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A Social Capital Perspective on Projects: Measuring the Unobservable Using Structural Equation Modeling

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Abstract

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MBA, Vanderbilt University, 1995

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Dissertation Submitted in Partial Fulfillment

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Applied Management and Decision Sciences

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Abstract

Project leadership requires a diverse blend of technical and behavioral skills. Researchers have focused on the technical aspects of project management, leaving a void in understanding the behavioral skills of project leadership. The purpose of this correlational study was to gain insights into the behavioral aspects of projects by understanding the social capital and knowledge integration abilities of project leaders. Nahapiet and Ghoshal's social capital definition and its structural, relational, and cognitive attributes form the basis for the social capital theory constructs used in this study. The focus of the research questions was on the relationship of social capital to knowledge integration and project success. A self-designed survey ($\alpha = .925$) was used to measure the latent variables of a project leader's social capital and knowledge integration abilities on the observed variable of project success. Survey research, conducted using a sample of project management professionals ($N = 108$), elicited project members' perceptions on the behavioral aspects of project leaders. Structural equation modeling validated that knowledge integration assists in achieving project success and that 2 types of social capital, structural and relational, have a significant influence on knowledge integration. Structural social capital has a positive effect, and relational social capital has a negative effect. The findings indicated that project management professionals need not only technical skills, but also behavioral skills. Having project leaders with the right blend of competencies will improve project success rates, affecting social change by enabling organizations to achieve greater economic benefits from better understanding the behavioral aspects of project teams.

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Dedication

I dedicate the final outcome of this doctoral journey to the two men in my life who were with me every step of the way. Don’t ever give up, because I never did!

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Chapter 1: Introduction

Individuals interact with other people in society and rely on others to accomplish things. This can be as simple as asking a spouse to pick up a gallon of milk on the way home from work, asking a co-worker how to access the report on a system they are familiar with, or anticipating that a teammate will pass the hockey puck down the ice to a player who has an open shot to the net. All of these examples involve interaction with others to benefit an individual or a group of people. Very rarely do people live in seclusion like hermits to avoid social connections with others. The word hermit evokes a mental picture of an uncivilized, emotionally unstable, unsocialized individual; someone socially inept at interacting with others. Such a person may have difficulty existing in society because of the need for interdependency with others to provide personal and societal benefits. Human beings need others to get things done, learn things, give and receive support in various endeavors, and become stronger together than if they acted alone. Truly, from an organizational perspective, the whole is greater than the sum of the parts because an organization is a collection of individuals coming together to achieve common goals.

The orchestration of parts into a greater whole is the fundamental task in the project management field. A project is defined as “a temporary undertaking to produce a unique output subject to limitations such as time, people, and other resources” (Kloppenborg, Shriberg, & Vekatraman, 2003, p. 11). There are two key elements within this definition of a project. First, it is a temporary endeavor and project teams are continually formed and adjourned, contributing to the challenge of developing a team

culture and unity for finite assignments. Second, resource limitations provide a unique challenge to the individuals, skills, and knowledge available for project success. The project triangle representing the trade-offs of time, cost, and quality to achieve the desired project goal highlights these resource limitations (Project Management Institute, 2008). Given these limitations and constraints placed on individual project members and the project team, the ability of the project team to come together as a unified whole is challenging but necessary for project success.

Additional trade-offs within a project team are related to the project team members. Some project members are on multiple teams, some are from matrix organizations with two bosses, some work from remote locations, and the majority may have never worked with the project leader or the other team members before. The reporting relationship of the team members and the diversity of functional disciplines are unique to project management. Waldman (n.d.) defined project teams as multifunctional teams "from different functional, technical, or professional backgrounds" (p. 85). Project teams are not like functional organizations where individuals from the same discipline come together to achieve the same discipline-specific objectives, such as the closing of the monthly accounting transactions in the accounting department. Rather, uniqueness in project activities and diversity in people, knowledge, skills, and abilities are two points of distinction for project teams. Analyzing these two challenges highlights elements of differentiation from the general management principles "previously applied generally to ongoing operations" (Kloppenborg et al., p. 12). Project teams unite to focus on a particular problem, with a specific project scope, to achieve a specific outcome that is

dependent on the working relationships and skills of the project team and its project leader. An important asset of project teams is not only the members' specialized knowledge, but also their capability to integrate this knowledge to make connections that lead to project success and may develop into a competitive advantage (Grant, 1996b; Kogut & Zander, 1992).

The project leader is responsible for managing the complexity of the project team. The project leader has the challenge of unifying a diverse group of individuals to form a cohesive, integrative project team. One of the greatest challenges of a project leader is to unite individuals with different experiences, functional backgrounds, and skills, and "[mold] them into a cohesive unit" (Pinto, Thoms, Trailer, Palmer, & Govekar, 1998, p. 10). This challenge, coupled with a business environment characterized by slow economic growth, increased globalization, and the attention needed to focus on developing markets as a source of opportunities, highlights the need to understand how the project leader contributes to project team cohesion, knowledge integration, and success.

Unfortunately, organizational priorities do not always focus on the formal development of the project leader. The Project Management Institute's (PMI) report "Pulse of the Profession: Driving Success in Challenging Times" (2012) showed a significant decrease (52% to 47%) from 2010 to 2011 in the percentage of surveyed firms that have formal processes for developing project manager competency skills. PMI (2013a) reported an additional 3% decline in 2012. However, the same surveyed firms cited talent and staffing the project team as critical project success factors. Researchers

frequently cite the limited empirical studies on the behavioral aspects of projects, project teams, and project leadership (Fortune & White, 2006; Ratcheva, 2009; Turner & Müller, 2006). Thus, there appears to be a gap in scholarly understanding of how the behavioral aspects of projects, project teams, and project leadership contribute to a project's overall success and an organization's commitment to developing its project team leaders and members.

The objective for this research study was to address the gap in the literature and contribute to the behavioral understanding of project teams, knowledge integration, and project success. Skills, knowledge, and ability exist within the individuals of a project team. However, there are limits to measuring the intangible aspects of how individuals come together and integrate their respective skills, knowledge, and abilities into a cohesive unit. The purpose of this study was to examine how project leaders' social capital relates to the ability of project teams to integrate knowledge cohesively to achieve project success. Project team members' perceptions were used as the basis to measure how project leaders' social capital contributes to knowledge integration and project success.

Although more elaborate definitions of social capital and knowledge integration appear below in the Definition of Terms and Chapter 2, it is important to establish a basic understanding of how these terms apply to this study. *Social capital* refers to a network of relationships an individual uses to access various resources to achieve results. Social capital is about engaging with others and sharing knowledge with the goal of integrating information or accessing information for action. *Knowledge integration* refers to the

creation of usable information and the ability to create new meaning from, or understanding of, information from both existing and new relationships. The premise for combining these two terms in this study is that knowledge is an organizational resource, and that this resource can lead to producing a competitive advantage (Grant, 1996a, 1996b) because social capital may create organizational knowledge (Nahapiet & Ghoshal, 1997, 1998). The results of this study not only show how social capital variables and knowledge integration relate to project success, but also how this knowledge can lead to improving the economic value of projects by reducing the 37.7% of projects that do not meet original goals and business intent (PMI, 2013a), advancing project managers to project leaders by focusing on developing project leadership competency skills, and optimally forming and executing project teams that best integrate the technical and behavioral aspects of project management.

The focus of the remainder of this chapter is on the main elements of this study, including (a) the background of the problem, (b) the problem statement, (c) the purpose of the study, (d) the research questions and hypotheses, (e) nature of the study, (f) the theoretical framework, (g) definitions of terms, (h) assumptions, scope, limitations, and delimitations, and (i) the significance of this research study.

Background

In PMI's 2012 global survey, practitioners and project leaders identified three trends that are forcing critical evaluation of project management practices in organizations, including "slow economic growth, shifting global market priorities, and a push for innovation" (p. 4). All three of these trends relate to the struggling global

economy and the aftermath of the financial crisis of 2008. Economic growth has slowed in mature markets, forcing companies to look to new opportunities in emerging markets, and to develop innovations, ideas, and products that will fit the unique needs of the emerging markets while overcoming the limitations inherent in oversaturated mature markets.

The challenging and changing business environment demands advances in project management competencies. Emerging markets are turning to project management to move from developing to developed infrastructures (PMI, 2012). The increase in the use of projects to meet the demands of globalization and the competitive marketplace highlights the need to better understand the behavioral attributes and competencies of project management. However, the main role of project management is often viewed in the profession as a set of technical processes and systems used to achieve a desired outcome (PMI, 2009).

