico 2003, Oaxaca, Mexico.

Flyvbjerg, B., Holm, M., & Buhl, S. (2002). Underestimating costs in public works projects: Error or lie? *Journal of the American Planning Association, 68*(3), 279-291.

Fukuyama, F. (1995). *Trust. The social virtues and the creation of prosperity*. New York: The Free Press.

Gamson, W. (1968). *Power and discontent*. Homewood, IL: Dorsey.

Gillard, S., & Price, J. (2005). The competencies of effective project managers: A conceptual analysis. *International Journal of Management, 22*(1), 48-53.

Hamilton, A. C., & Westney, R. E. (2002). Cost estimating best practices. *2002 AACE International Transactions, EST.02*(1-5).

Hargreaves, A. (2002). Teaching and betrayal. *Teachers & Teaching, 8*(3/4), 393-407.

Hartman, F. T. (2002). The role of trust in project management. In D. P. Slevin, D. I. Cleland & J. K. Pinto (Eds.), *The frontiers of project management research* (pp. 225-236). Newton Square, PA: Project Management Institute.

Hattori, R. A., & Lapidus, T. (2004). Collaboration, trust and innovative change. *Journal of Change Management, 4*(2), 97--104.

Hebert, B. (2002). Tracking progress. *CMA Management, 75*(10), 24-27.

Henttonen, K., & Blomqvist, K. (2005). Managing distance in a global virtual team: The evolution of trust through technology-mediated relational communication. *Strategic Change, 14*(2), 107-119.

Herzog, V. (2001). Trust building on corporate collaborative project teams. *Project Management Journal, 32*(1), 28-35.

Hillson, D. (2003). Assessing organisational project management capability. *Journal of Facilities Management, 2*(3), 298-311.

Hodgson, D. (2002). Disciplining the profession: The case of project management. *Journal of Management Studies, 39*(6), 803-821.

Hodson, R. (2004). Organizational trustworthiness: Findings from the population of organizational ethnographies. *Organization Science: A Journal of the Institute of Management Sciences, 15*(4), 432-445.

Ibbs, C. (2001). Assessing project management maturity. *Project Management Journal, 31*(1), 32-43.

Jarvenpaa, S. L., Shaw, T. R., & Staples, D. S. (2004). Toward contextualized theories of trust: The role of trust in global virtual teams. *Information Systems Research, 15*(3), 250-267.

Kahn, R. (1964). Role conflict and ambiguity in organizations. *The Personal Administrator, 9*, 8-13.

Karlsen, J. T., & Lereim, J. (2005). Management of project contingency and allowance. *Cost Engineering, 47*(9), 24-29.

Keisler, J. (2004). Value of information in portfolio decision analysis. *Decision Analysis, 1*(3), 177-189.

Kendra, K. A., & Taplin, L. J. (2004). Change agent competencies for information technology project managers. *Consulting Psychology Journal: Practice & Research, 56*(1), 20-34.

Kerzner, H. (2003). *Project management: A systems approach to planning, scheduling, and controlling* (8th ed.). Hoboken, NJ: John Wiley & Sons.

Kinsella, S. M. (2002). Activity-based costing: Does it warrant inclusion in a guide to the *Project Management Body of Knowledge (PMBOK guide)*? *Project Management Journal, 33*(2), 49-56.

Kouzes, J. M., & Posner, B. Z. (2002). *The leadership challenge* (3rd ed.). San Francisco: Jossey-Bass.

Krishnan, V. (2001). Value systems of transformational leaders. *Leadership & Organization Development Journal, 22*(3), 126-132.

Langfred, C. W. (2004). Too much of a good thing? Negative effects of high trust and individual autonomy in self-managing teams. *Academy of Management Journal, 47*(3), 385-399.

Leedy, P. D., & Ormond, J. E. (2004). *Practical research: Planning and design* (8th ed.). Columbus, OH: Prentice Hall.