Project management perspectives need to extend beyond only the technical skills of project management, and move to a strategic perspective that focuses on aligning all resources and competencies to the competitive environment, including social and behavioral aspects of projects. Jugdev, Müller, and Hutchinson (2009) reviewed the literature to identify research trends in project management and two main themes emerged. First, emphasis on controls, tools, and techniques of projects continues; these elements focus on the technical side of project management. Second, there is an increase in the number of research papers involving interpersonal dimensions of project

management and a greater focus on understanding and valuing project leadership and collaborative workforces.

The second research theme, identified by Jugdev et al. (2009), specifically focused on the ability to understand, measure, and value project leadership competencies and is the focus of this study. These project leadership competencies focus on the behavioral aspects of project teams and require social collaboration and knowledge integration beyond the functional areas of expertise and the technical processes of project management. The realities of the struggling global economy have led to a renewed focus on talent development in project management and other areas that directly relate to organizational performance (Barker, 2009; PMI, 2012, 2013a). Although training and development in project management remains relatively informal, with only 70% of organizations having a defined career path for those engaged in project management and an overall decline in the common practices for developing project manager competency skills, there is a renewed focus in organizations on developing project manager skill sets and performance management given the turbulent economic environment and the need to get more from existing resources (Barker, 2009; PMI, 2012, 2013a).

Organizations' use of informal skills training and the decline in project manager competency development conflicts with ways to achieve project success. During turbulent economic times, project and professional development cancelations are prominent (PMI, 2012, 2013a). In 2009, 53% of organizations reported canceling or delaying projects and 51% reported canceling or rescheduling professional development training because of the economic downturn (PMI, 2012). In the first quarter of 2012,

there was an improvement resulting from improved economic conditions and growing reliance on projects for performance, with surveyed organizations reporting only 39% canceled or delayed projects, and 43% canceled or delayed professional development activities (PMI, 2012). Given that the economic environment has forced companies to evaluate what they are doing and how they are doing it, there is a greater need for implementing effective project management teams, developing highly collaborative workforces, and elevating project leadership skills and abilities.

A greater strategic focus on project management and project leadership is emerging. No longer is business as usual appropriate in the struggling business environment. The movement from the traditional paradigm of projects as operational activities to the emerging perspective of strategic project management to support business strategy and sustainability is relevant given the trends of constrained economic growth, shifting global market priorities, and the need for innovations not only with products but also with strategy and execution (Patanakul & Shenhar, 2012; PMI, 2012). The continued uncertainty in economic conditions further indicates the need for companies to focus on controllable aspects of project management beyond technical attributes, and towards how behavioral aspects of project leaders can affect project outcomes. Companies can directly control their hiring, staffing, and training decisions.

Thus, there is a need to focus on the behavioral aspects of project management and to understand the relationship between social capital and knowledge integration in project leadership. Knowledge acquisition, integration, and transformation occur daily in project teams and between project members. Knowledge moves throughout an

organization both internally and externally, and the adaptation, use, and reconfiguration of the knowledge exchanged influences the project team members, processes, and decisions. By moving from a solely resource-based perspective (Barney, 1991; Wernerfelt, 1984) to a dynamic knowledge-based perspective (Grant, 1996a) firms come to understand knowledge as a strategic asset used to create a competitive advantage. The intent for this research study was to focus on understanding the social processes of knowledge integration by examining the social capital of project leadership. The social dimensions studied include structural, relational, and cognitive dimensions of a project leader's social capital and how these social dimensions relate to knowledge integration and project success.

Problem Statement

Project leadership requires a diverse blend of technical and behavioral skills to achieve project success. The literature, explored in Chapter 2, has primarily focused on the technical aspects of project management and has left a void in understanding the behavioral and relational skills of project leaders (Hyväri, 2006; Jacques, Garger, & Thomas, 2008; Kloppenborg et al., 2003; Korrapati & Kocherla, 2013; Thamhain, 2004). For example, project leaders need behavioral and relational skills to manage multiple networks with various stakeholders, to access resources, and to build trust within the temporary team structure to achieve project success. The basis of this research study stems from the lack of empirical research and the limited understanding of the behavioral aspects of project management. Therefore, the problem is that most researchers have primarily focused on the project management technical skill set while giving little

attention to the behavioral and relational skills project leaders need, and specifically to the relationship of project leaders' social capital to the knowledge integration abilities within a diverse project team for its project success.

The problem addressed in this study is the gap in knowledge and empirical research about how a project leader's social capital relates to the knowledge integration abilities of the project team and its potential for project success. There are two important elements in this study. First, the primary focus of the study was on the intangible behavioral and relational skills that lack empirical research in the project management literature (Fortune & White, 2006; Ratcheva, 2009; Turner & Müller, 2006). Second, the study involved an attempt to measure an unobservable, intangible, latent construct of social capital in project teams. This study is important to organizations because project failure is costly (PMI, 2013a) and project leadership may be a critical project success factor (Belout & Gauvreau, 2004; Cooke-Davies, 2002; Ratcheva, 2009).

Past researchers have studied social capital and its relationship to knowledge integration across business units (Tsai & Ghoshal, 1998), on group effectiveness with internal and external conduits (Oh, Chung, & Labianca, 2004; Oh, Labianca, & Chung, 2006), product innovation (Tsai & Ghoshal, 1998), R&D and technical projects (Grewal, Lilien, & Mallapragada, 2006; Weck, 2006), and within virtual teams (Robert, Dennis, & Ahuja, 2008). But no researcher has examined a project leader's social capital and its relationship to a project team's knowledge integration abilities and project success. The lack of empirical studies measuring the social capital of project leadership is an important gap in the body of knowledge; filling this gap can lead to greater economic benefit with

improved project success. By understanding a project leader's social capital and how that leader's social capital relates to knowledge integration abilities within a project, researchers and organizational leaders can better understand the complex social behaviors in project teams. Thus, this quantitative study was an examination of the dimensions of social capital, as defined by Nahapiet and Ghoshal (1998), to understand the structural, cognitive, and relational dimensions of social capital and how a project leader's social capital relates to knowledge integration and project success.

Purpose of the Study

The purpose of conducting this quantitative, correlational study was to gain insights into the social capital of project leaders and their knowledge integration abilities to develop an understanding of how these behavioral and relational skills relate to project success. The focus of the survey instrument developed and the pilot study conducted was on the social and behavioral processes of knowledge integration by measuring the social capital of a project leader, from project team members' perceptions, through multivariate data analysis using structural equation modeling. The correlational design, survey research method, and structural equation modeling (SEM) were appropriate for this study because they enabled a synthesis of theoretical and empirical aspects of behavioral research needed to understand the social and behavioral phenomena of project leadership and project teams. Structural equation modeling can best evaluate the predictive relationship between latent variables of social capital and knowledge integration on the outcome of project success through correlation coefficients, covariances, variances, and means (Hancock & Mueller, 2012). The social capital dimensions used in this study

include structural, relational, and cognitive dimensions of a project leader's social capital and how these interrelated covarying elements relate to the knowledge integration abilities of a project team and its project success. Social capital was the independent latent variable, with knowledge integration as the dependent latent and project success as the dependent observable variables.

Research Questions

The research questions for this study examined the relationship between variables in order to better understand the underlying dimensions of social capital related to project team knowledge integration abilities and project success. The central research question for this study was: To what extent does a project leader's social capital relate to the knowledge integration abilities of a project team and its project success? The secondary research questions included the following:

1. From the perception of project members, to what extent does a project leader's perceived social capital relate to knowledge integration within project teams?
2. From the perception of the project members, to what extent does a project leader's ability to integrate knowledge relate to project success?
3. From the perception of the project members, to what extent do different social capital dimensions more or less relate to knowledge integration and project success?

An a priori model (see Figure 1) with hypotheses was developed to study the underlying relations between a project leader's social capital, knowledge integration, and

project success, and to address the lack of empirical studies on the behavioral and relational aspects of project management. Given that this study attempted to examine the relationship of a project leader's social capital on knowledge integration and project success, Table 1 provides a summary of the testable hypotheses developed from the research questions presented.

Table 1

Summary of Testable Null and Alternative Hypotheses

Construct	Hypothesis
$H1a_o$ (structural: bonding)	A project leader's internal connections are not positively associated with the ability to integrate knowledge within a project team.
$H1a_a$ (structural: bonding)	A project leader's internal connections are positively associated with the ability to integrate knowledge within a project team.
$H1b_o$ (structural: bridging)	A project leader's access to external connections is not positively associated with the ability to integrate knowledge within a project team.
$H1b_a$ (structural: bridging)	A project leader's access to external connections is positively associated with the ability to integrate knowledge within a project team.
$H1_o$ (structural)	A project leader's access to both internal and external knowledge resources is not positively associated with the ability to integrate knowledge within a project team.
$H1_a$ (structural)	A project leader's access to both internal and external knowledge resources is positively associated with the ability to integrate knowledge within a project team.
$H2_o$ (relational)	A project leader's perceived trustworthiness is not positively associated with the ability to integrate knowledge within the project team.
$H2_a$ (relational)	A project leader's perceived trustworthiness is positively associated with the ability to integrate knowledge within the project team.
$H3_o$ (cognitive)	A project leader's ability to share project meaning and goals is not positively associated with the ability to integrate knowledge within a project team.
$H3_a$ (cognitive)	A project leader's ability to share project meaning and goals is positively associated with the ability to integrate knowledge within a project team.
$H4a_o$ (knowledge integration)	A project leader's extent of knowledge integration within a project team is not positively associated with the project completed on budget.
$H4a_a$ (knowledge integration)	A project leader's extent of knowledge integration within a project team is positively associated with the project completed on budget.
$H4b_o$ (knowledge integration)	A project leader's extent of knowledge integration within a project team is not positively associated with the project completed on time.
$H4b_a$ (knowledge integration)	A project leader's extent of knowledge integration within a project team is positively associated with the project completed on time.
$H4c_o$ (knowledge integration)	A project leader's extent of knowledge integration within a project team is not positively associated with the project completed within the project scope.
$H4c_a$ (knowledge integration)	A project leader's extent of knowledge integration within a project team is positively associated with the project completed within the project scope.

The intent for each of the hypotheses was to explore a separate social capital dimension and its relationship to how project leaders access knowledge and integrate it into the team for project success. Nahapiet and Ghoshal's (1998) social capital framework, which included three dimensions of structural, relational, and cognitive social capital, served as the conceptual basis of this study.

Nature of the Study

The design of this quantitative correlational study enabled the examination of the relationship of a project leader's social capital to knowledge integration and project success within a project team. The positivist perspective adopted resulted in the use of a quantitative design. A constructivist perspective was not appropriate because the empirical research approach was based on collecting measurable data about social capital constructs that exist in the literature. (Corbin & Strauss, 2008).

Singleton and Straits (2005) identified four primary modes of data collection including: (a) surveys, (b) experiments, (c) field research, and (d) available data. Each has strengths, weaknesses, and various research constraints that can lead the researchers to select one research strategy over the other. These constraints can include ethical concerns, limited time and personnel, or appropriateness. Survey design was selected as the research method for this study because researchers have already defined the social capital constructs employed in the a priori model (Nahapiet & Ghoshal, 1997, 1998). The intent in this research study was not to research or develop new social capital constructs; rather, it was to measure the strength and relationship of the previously defined social capital constructs on knowledge integration and project success within project teams.

Experiments were not appropriate because this approach works best when investigating causes of phenomena (Singleton & Strait, 2005). The research questions for this study were not about how or why the constructs are present, but rather about the strength of the relationships and interrelationships of the social capital constructs. Field research was also not appropriate because social capital is not readily observable. Instead, in this study, latent variables were used to measure the project members' perception of the project leader's social capital. No available data are known to exist within project teams to measure a project leader's social capital, and if such data did exist, it would be proprietary to the project team and probably not be available to others. Quantitative analysis using survey research methodology provided an understanding of the theoretical constructs of this study based on an examination of the observable behaviors used to predict unobservable variables, explaining the strength, intensity, and the interrelationship of the perceived, complex social behavior of project leadership and project teams.

The a priori model and testable hypotheses of this study indicate that a project leader's social capital relates to the ability to integrate knowledge within a project team. The structural, relational, and cognitive dimensions of social capital theory represent a project leader's social capital, and this respectively includes access to information, the ability to share information with others, and the ability to understand the value and usefulness of new information (Nahapiet & Ghoshal, 1998).

Social capital is a multifaceted set of actual and potential resources that, if employed by the project manager, may have the potential to provide benefits for project

success (Nahapiet & Ghoshal, 1998). The social capital of a project leader potentially provides that leader the ability to access and integrate knowledge and skills from multiple resources to transform knowledge that transcends functional boundaries and potentially creates a competitive advantage for the organization. The a priori model, shown in Figure 1, provided the basis for measuring this theory and the structural, relational, and cognitive variables of social capital theory. The goal was to measure cause and result variables in a causal hypothesis (Lei, 2006), where knowledge integration is the mediating, dependent latent variable between social capital latent independent, cause variables and the project results, dependent observed variable.

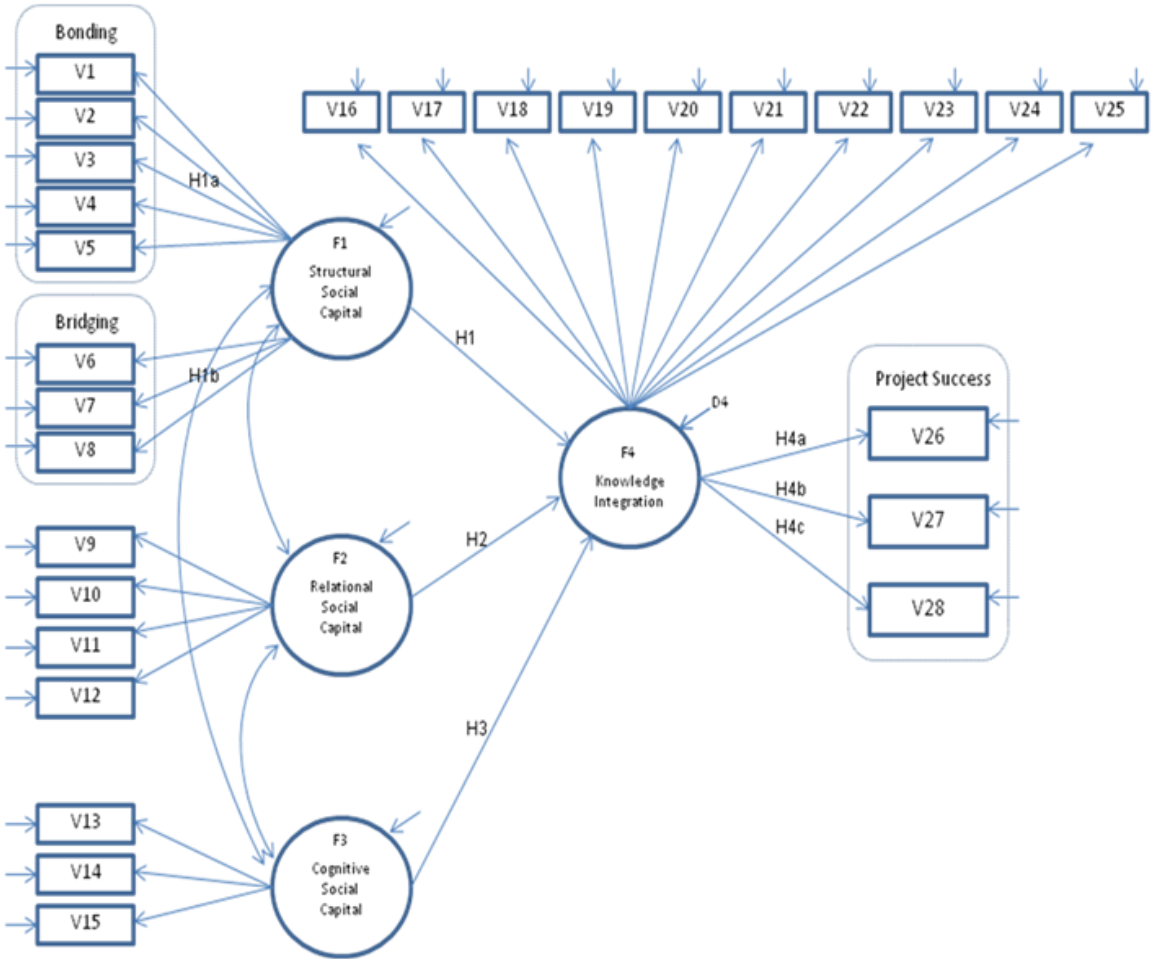

Figure 1. The a priori theoretical model. Author constructed.