Lehtonen, T. (2004). Attributes and success factors of partnering relations – a theoretical framework for facility services. *Nordic Journal of Surveying and Real Estate Research, 2*, 31-46.

Leslie, C. R. (2004). Trust, distrust, and antitrust. *Texas Law Review, 82*(3), 515-680.

Lewicki, R., McAllister, D., & Bies, R. (1998). Trust and distrust: New relationships and realities. *Academy of Management Review, 23*(3), 438-458.

Lind, D. A., Marchal, W. G., & Mason, R. D. (2002). *Statistical techniques in business & economics* (11th ed.). Boston: McGraw-Hill Irwin.

Lines, R., Selart, M., Espedal, B., & Johansen, S. (2005). The production of trust during organizational change. *Journal of Change Management, 5*(2), 221-245.

Ludwick, P. F. (2004). The second sermon on synergy: Creating trust loops. *Journal of Housing & Community Development, 61*(2), 30-35.

Martin, K. (2006). The trust factor. *Industrial Engineer: IE, 38*(3), 30-35.

Mayer, R., Davis, J., & Shoorman, F. (1995). An integrative model of trust. *Academy of Management Review, 20*(3), 709-734.

Mayfield, J., & Mayfield, M. (2002). Leader communication strategies critical paths to improving employee commitment. *American Business Review, 20*(2), 89-94.

McAllister, D. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal, 38*(1), 24-59.

McCray, G. E., Purvis, R. L., & McCray, C. G. (2002). Project management under uncertainty: The impact of heuristics and biases. *Project Management Journal, 33*(1), 49-57.

McCune, J. C. (1998). That elusive thing called trust. *Management Review, 87*(7), 10-15.

McKnight, D. H., Cummings, L. L., & Chervany, N. L. (1998). Initial trust formation in new organizational relationships. *Academy of Management Review, 23*(3), 473-490.

Meredith, J. R., & Mantel Jr., S. J. (2005). *Project management. A managerial approach* (6th ed.). New York: John Wiley & Sons.

Mertens, D. M. (2005). *Research and evaluation in education and psychology. Integrating diversity with quantitative, qualitative, and mixed methods* (2 ed.). Thousand Oaks, CA: SAGE.

METRIC. (2005). Measurement excellence and training resource information center. Critical review of organizational trust inventory (OTI). Retrieved October 30, 2005, from http://www.measurementexperts.org

Mishra, J., & Morrissey, M. (1990). Trust in employee / employer relationships: A survey of West Michigan managers. *Public Personnel Management, 19*(4), 443-463.

Mollering, G., Bachmann, R., & Lee, S. H. (2004). Understanding organizational trust--foundations, constellations, and issues of operationalization. *Journal of Managerial Psychology, 19*(6), 556-570.

Morris, P. W. G., & Jamieson, H. A. (2004). Moving from corporate strategy to project strategy: Leadership in project management. In D. P. Slevin, D. I. Cleland & J. K. Pinto (Eds.), *Innovations. Project management research 2004* (pp. 123-140). Newton Square, PA: Project Management Institute.

Morrison, J., & Brown, C. (2004). Project management effectiveness as a construct: A conceptual study. *South African Journal of Business Management, 35*(4), 73-94.

Morrow Jr., J. L., Hansen, M. H., & Pearson, A. W. (2004). The cognitive and affective antecedents of general trust within cooperative organizations. *Journal of Managerial Issues, 16*(1), 48-64.

Nemati, H., Todd, D., & Brown, P. (2002). A hybrid intelligent system to facilitate information system project management activities. *Project Management Journal, 33*(3), 42-52.

Pauleen, D. J. (2003). An inductively derived model of leader-initiated relationship building with virtual team members. *Journal of Management Information Systems, 20*(3), 227-256.

Pennypacker, J., & Grant, K. (2003). Project management maturity: An industry benchmark. *Project Management Journal, 34*(1), 4-11.

Perrott, M. W. (2004). The cost estimator's dilemma. *AACE International Transactions*, 1-9.