The measurement of a project leader's social capital and knowledge integration is unobservable in principle. These unobservable variables are latent, or endogenous, variables (shown as circles in Figure 1). Even though these variables are unobservable directly, researchers can assign observable, or exogenous, variables (shown as rectangles in Figure 1) to assist in measuring the unobserved variables and explaining the relationship of the observed variables to the unobserved variables (Savalei & Bentler, 2006).

Theoretically, the implication is that the observable variables cause changes in the unobservable variables, and the observable variables can thus assist in measuring the unobservable latent variables (Bollen & Lennox, 1991). The statistical technique of SEM was appropriate for this study because it allowed for testing of the a priori model, and it allowed for both the study of the latent variables through measurement models and the study of social capital theory as the underlying theory through a structural model.

This study included theoretical constructs that provided the ability to measure the latent variables, and in turn, provided the opportunity to study knowledge and the social and behavioral processes that occur through knowledge sharing, transfer, and integration between people and teams. Project management professionals were the sampling frame to study how social capital relates to a project leader's ability to integrate knowledge for project results. Chapter 3 contains discussion about the specific details of the research design and methodology for this study.

Theoretical Framework

Given the limitations of existing research focusing on the behavioral and social aspects of project leadership, an approach to studying the intangible, behavioral aspects of project leadership is necessary. Social capital theory provides such an approach and was the theoretical framework used to develop the a priori model for this study that explored the social capital of project leadership and its relationship to knowledge integration and project success.

Social capital theory focuses on interactions between individuals in a collective manner, and on how the collective relationships provide valuable resources and benefits

to individuals involved in the relationships (Burt, 1997). The overall idea of social capital is that forming relationships, sharing, and working together offers a greater benefit than if operating alone. Although social capital theory has primarily been studied in the social sciences, it has application to the business literature. Nahapiet and Ghoshal's (1998) social capital definition and its structural, relational, and cognitive attributes form the basis of the social capital theory constructs used in this study. Theoretical contributions from the use of Nahapiet and Ghoshal's social capital definition as a framework for this study included: (a) all three dimensions of social capital potentially affect knowledge integration, (b) all three dimensions of social capital demonstrate covariance relationships, (c) the social capital of the project leader relates to knowledge integration, and (d) knowledge integration is a mediating relationship between a project leader's social capital and a project team's performance. Chapter 2 contains a further discussion of social capital theory, its evolving research and application in the business literature, and the research variables of this study.

The a priori model indicates that social capital is a driving force for project team knowledge integration and project success. This social capital framework is appropriate for several reasons. Researchers who focus on project leadership and project teams tend to emphasize the technical aspects and avoid the behavioral and relational aspects of project management. Much of the literature fails to mark project leadership as a success factor. There is a need to better understand the complex social interactions of the project leader both internal and external to the project team in order to improve knowledge sharing leading to knowledge integration, to reduce project failure rates, and to enhance

the economic benefits of projects. Knowledge is a valuable resource, and understanding the value project leadership brings to a project team can assist organizations in defining the skills and abilities desired for team formation and project leadership selection. Understanding how one leads, interacts, and integrates a diverse group of individuals into a cohesive unit can provide insights into factors of project success.

Definitions of Terms

The major concepts in this study's theoretical framework are social capital, knowledge integration, and project success. The following contains definitions of terms used in this study.

Cognitive capital: The capability to share knowledge and understanding through common meaning (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998).

Endogenous variable: A dependent variable used to explain the model relationships that are derived within the system (Hancock & Mueller, 2012; Mueller, 1996).

Exogenous variable: An independent variable used to explain the model relationships that originate from outside of the model and are derived externally (Hancock & Mueller, 2012; Mueller, 1996).

Knowledge integration: The ability to recognize, combine, and use knowledge gained from others through sharing, collaborating, and communicating to create new knowledge (Burt, 2000; Cohen & Levinthal, 1989, 1990; Grant, 1996a; Okhuysen & Eisenhardt, 2002).

Latent variable: A variable not directly measured or observed, but predicted through observed measures (Hancock & Mueller, 2012; Mueller, 1996).

Project: A temporary endeavor to achieve a unique outcome; projects have definable beginning and ending time frames (PMI, 2008).

Project leader: An individual assigned to lead the collective actions of a project team to achieve defined project objectives.

Project leadership: The process of organizing, developing, and managing the collective actions of a project team to achieve defined project objectives.

Project management: A specific field of study using relevant knowledge, skills, tools, and project techniques with diverse individuals working together as a cohesive unit to collectively achieve specific project requirements (PMI, 2008).

Project success: The closure of a project from beginning to end meeting the project scope, timeline, and budget (PMI, 2008).

Project team: A diverse group of individuals, each with unique knowledge and skills, led by a project leader, collaborating as a cohesive unit to achieve project objectives. (PMI, 2008).

Relational capital: Norms of cooperation facilitated, trusted, and respected by interacting individuals and organizations (Barney & Hansen, 1994; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998).

Social capital: The use of relationships to access and utilize resources through human interactions that can be potentially beneficial when combined and exchanged (Bourdieu, 2002; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998).

Structural capital: Access to potential and available resources through relationships (Burt, 2000; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998).

Structural equation model: A theoretical framework of latent and observed variables to predict patterns of behaviors, relationships, and outcomes (Hancock & Mueller, 2012).

Structural equation modeling (SEM): A statistical technique to analyze relationships of latent and explanatory variables using factor analysis, path analysis, and linear regressions. SEM allows simultaneous examination of dependence relationships between variables (Hancock & Mueller, 2012; Mueller, 1998).

Assumptions

The purpose of this study was to gain insights into the social capital and knowledge integration abilities of project leadership and to develop an understanding of how these behavioral and relational skills relate to project success. The main assumption in this study was that social capital has a positive relationship to knowledge integration and project success. The definition of social capital focuses on the use of resources, and a second assumption was that resources would be used in a positive manner by project teams. Although some researchers have addressed the negative outcomes of social capital (Adler & Kwon, 2002; Coleman, 1990; Lesser, 2000), the results from this study attempt to measure the value creation that can occur from the positive, tangible and intangible outcomes from social capital.

Scope and Delimitations

Given the many definitions of social capital in the literature, this study was based on the constructs defined by Nahapiet and Ghoshal (1998). Nahapiet and Ghoshal defined three constructs as structural, relational, and cognitive dimensions of social capital. Structural constructs focus on access to information through various network relationships; these are both internal and external relations. Measurements included access to the project leader, formal and informal communications, and the ability of the project leader to gain top management support through needed resources for project success. Relational dimensions focus on trustworthiness of the project leader and the norms of cooperation the project leader facilitates. Measurements included perceptions of the degree of competence of the project leader by the project members and his or her concern for the team over individual interests; these relational aspects indicate an environment that fosters the willingness and motivation to share. Cognitive dimensions integrate the capacity to exchange expert knowledge through common meaning and a collective, shared understanding of the common meaning. Measurements included ongoing communication through project charters and plans. All three of the constructs within this study focused on the behavioral attributes of a project leader as perceived by the project team members. Not included in this study were behavioral aspects beyond the above and any task-related attributes. The use of Nahapiet and Ghoshal's definition has the potential to exclude other behavioral activities, outside the scope of this study, which could potentially build social capital within the project team.

This study included convenience sampling from project management professionals who are members of the PMI. PMI is a global organization consisting of 437,576 members in 84 countries with approximately 250 chapters in over 70 countries (PMI Today, 2014). A minimum sample of between 100 and 285 participants was the goal for this quantitative study, based on the selected research methodology and number of variables in the a priori model. Given the nonprobability sampling method used, it was not possible to generalize beyond the sample. The duration of the data collection was approximately 30 days once the survey was accessible to the chapter members, which was administered through QuestionPro, a third-party survey company.

Participants included in the survey results had to have participated in a project in the past 3 years, regardless of their specific role on the project team, age, gender, or level of education. The survey included demographic questions to understand the composition of project teams and their potential relationship to the success of the projects represented by the participants. The study did not distinguish the project team's type of working location, such as centralized location of the project teams, remote teams, or geographically dispersed project teams.

This research was delimited to studying the effects of a project leaders' perceived social capital. Hence, the study did not focus on the mechanisms that create or develop the project leader's social capital. The basis of the research design was the literature reviewed and how previous researchers evaluated and developed approaches for measuring respondents' perceptions on intangible, latent variables (Aquino & Serva, 2005; Chang, Wong, Li, Lin, & Chen, 2011; Chen, Chang, & Hung, 2008; Tsai &

Ghoshal, 1998; Schenkel & Garrison, 2009; Yoo, Vonderembse, & Ragu-Nathan, 2011). Given the difficulty in measuring social capital, this study used project members' perceptions and asked them to evaluate the project leaders' behavioral skills by responding to how the project leader behaved and led the project team. The findings from the literature have shown that using perceptions is a valid way to study social capital and team relationships. Chapter 3 includes further exploration of the use of perceptions in survey research, along with the survey instrument design.

The study also does not take into account the personality characteristics of the project leader. The study assessed the behavioral aspects of project leadership and how the project leader's social capital relates to knowledge integration and project success, as perceived by the project members.

Limitations

The target population was PMI members. The selected target population has a vested interest in project management and thus limits the generalizablity of the study to project-based organizations and various types of projects. The convenience sampling approach limits generalizability of the study results.

Issues of generalizability and time are typical methodological limitations resulting from the use of SEM (MacCallum & Austin, 2000). SEM analyzes the structure of relationships within a specific population through measured variables (MacCallum & Austin, 2000). Generalizability is limited to a particular sample, as previously discussed, and to the specific variables measured in the constructed model. Common indicators define latent variables and "valid results and interpretation depend on having appropriate

operationalizations of the latent variables under study" (MacCallum & Austin, 2000, p. 212). The a priori model of this study attempted to capture project members' perceptions of the social capital of project leadership at a single point in time. Therefore, this was not a longitudinal study. However, the a priori model constructed was designed to measure and identify relationships and trends of the project team relationships over the life of the project so it does account for the project life cycle; no attempt was made to measure and analyze various points in time. The interpretation of the results, presented later in the study, reflects these limitations.

Significance of the Study

The significance of this study was the measurement of the behavioral and relational aspects of social capital within a project team. The a priori model indicated a project leader's social capital as an important factor in knowledge integration and project success to address the literature gap and advanced knowledge on the behavioral and relational aspects of project management. The results of this study provide researchers and organizational leaders tools to understand the social behavior within project teams and the dimensions of a project leader's social capital that contribute to knowledge integration and project success. By examining a project leader's social capital within the project team, social change in any industry employing project teams can benefit from the study results by improving project success.

Understanding the social capital of project teams will aid organizations in reducing failed projects by identifying the behavioral and relational aspects of project teams that can lead to high performing entities. The focus by organizations on the people

aspects of project teams also supports the anticipated growth in the project management profession. Both job growth and economic growth resulting from the project management profession is anticipated to occur from 2010-2020. Job growth will come from an estimated additional 15.7 million new project management roles, resulting in high demand for project managers with relevant project management skills (PMI, 2013b). Economic growth will follow the talent demand with $6.61 trillion added to the project management profession during this 10-year span (PMI, 2013b). The expectation is that the project management profession will flourish; hence, relevant project management skills are critical to support both the job and economic growth in the project management profession.

Social capital is different from other capital forms, such as financial or human capital (Adler & Kwon, 2002; Burt, 1997). The benefit of social capital stems from the embedded relationships of individuals. Social capital integrates individual capabilities into potential resources and benefits to create new forms of knowledge that can create a competitive advantage. Given the increased use of project teams and the lack of focus on formalized leadership programs, this study provided insights into the project leader's social capital competencies and their relationship to knowledge integration and project success. A better understanding of complex social behavior within teams and the ability to measure intangible aspects of project leadership enables organizational leaders to identify general, successful project leadership traits for project leadership selection and project team formation. Areas for broader application include organizational learning, succession planning, and the development of training programs enabling increased

economic benefits from successful project management processes and practices (Bartsch, Ebers, & Maurer, 2013; Ram, Wu, & Tagg, 2013; Reagans & Zuckerman, 2001; Reagans, Zuckerman, & McEvily, 2004; Thomas & Mullaly, 2007). The ability to improve project failure rates can lead to economic benefits for project team members, organizations, and society.

Summary

This chapter contained an introduction to the study of social capital of project leadership and its relationship to knowledge integration and project success. A brief overview of the background and the problem statement led to the general research questions of this study and the theoretical framework used to develop a testable, a priori model. The theoretical model, developed based on the literature on social capital and measuring unobservable, intangible variables, led to the proposed hypotheses and research methodology used to test the proposed model.

A review of the literature, with a focus on social capital, knowledge integration, and project success, appears in Chapter 2. Chapter 3 contains a discussion about the design and methodology of this research study, highlighting the quantitative approach, the survey design, and the results of the research instrument pilot study. Chapter 4 provides a presentation of the results of the SEM analysis, and lastly, Chapter 5 contains discussion on the study conclusions and recommendations for future research.

Chapter 2: Literature Review

Introduction

Project team members come from diverse backgrounds and experiences. These teams must use their collective knowledge to achieve a desired outcome. The challenge for project leaders is developing and activating the project team's collective knowledge. Chua, Lim, Soh, and Sia (2012) stated that "collective knowledge must be generated through interaction, negotiation, and learning to achieve shared understanding of organizational processes" (p. 578). Collective knowledge in project teams differs from the summation of individual knowledge (Grant 1996a), and the a priori model of this study reflects this by showing a project leader's social capital as the initiating source to develop a project team's collective knowledge and that social capital is the means used to integrate individual team members' knowledge into collective knowledge for project success. The purpose of this quantitative, correlational study was to gain insights into the behavioral aspects of project management and to understand the social capital and knowledge integration abilities of project leadership. Prior project management researchers' have focused on the technical skills of project teams. As a result, there are limited empirical research studies that address the behavioral and relationship skills needed for project success (Hyväri, 2006; Judgev & Müller, 2005).

The following literature review contains an exploration of the classic definition of social capital, the social capital attributes related to this study and research questions, and how social capital and its attributes apply to project management studies. The literature

review conducted justified the a priori model presented in Chapter 1 (see Figure 1) and highlighted gaps in the literature that I attempted to fill with my research study.

Literature Search Strategy

As a starting point, I searched PMI Knowledge Center on its member website to assess academic and professional research conducted in the project management industry and to understand current trends within the industry. I then searched two primary project management journals, *Project Management Journal* and *International Journal of Project Management*, to assess research conducted at the intersection of social capital and project management. In these two peer-reviewed journals, using *social capital* as the search term, I discovered 375 articles published from 1983-2015. The *Project Management Journal* search only returned three articles.

I then conducted a broader literature search using the multiple database search engine, Thoreau, which searches all EBSCO databases and e-books, as the main source of information for this study. Additional databases employed included ScienceDirect, SAGE and ProQuest Central. The searchable topics included *social capital, social capital and project management, project leadership, social capital and project leadership, knowledge integration, knowledge integration and project teams,* and *project success factors*.

Classic theorists' publications, in the form of books and articles, provided overviews of social capital theory outside the business literature and in its original habitat of the social sciences. I did not limit the search timeframe for classic social capital theory research. Given that the theoretical model for this study was built upon Nahapiet and Ghoshal's (1998) framework, the literature search strategies focused on texts published

from 1998 to the present. The search included various forms of published works, including peer reviewed articles, trade publications, and books.

Theoretical Framework

Social capital theory is a theory of relationships. It is about interaction between and among individuals for a desired outcome. Project management teams are webs of internal and external relationships that work together for a defined beneficial outcome. The study of the social capital of project teams can provide insight into the human relationships of the project teams and an understanding of how these intangible resources and organizational capabilities, such as knowledge integration, yield project success.

Social Capital Theory

Social capital theory has much research and literature grounded in its application to public policy and civil society, as it originated in the social sciences in the work of seminal theorists Coleman (1988), Bourdieu (1986, 2002), and Putnam (1993, 2000). However, social capital theory is applicable to business organizations inasmuch as it serves as a framework to understand relationships between individuals and among larger networks of teams, departments, functions, organizations, and associations (Cohen & Prusak, 2001).