Perry, R. W., & Mankin, L. D. (2004). Understanding employee trust in management: Conceptual clarification and correlates. *Public Personnel Management, 33*(3), 277-290.

Piccoli, G., & Ives, B. (2003). Trust and the unintended effects of behavior control in virtual teams. *MIS Quarterly*, *27*(3), 365-395.

PMI. (2003). *Organizational project management maturity model (OPM3) knowledge foundation*. Newton Square, PA: Project Management Institute.

PMI. (2004). *A guide to the project management body of knowledge PMBOK guide* (3rd. ed.). Newton Square, PA: Project Management Institute.

PMI. (2005). Project management institute. Retrieved February 13, 2005, from www.pmi.org

PMI. (2006). Project management institute. Retrieved August 6, 2006, from www.pmi.org

Podsakoff, P., MacKenzie, S., & Boomer, W. (1996). Transformational leader behaviors and substitutes for leadership as determinants of employee satisfaction, commitment, trust, and organizational citizenship behaviors. *Journal of Management, 22*(2), 259298.

Purvis, R., McCray, G., & Roberts, T. (2004). Heuristics and biases in information systems project management. *Engineering Management Journal, 16*(2), 19-27.

Read, W. H. (1962). Upward communication in industrial hierarchies. *Human Relations, 15*(1), 3-15.

Ripley, P. W. (2004). Contingency! Who owns and manages it? *AACE International Transactions, CSC.08* 1-4.

Roberts, K., & O'Reilly, C. (1974). Measuring organizational communication. *Journal of Applied Psychology, 59*(3), 231-236.

Roberts, T. L., Sweeney, P. D., McFarlin, D., & Cheney, P. H. (2004). *Assessing trust among is personnel: A view of general trust, trust of management and inter-organizational trust.* Paper presented at the 37th Hawaii International Conference on System Sciences, Big Island, HI.

Rothwell, G. (2005). Cost contingency as the standard deviation of the cost estimate. *Cost Engineering, 47*(7), 22-25.

Rotter, J. (1971). Generalized expectancies for interpersonal trust. *American Psychologist, 26,* 443-452.

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review, 23*(3), 393-404.

Sawyer, R. (1994). *The art of war by Sun-Tzu. Translated, with introductions and commentary by Ralph D. Sawyer*. New York: MetroBooks.

Scott, W. R. (2003). *Organizations. Rational, natural, and open systems* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Serpell, A. F. (2004). Towards a knowledge-based assessment of conceptual estimates. *Building Research & Information, 32*(2), 157-164.

Shenhar, A. J., & Dvir, D. (2004). Project management evolution: Past history and future research directions. In D. P. Slevin, D. I. Cleland & J. K. Pinto (Eds.), *Innovations. Project management research 2004* (pp. 57-64). Newton Square, PA: Project Management Institute.

Sheppard, B., & Sherman, D. (1998). The grammars of trust: A model and general implications. *Academy of Management Review, 23*(3), 422-437.

Sherwood, A. L., & DePaolo, C. A. (2005). Task and relationship-oriented trust in leaders. *Journal of Leadership & Organizational Studies, 12*(2), 65-81.

Shockley-Zalabak, P., Ellis, K., & Winograd, G. (2000). Organizational trust: What it means, why it matters. *Organizational Development Journal, 18*(4), 35-48.

Sitkin, S., & Pablo, A. (1992). Reconceptualizing the determinants of risk behavior. *Academy of Management Review, 17*(1), 9-38.

Skulmoski, G. (2001). Project maturity and competence interface. *Cost Engineering, 43*(6), 11-18.

Smith, A. D. (2003). Surveying practicing project managers on curricular aspects of project management programs: A resource-based approach. *Project Management Journal, 34*(2), 26-33.

Snow, A., & Keil, M. (2002). The challenge of accurate software project status reporting: A two-stage model incorporating status errors and reporting bias. *IEEE Transactions on Engineering Management, 49*(4), 491-504.