Coleman (1990) defined social capital by its function and the "various entities that consist of some aspect of social structure and [they] facilitate certain actions of individuals who are within the structure" (p. 302). The idea of function within this definition is that social capital is "not a single entity, but a variety of different entities" (Coleman, 1990, p. 302). However, the different entities must have a common structure

where individual actions occur within the structure. Coleman (1991) specifically defined the functions as types of social structures that facilitate individuals' choice of action. He defined two types of social structures including primordial and constructed structures. Primordial structures are those that originate at birth such as family, ethnic group, or religious affiliation. Whereas the constructed structures are social organizations developed for a single purpose, function, or narrow range of purposes (Coleman, 1991). Essentially, the desired purpose and outcome determines the structure to engage with for individual development, and the function defines the specific structure to engage with for that development. According to Coleman's definition of function, different groups have different purposes at different times. Thus, individuals' choices are deliberate, chosen, and purposeful based on the function of the social structure. The functional definition supports Coleman's (1988) integration of rational choice theory into his analysis of social capital theory and the interconnection between the individuals and the social structure.

Bourdieu (1986) defined social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition" (p. 248). He viewed structures as given and inherently available regardless of what individuals contribute to the structure, and focused on the primordial structure in relation to Coleman's functional definition. In Bourdieu's study, he focused on social classes as relationships of mutual attributes and classes as socially variable entities made up of others who occupy a similar sphere or space (1989). He analogized social space to geographic space, noting that the closer the groups, "the more common properties they have" (Bourdieu, 1986, p.16). He

also stated that people who find themselves in close social space may be close geographically. However in today's global and remote organizational environments, social space can be close even without close geographic space, as social space is related to commonness and likeness.

Both Bourdieu and Coleman integrated structure within their definitions; however, Coleman focused on how individual contributions foster and create benefits within the structure, while Bourdieu focused on the individual benefits derived just from belonging to the structure. Coleman (1988) saw value in the social structures to provide cognitive development and individual self-interest leading to collective action and benefits to the entire group, not just benefits to the individual efforts. This is because social capital, in Coleman's structure, demands cooperation between self-interested individuals, and social capital becomes a public, not a private good like human and physical capital forms. Thus, social capital is not just about credentials as is the focus of Bourdieu's (1986) social structures, given that he implied that just belonging to the structure creates social capital as shown in the phrase "possession of a durable network" (p. 248). Therefore, Bourdieu (1977) focused on maintaining the structure as "collectively-owned capital" (p. 249) whereas, Coleman focused on building individual knowledge through the structure and constructing social organizations to achieve a specific function through social exchange. The key difference between Bourdieu's and Coleman's definitions is that the former emphasizes results while the later emphasizes function. Bourdieu saw social capital as resulting *from* the network, whereas Coleman saw social capital as a function *of* the individual within the network. Regardless of how

social capital is developed within the two definitions, the theorists agree that social capital is a form of capital that can provide benefits for individuals and groups.

Putnam (1993) best summarized the benefits of social capital, stating, “Like other forms of capital, social capital is productive, making possible the achievement of certain ends that would not be attainable in its absence” (p. 167). His summarization of social capital focused on social capital as connections of individuals and social networks that include benefits and reciprocity. Putnam’s social networks are similar to Coleman’s constructed social networks inasmuch as Putnam linked the decline of American society to a decline of primordial structures and the transfer of responsibility and support of individual decisions to constructed social networks outside of the family. Putnam attempted to focus on the social phenomena as it focused less on the individual, demonstrated by Bourdieu and Coleman’s studies, and more on the idea that individuals do not have social capital. Rather, social capital refers to connections among individuals (Putnam, 2000, p. 19) and thus applies to groups, communities, and nations. Putnam (2000) showed what he understood as the decline of American society using statistics including downward trends in political participation and group associations, decreases in philanthropic generosity, and increases in crime. In his popular book, titled *Bowling Alone*, Putnam showed American people are still bowling, just not in leagues and socially connected groups; thus, they are metaphorically “bowling alone.”

The crux of the social capital challenge is the pull between the individual and the group and what each contributes. There have been debates on how social capital has been applied in the literature. The application of social capital as both an individual benefit and

a community benefit draws controversy on defining, understanding, and measuring social capital (Contractor, Wasserman, & Faust, 2006; Foley & Edwards, 1999; Ibarra, Kilduff, & Tsai, 2005; Portes, 2000;). Putnam's social capital argument is about group association and community benefit, whereas Bourdieu and Coleman share the notion that social capital is available through relationships and social structures as a resource to individuals and groups. Coleman's contention that human capital and social capital are complementary resources, as opposed to competing resources, differs from Putnam's group associations and outcomes. It is through understanding the seminal theorists' definitions of social capital presented in this section, and the dynamic tension between the individual asset and the group resource, that the conceptualization of this research study occurs.

The ability of a project team to integrate knowledge and achieve project success is an attribute of the group resources delivered by the project leader's social capital. The research design of this study is used to hypothesize that a project leader's social capital positively relates to knowledge integration and project success by recognizing the various individual "actors" within the social structures and recognizing the collective benefit to all the "actors" in the social structure (Coleman, 1988), or in this specific study the project team. Applying social capital theory to examine a project leader's social capital and its relationship to knowledge integration and project success aligns with social capital as a resource and the definition of social capital to bridge both the individual and the collective (Fields, 2003).

Multilevel analysis. The challenge for the researcher is studying the multilevel analysis between the individual and the group. Various foci levels of relationships examined relations both within and outside the network based on the individual, dyad and triad relations, groups, and inter- and intraorganizational levels (Contractor et al., 2006). Ibarra et al. (2005) outlined future research areas that intersect the individual and the collective, identifying a gap in prior research that focused on a specific level of analysis and generally ignored the link between micro level and macro level analysis. One specific recommendation from these authors is for future research to address the dilemma called the "social capital and individual-collective dilemmas" (Ibarra et al., 2005, p. 360) and to evaluate the social capital for both individuals and collectives. Contractor et al. (2006) supported the need for multilevel analysis by reconceptualizing today's organization from hierarchical structures to dynamic network forms, or relational systems, that must adapt and link to multiple organizations and individuals. Project teams have always been dynamic network forms that come together on a temporary basis for a desired outcome. An attempt to address the individual-collective dilemma occurred in this research study by examining individuals within a collective context through the project leader's social capital and the relationships with the project team to better understand how an individual's social capital relates to the collective project team's knowledge integration and project success.

A priori model foundation. Social capital constructs and knowledge resources start with the individual and integrates collectively together both formally and informally, through strong and weak relational ties, and in open and closed networks (Mohamed,

Stankosky, & Murray, 2004; Widen-Wulff & Ginman, 2004). Nahapiet and Ghoshal (1998) provided a theoretical framework, which is grounded in social capital theory that integrates the individual and the collective. These authors defined social capital "as the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet & Ghoshal, 1998, p. 243). While Nahapiet and Ghoshal's analysis focused on the sociological dimensions of knowledge exchange and combination through structure, cognitive, and relational attributes of social capital for an organizational advantage, it did not specifically measure the various outcomes resulting for the organizational advantage created. These authors stated they focused on the creation and not the exploitation aspects of social capital (Nahapiet & Ghoshal, 1998). They focused on advancing the social capital dialogue by attempting to understand the dimensions of social capital through a theoretical framework that only provided justification for why and how value creation occurs (Nahapiet & Ghoshal, 1998).

Nahapiet and Ghoshal (1998) provided a theoretical model to understand how social capital facilitates value creation. Tsai and Ghoshal (1998) empirically tested the model and found strong support that social capital facilitates value creation, defined in their study as product innovation. This research study further evolved social capital theory from concept to application. The a priori model tested in this study, based on seminal definitions of social capital theory, attempted to fill the gap in the literature by expanding the definition of value creation to include project success. This research study focused on measuring the value creation activities and social entities of project teams to

better understand how a project leader's social capital facilitates knowledge integration and relates to project success.

Social Capital Attributes

Nahapiet and Ghoshal's (1998) definition of social capital identified three specific dimensions of resources, including structural, relational, and cognitive dimensions. These are not three distinct and separate dimensions, but rather highly interrelated dimensions of social capital (Nahapiet & Ghoshal, 1998). The following provides a literature based description and overview of each construct and its support for and integration into this research study.

Structural social capital. Relations and access to others for information define the structural constructs of social capital. The literature distinguished between the bridging and bonding aspects of social capital (Burt, 1992; Coleman, 1988). Bridging focuses on external ties and bonding focuses on internal ties. Both bridging and bonding aspects are critical in project teams because they provide different information, from different sources, with different effects (Newell, Tansley, & Huang, 2004; Reagans et al., 2004). Access to different knowledge sources produces nonredundant information, defined in the literature as knowledge heterogeneity, and is shown to have positive benefits including an increase in new resources and opportunities (Granovetter, 1973) and enhanced managerial performance and innovation (Moran, 2005; Rodan & Galunic, 2004; Rosenkopf & Nerkar, 2001; Rost, 2011). Building on the idea of benefits from various knowledge sources, Grandori and Furnari (2008) introduced the "law of organizational core variety" (p. 468) and the "law of structural heterogeneity" (p. 470),

that focused on the combination of different organization attributes as effective and necessary to produce outcomes. However, the challenge is combining the knowledge heterogeneity accessed from bridging relations and the knowledge homogeneity accessed from bonding relationships. Both provide access to different kinds of information and knowledge and, when combined, may provide complementary benefits to the project team.

To advance the understanding of complementary resources and the organizational benefit that one element may increase value to another element, Ennen and Richter (2010) conducted a literature review on the concept of complementarity. Their findings indicate that heterogeneous factors in organizations can drive performance with complementary relationships and "conclude that complementarities are systems-specific phenomena that results from the embeddedness of individual characteristics in the organizational nexus of relationships among multiple elements" (Ennen & Richter, 2010, p. 208). This complementarity perspective integrates a resource-based view that resources, both human and nonhuman, can add value and the ability to combine the different resources can create a competitive advantage (Adegbesan, 2009; Barney, 1991). However, Ennen and Richter argued that little clarity in the research exists about the characteristics of the resources that may complement one another. Access to both heterogeneous and homogenous information may provide added value, complementary, and possibly competing resources, to the project teams' success. By separating bridging and bonding resources in the a priori model of this study, there is an opportunity to examine the different characteristics of relationships and to understand the combination

effect from internal and external structural relations on knowledge and project performance. This approach was consistent with the recommendations in the literature to understand individual characteristics of resources (Ennen & Richter, 2010) and to examine the social factors of interactions influenced by other interactions (Porter & Siggelkow, 2008).

The type of information and the benefits derived from each type of structural source varies. Reagans et al. (2004) framed structural constructs within teams through the demographic diversity lens measuring how team member diversity relates to performance. Reagans and Zuckerman (2001) stated that knowledge homogeneity occurs when people share the same demographic characteristics, and this can lead to mutual identification, cohesiveness, and higher levels of trust. The challenge, however, is that similar demographic characteristics can hinder the ability to coordination outside the similar network and this can obstruct the capacity for collective actions that require similar and dissimilar knowledge that is necessary for team performance. Diversity in social structures can provide information benefits and produce nonredundant information and resources that are beneficial for teams. Reagans et al. identified this as a team diversity debate about network density (knowledge homogeneity) and network range (knowledge heterogeneity).

The crux of the diversity-performance debate is grounded in opposing views and trade-offs regarding the types of information managed based on team diversity. Internal team density, or bonding relationships, is impacted by less diverse teams with an increase in knowledge homogeneity resulting in access to similar knowledge and resources and

limiting the breadth of access to knowledge or information. More diverse teams provide access to external networks or bridging relations, and this provides knowledge heterogeneity. The opposing views are one of coordination of knowledge and one of access to nonredundant knowledge.

Even though these social relations are structurally distinct, they both can account for team productivity and project success (Reagans & Zuckerman, 2001) and both attempt to examine and understand knowledge sharing behavior. Reagans et al. (2004) stated a demography based approach can be problematic and knowledge of the demographic composition of teams can help identify predictable limitations. These authors concluded that a social network based approach is preferable to a demographic based approach to team structure. Although this dissertation research did not take into account the demographic diversity of team composition, the literature supports the approach used because the objective was to provide an understanding of a project leader's social processes and access to both internal and external knowledge sources that have different strengths and weaknesses, potentially related to knowledge integration and project success, relevant to the research questions posed in the study.

There is further debate in the literature about network density and network range, or the type of knowledge and the source of the knowledge. Newell et al. (2004) argued for distinguishing between bridging and bonding aspects of social capital. These authors argued that strong internal, bonding ties create a cohesive social unit that leads to the integration of knowledge obtained through the use of weak, bridging ties for a collective purpose (p. S55). However, Adler and Kwon (2002) preferred no distinction between

bridging and bonding ties because both occur in all situations. These authors integrated both structures, without distinction between bridging and bonding relations, in their definition of social capital, as "the goodwill available to individuals and groups … its source lies in the structure and content of the actor's social relations" (p. 23). The information and degree of influence or expertise available depend on both the bridging and bonding relations. They specifically stated their definition "encompasses internal and external ties" (p. 23) and focuses on an opportunity-motivation-ability framework, indicating all three of these elements must be present to activate social capital regardless of its structural relations. Adler and Kwon may not have separated bridging and bonding, but they did allude to the separation in their definition of social capital.

Both bridging and bonding relationships provide benefits from the different structure and content provided. Adler and Kwon (2002) recognized this and stated "task contingencies" (p. 33), or the social capital constructs and the organizational objective or "task," determines the value of the structural ties even though they do not measure them separately. Thus, the task of the project team determines the value of the various structural constructs and its contribution to the project leader's social capital and ability to achieve project success. Adegbesan (2009) found that the ability to integrate multiple resources is what can produce a competitive advantage. Rost (2011) showed bridging and bonding relations are not substitutes; but rather, complements, and that "strong ties become most beneficial when combined with weak network architectures" (p. 601). Therefore, the framework presented in the literature, recognizing different types of

information sources and its content, supported including both bridging and bonding structural relations within this study.

Ancona and Caldwell (1992) expanded the research to examine the external boundaries of product development project teams and its relationship to performance. One key finding from their study was the higher performing teams had more external activities than lower performing teams. These authors believed integrating external activities into the research reflects more accurately the activities of teams. These authors found that teams with more external activities performed better than teams that neglected external activities and only focused internally (Ancona & Caldwell, 1992, 2007). Their research identified that vertical activities aid in managing top management relations, and horizontal activities focus on technical and market information sources. Task only activities, or those of technical skills, are not the best indicators of a project team's performance (Ancona & Caldwell, 1992). Ancona and Caldwell suggested a team leader is a large part of the external activities of a team. The focus needs to be on the content of the exchanges, the pattern and purpose of the external relationships, and not merely on the frequency of contact and communication. These authors found that teams that managed both ambassador roles and workflow were able to maintain performance over time, illustrating both internal and external project relationships are necessary for project performance.

Consistent with Ancona and Caldwell's (1992) findings, Tushman and Katz (1980) found a positive association between external organizational communication and project performance because the project leaders are not only gathering external

information but also facilitating and mediating the flow of external information within the project team. These authors refer to this role as “boundary spanning” because of the need to access external inputs, to coordinate with various stakeholders, and to gain support from those that influence the project team and its resources.

Prior findings by researchers show that one bridging tie that is important to project success is top management support (Barczak, Griffin, & Kahn, 2009; Chollet, Brion, Chauvet, Mothe, & Geraudel, 2012; Karahanna & Preston, 2013, Marrone, Tesluk, & Carson, 2007). Much of the research on top management support focuses on the existence of the support and its relationship to project success. Chollet et al. (2012) integrated a social capital perspective to top management support by asking why some projects get more support than others. They found that the degree of top management support given to a project is a function of a project leader’s social capital utilizing vertical strong ties and also a sparse network. Liu, Wang, and Chua (2015) found that creating and mobilizing social capital through repeated interactions helps a project obtain top management support. Conversely, these authors also found that failure to use social capital to engage top management can lead to a decrease in support. A benefit realized from the structural social capital constructs is not only the access to information but also how project leaders facilitate that information (Rost, 2011; Chollet et al., 2012). These authors argued both weak and strong ties are not contradictory, but complementary.

One benefit of social capital is the ability to access information and use it for a positive outcome. The structural elements of social capital evaluate the ability to access information and to also access information in a content that is usable for a benefit. The

research demonstrates social ties based on bonding and bridging relationships with different structures and knowledge based on the strength of the relationship (Burt 2000; Coleman, 1988). These relationships may be accessed based on resources (Adegbesan, 2009; Chollet et al., 2012), tasks or affect (Oh et al., 2006), and possibly for multiple purposes (Oh et al., 2004). Recent developments in the literature recognize the bridging and bonding ties not as separate, conflicting sources, but rather as complementary resources (Chollet et al., 2012; Rost, 2011). Grounded in the literature, this study involved measuring both the bridging and bonding social capital constructs of a project leader's social capital and its facilitating role of integrating both heterogeneous and homogeneous knowledge within the project team.