Sparrowe, R. T., & Liden, R. C. (2005). Two routes to influence: Integrating leader-member exchange and social network perspectives. *Administrative Science Quarterly, 50*(4), 505-535.

Srivannaboon, S., & Milosevic, D. Z. (2004). The process of translating business strategy into project management actions. In D. P. Slevin, D. I. Cleland & J. K. Pinto (Eds.), *Innovations: Project management research 2004* (pp. 175-194). Newton Square, PA: Project Management Institute.

Sydow, J. R., & Windeler, A. (2003). Knowledge, trust, and control. *International Studies of Management & Organization, 33*(2), 69-99.

Toney, F. (2003). *Ethical leadership: Its biblical basis*. Unpublished manuscript, Scottsdale, AZ.

Trost, S. M., & Oberlender, G. D. (2003). Predicting accuracy of early cost estimates using factor analysis and multivariate regression. *Journal of Construction Engineering & Management, 129*(2), 198.

Tucker, B. A., & Russell, R. F. (2004). The influence of the transformational leader. *Journal of Leadership & Organizational Studies, 10*(4), 103-111.

United States Department of Labor. (2006). *Occupational employment statistics.* Retrieved August 6, 2006, from http://data.bls.gov

Wang, X. (2001). Dimensions and current status of project management culture. *Project Management Journal, 32*(4), 4-17.

Weichun, Z., May, D. R., & Avolio, B. J. (2004). The impact of ethical leadership behavior on employee outcomes: The roles of psychological empowerment and authenticity. *Journal of Leadership & Organizational Studies, 11*(1), 16-26.

Whitener, E., Brodt, S., Korsgaard, M., & Werner, J. (1998). Managers as initiators of trust: An exchange relationship framework for understanding managerial trustworthy behavior. *Academy of Management Review, 23*(3), 513-530.

Whiteside, J. D. (2003a). Cost model performance. *Transactions of AACE International, EST.11*, 1-11.

Whiteside II, J. D. (2003b). Estimate peer review. *2003 AACE International Transactions, EST.05*, 1-10.

Willemyns, M., Gallois, C., & Callan, V. J. (2003). Trust me, I'm your boss: Trust and power in supervisor-supervisee communication. *International Journal of Human Resource Management, 14*(1), 117-126.

Williams, M. (2001). In whom we trust: Group membership as an affective context for trust development. *Academy of Management Review, 26*(3), 377-396.

Wren, D. (1994). *The evolution of management thought.* (4 ed.). New York: John Wiley & Sons.

APPENDIX A

Survey Instrument

Survey Form

Thank you for your participation in this survey. Please provide the following brief background information and then complete the sixteen questions on page 2.

1. What is your age?

- ☐ 21 – 30 years
- ☐ 31 – 40 years
- ☐ 41 – 50 years
- ☐ 51 – 60 years
- ☐ 61 years of older

2. What is your gender?

- ☐ Male
- ☐ Female

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

- ☐ High school degree or equivalent
- ☐ Some college
- ☐ 2 year college degree
- ☐ 4 year college degree
- ☐ Masters degree
- ☐ Doctoral degree

4. How long have you worked for your current organization?

- ☐ Not currently employed
- ☐ Less than one year
- ☐ 1 year to less than 3 years
- ☐ 3 years to less than 5 years
- ☐ 5 years to less than 10 years
- ☐ 10 years to less than 15 years
- ☐ 15 years or more

5. Do you possess an active Project Management Professional (PMP) certification issued from the Project Management Institute (PMI)?

- ☐ Yes
- ☐ No

6. How would you best categorize your organization's project management process?

- ☐ Management of individual project goals is the primary focus
- ☐ Management of all the projects under the umbrella of programs is the primary focus
- ☐ Management of projects and programs do not always share common objectives and the managerial approach includes a balanced view on how to distribute scarce resources between those competing desires

In your role as a Project Manager, please choose the unit or department which you can most knowledgeably report the opinions of members of your department or unit.

Please circle the number to the right of each statement that most closely describes the opinion of members of your department or unit toward the leadership unit.

Question	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
1. We think the people in the leadership unit tell the truth.	1	2	3	4	5	6	7
2. We think that the leadership unit meets its negotiated obligations to our department.	1	2	3	4	5	6	7
3. In our opinion, the leadership unit is reliable	1	2	3	4	5	6	7
4. We think that the people in the leadership unit succeed by stepping on other people.	1	2	3	4	5	6	7
5. We feel that the leadership unit tried to get the upper hand.	1	2	3	4	5	6	7
6. We think that the leadership unit takes advantage of our problems.	1	2	3	4	5	6	7
7. We feel that the leadership unit negotiates with us honestly.	1	2	3	4	5	6	7
8. We feel that the leadership unit will keep its word.	1	2	3	4	5	6	7
9. We think the leadership unit does not mislead us.	1	2	3	4	5	6	7
10. We feel that the leadership unit tries to get out of its commitments.	1	2	3	4	5	6	7
11. We feel that the leadership unit negotiates joint expectations fairly.	1	2	3	4	5	6	7
12. We feel that the leadership unit takes advantage of people who are vulnerable.	1	2	3	4	5	6	7

Question	Poor	Below Average	Slightly Below Average	Average	Slightly Above Average	Above Average	Excellent
13. Within projects you manage, compared to average industry practice, the level of accuracy between estimated project costs versus actual costs is:	1	2	3	4	5	6	7
14. Within projects you manage, compared to average industry practice, the level of accuracy between the estimated project schedule versus the actual schedule is:	1	2	3	4	5	6	7
15. Within projects you manage, compared to average industry practice, the level of accuracy between the estimated project risks versus the actual risks encountered is:	1	2	3	4	5	6	7
16. Within projects you manage, compared to average industry practice, the level of accuracy of the project's overall estimating process is:	1	2	3	4	5	6	7

APPENDIX B

Informed Consent Form

Dear Participant,

I am a student at the University of Phoenix working on a Doctor of Business Administration degree. I have been granted permission by the PMI Mile-Hi Chapter President to conduct a research study on the correlation of organizational trust and the accuracy of the project estimating process among members of the Mile-Hi Chapter.

Your participation will involve completing a brief survey regarding your project management experiences. The survey should take no longer than 15 minutes to complete. Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, you can do so without penalty or loss of benefit to yourself. The results of the research study may be published, but your name will not be used and your results will be maintained in confidence.

In this research, there are no foreseeable risks to you**.**

Although there may be no direct benefit to you, the possible benefit of your participation is your contribution to the practical and scholarly body of knowledge as it relates to the field of project management.

If you have any questions concerning the research study, please call me at [redacted]

By returning the completed survey questionnaire, your consent to participate in this study will be assumed.

Sincerely,

James M. Wood, PMP

APPENDIX C

Permission to Use Premises

UNIVERSITY OF PHOENIX

INFORMED CONSENT: PERMISSION TO USE PREMISES

Project Management Institute Mile-Hi Chapter

I hereby authorize James M. Wood, PMP, a student of the University of Phoenix, to use the facilities requested to conduct a study entitled Organizational Trust as an Antecedent of an Accurate Project Estimating Methodology.

_____//Bob Kois//_____ _____April 9, 2006_____

Signature

___PMI Mile-Hi Chapter President____

Title

PMI Mile-Hi Chapter Meeting Rooms

Name of Facility

APPENDIX D

Permission to Use OTI–SF

UNIVERSITY OF PHOENIX

PERMISSION FOR USING AN EXISTING SURVEY

November 30, 2005

James M. Wood
[redacted]

Thank you for your request for permission to use the Organizational Trust Inventory-Short Form in your dissertation. We are willing to allow you to reproduce the instrument as outlined in your letter at no charge with following understanding.

- You will use this survey only for your dissertation and will not sell or use it with any compensated management/curriculum development activities.
- You will include the copyright statement on all copies of the instrument.
- You appropriately cite the source of the instrument.
- You send us an electronic copy of the instrument and the data when you're done so we can develop norms.
- You send us a copy of papers using the OTI.

If these are acceptable terms and conditions, please indicate so by signing one copy of this letter and returning it to us.

Best wishes with your project.

Sincerely,

Signature

I understand these conditions and agree to abide by these terms and conditions.

Signed____// Dr. Phil Bromiley //_____ **Date**_____10/06/2005_____

Expected date of completion _____May 15, 2006_____

APPENDIX E

Informal Permission to Use Organizational Trust Inventory – Short Form

The following email correspondence provided the researcher with initial, informal permission to utilize the Organizational Trust Inventory – Short Form:

Sorry I did not get back to you sooner. I've attached a copy of the paper on the OTI.

We give permission for research use of the OTI with no charge but subject to the following conditions: (i) that you appropriately cite the source of the instrument, (ii) that you send us an electronic copy of the instrument and the data when you're done so we can develop norms, and (iii) that you send us a copy of papers using the OTI.

We charge a small fee for consulting uses.

Phil

From: JAMES WOOD [redacted]
Sent: Wednesday, October 05, 2005 6:21 AM
To: pbromiley@[redacted]
Subject: Re: Organizational Trust Inventory

Hello Dr. Bromiley,

I am following up on my message below.

I would like to obtain your Organizational Trust Inventory instrument for potential use in my doctoral dissertation. I have reviewed your work in R.M. Kramer's *Trust in Organizations* book and I am convinced that your instrument is appropriate for my research.

Please inform me of the process to acquire your OTI instrument materials.

Thank you in advance Dr. Bromiley.

Respectfully,

James M. Wood
Doctoral Student
University of Phoenix

----- Original Message -----
From: James Wood
To: pbromiley@[redacted]
Sent: Monday, September 05, 2005 12:13 PM
Subject: Organizational Trust Inventory

Dear Dr. Bromiley,

I am a third year doctoral student working on a dissertation related to the construct of organizational trust within the context of project management.

In investigating an appropriate, validated instrument to measure organizational trust, I have, of course, discovered your Organizational Trust Inventory. I am hopeful that your instrument will fit my research needs.

As such, I would like to review the most recent version of your OTI long and short-form instrument. Would you be willing to provide me with a review copy of these instruments for that purpose?

Thank you in advance for your help and for your time Dr. Bromiley.

Respectfully,

James M. Wood
Doctoral Student
University of Phoenix

APPENDIX F

OTI–SF

Organizational Trust Inventory—Short Form (OTI-SF)

Please choose the unit or department about which you can most knowledgeably report the opinions of members of your department or unit.

1. *Your* department or unit is _____. (enter name of department/unit)
2. The *other* department or unit about which you are responding is _____. (enter name of department/unit)

Please circle the number to the right of each statement that most closely describes the opinion of members of your department toward the other department. Interpret the blank spaces as referring to the other department about which you are commenting.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

1. We think the people in _____ tell the truth in negotiations.	1	2	3	4	5	6	7
2. We think that _____ meets its negotiated obligations to our department.	1	2	3	4	5	6	7
3. In our opinion, _____ is reliable.	1	2	3	4	5	6	7
4. We think that the people in _____ succeed by stepping on other people.	1	2	3	4	5	6	7
5. We feel that _____ tries to get the upper hand.	1	2	3	4	5	6	7
6. We think that _____ takes advantage of our problems.	1	2	3	4	5	6	7

7. We feel that _____ negotiates with us honestly.	1	2	3	4	5	6	7
8. We feel that _____ will keep its word.	1	2	3	4	5	6	7
9. We think _____ does not mislead us.	1	2	3	4	5	6	7
10. We feel that _____ tries to get out of its commitments.	1	2	3	4	5	6	7
11. We feel that _____ negotiates joint expectations fairly.	1	2	3	4	5	6	7
12. We feel that _____ takes advantage of people who are vulnerable.	1	2	3	4	5	6	7