Relational social capital. The definition of the relational constructs of social capital focuses on the benefits of relationships and how they affect behavior (Aslam, Shahzad, Syed, & Ramish, 2013). Nahapiet and Ghoshal (1998) discussed relational aspects of social capital as trust, norms, obligations and expectations, and identification. These relational attributes are sources for social interactions that determine the level of engagement and commitment by group members that result in benefits for the group as a whole and the individuals within the group (Aslam et al., 2013; Chou & He, 2011; Chow, Cheung, & Chan, 2012; Hsu, Hung, Chen & Huang, 2013). A project leader's relational social capital may determine the project team member's level of engagement.

The literature studies have implied a link between trust and social capital, but it contains limited empirical research (Dirks 2000; Gillespie & Mann, 2004; Tansley & Newell, 2007). Tansley and Newell examined global human resource information

systems projects and the association of project leaders' behaviors and the development of trust. These authors identified trust in three ways: commitment trust, companion trust, and competence trust. Commitment trust comes from contractual agreements between individuals with the expectation of mutual benefit. Companion trust comes from cooperative behavior towards others that is based on mutual expectations and reciprocity. Commitment trust comes from formal arrangements and obligations; whereas, companion trust is from personal connections and emotional connections with others based on shared experiences or purpose. Competence trust is based on the perception of another's ability to carry out a task based on perceived skills and abilities. Competence trust can lead to respect and a positive reputation held in another (Tansley & Newell, 2007). These authors identified all three trust types as necessary elements within project teams and to achieve project success where commitment trust focuses on the project goals, companion trust focuses on individuals working together towards a collective approach, and competence trust focuses on technical knowledge and expertise brought to the project team. Tansley and Newell's study demonstrated "… the multiple types of knowledge that a project leader needs to acquire and skillfully use in order to build trust and exploit the different aspects of social capital" (p. 365) that are necessary for project success.

Their study also showed that structural relations determine the type of project leadership trust needed, where external leadership interactions with various stakeholders relied on commitment trust, internal leadership relied on companion trust to manage diverse, individual project members' motivation and support, and a hybrid leadership approach based on competence trust was needed to integrate the functional and technical

aspects of the project. Gillespie and Mann (2004) studied R&D teams and team members' trust in the leader and showed that leadership and shared values contribute to building trust towards team leaders. These and other studies on trust and leadership have reinforced the importance of relational social capital for team functioning and performance, specifically, where tasks are complex, unstructured, require interdependence, and rely on information sharing (McAllister, 1995).

Another perspective provided from the literature review is a clan control perspective of relational social capital attributes (Chua et al., 2012). The concept of clan control is the use of socialization mechanisms for developing and building a clan or a similar group of individuals. Rowe and Wright (1997) identified the purpose of clan control is to reduce dissimilarities across individuals to focus on creating norms to facilitate group success. Chua et al. (2012) found that the relational attributes of social capital developed not only through social activities outside of the project (e.g., team dinners), but also through the "projection of management sincerity and honest" (p. 594).

Integrity is an aspect of trust that focuses on individual's expectation that group members will follow a defined and accepted set of values, norms, and principles (Chiu, Hsu, & Wang, 2006). Nahapiet and Ghoshal (1998) stated that individuals are more willing to share and engage in cooperative interaction in the presence of trust. Their idea reinforced Nonaka's (1994) statement that trust creates an environment for knowledge sharing. The relational aspect of social capital creates and maintains exchange relationships that lead to knowledge sharing and knowledge integration.

The primary purpose of relational social capital within a project team is to facilitate knowledge exchange between individuals for a group benefit. The ability to work with others becomes part of the collective (Wasko & Faraj, 2005). But there is a balance between benefit for the group and benefit for the individuals. Scacchi, Feller, Fitzgerald, Hissam, and Lakhani (2006) found that reciprocity is necessary to sustain supportive relationships and mutually beneficial collective actions. Their findings support the role that social capital plays in knowledge sharing and knowledge integration. One challenge Leana and Van Buren (1999) identified is that the stability in relationships ensures social capital is used for public good rather than personal benefit. Project teams don't have the benefit of stability, by definition, and there must be a beneficial balance achieved through reciprocity of relationships. Blatt (2009) found that relational capital increases with a group's embeddedness, supporting the stability in relationships and that team structure determines social capital benefits. Thus, the challenge for a project leader is to develop a collective group without the advantage of stability or embeddedness from the temporary project structure that provides a benefit beyond the individual team members.

Relational social capital integrates the interpersonal and intangible aspects that facilitate knowledge integration and project performance. Trust, norms, obligations, and expectations are meaningful relational aspects of project leadership because the project leader has the hierarchy of power and must work to bring diverse, individuals together to perform as a collective group. The a priori model of this study accounts for the definition of project teams and proposes that a project leader's social capital can be a surrogate for

the lack of project team's stability and embeddedness. Project leaders can lead diverse individuals to work together as a collective group and to encourage collective benefits over individual benefits. Through a project leader's relational social capital, trust can build in one another, norms can create stability, commitment can increase, and project members can begin to identify with each other (Bolino, Turnley, & Bloodgood, 2002).

Cognitive social capital. The definition of the cognitive constructs of social capital focuses on the sharing of context for exchange. Nahapiet and Ghoshal (1997) stated that knowledge creation requires both knowledge exchange and knowledge combination, and this occurs through in three ways "-first through the existence of shared language and vocabulary; through common experience and the development of shared tacit knowledge; and through the sharing of collective narratives" (p. 37). Cognitive social capital develops through both explicit and tacit knowledge forms. The explicit knowledge form occurs through codification and capturing knowledge in written and organized formats shared with others. The tacit knowledge form occurs through verbal communication and personal experiences. Both explicit and tacit knowledge allows for knowledge sharing across individuals and within various social structures that can lead to shared understanding.

Explicit forms of cognitive social capital attributes are easier to understand within the project management processes. Codes are easily communicated and understood languages that embody knowledge. Project management professionals encapsulate project management knowledge in defined, standardized, and codified frameworks like project charts, work breakdown structures, critical path analysis, and project status

meetings. It is the tacit knowledge forms that are harder to codify and integrate within the project team.

Michael Polanyi (1966) defined knowledge as tacit and gained through personal experience. His perspective is phenomenological and not based on reason. Polanyi stated "we know more than we can tell" (p. 4) and this means it is difficult to provide a reason to something we know, as "knowledge is an activity which would be better described as a process of knowing" (p. 132). The integration with others comes from the idea that the knowledge is contextual and within the knower's mind and it needs to be integrated with others.

Individuals have the cognitive capability to understand and apply knowledge. Wasko and Faraj (2005) stated that for individuals to share knowledge they must be not only motivated, but they must also believe their contributions matter. These authors evaluated cognitive social capital through individual expertise and tenure of experience. Their findings illustrated that cognitive social capital is a vital part of knowledge contribution because individual expertise increased knowledge sharing and experience helped determine the relevance of the type of knowledge shared. Tiwana and McLean (2005) studied how individually held expertise in information system development teams resulted in creativity, and they found a positive and significant relationship between expertise integration and creativity. Their findings implied that teams that used individual members' expertise to allow individuals to build on each other's knowledge, skills, and perceptive were more likely to be creative. They defined expertise integration as "the coordinated application of individually held specialist expertise in the accomplishment of

tasks at the project level" (Tiwana & McLean, 2005, p. 17). The process of expertise integration involves the conversion of knowledge socially derived from shared meaning and narratives where individually held expertise is integrated at the project level. The concept of expertise knowledge among project team members provides a focus on individual knowledge and how it is integratively applied within the project team through cognitive social capital attributes.

Developing shared mental models within a team aids in integrating diverse expert knowledge both explicitly and tacitly. A shared mental model is a term used to represent knowledge structures held by team members that enable them to coordinate action and adapt behavior (Levesque, Wilson, & Wholey, 2001). Given that individual experts hold different knowledge, integrating them at the project level is the challenge for the project leader. Levesque et al. found that team members' mental models did not become similar over time. The role differentiation actually increased in teams, over time, and this led to decreased interaction and a decline in teams' shared mental models. The goal in applying cognitive social capital is not to hold a common perspective, but to hold multiple perspectives that are relevant to the group and project task. Levesque et al. challenged the assumption that the project task remains constant over time and stated that expert knowledge may vary over the project life cycle and that different forms of cognitive knowledge need to be integrated at different points in the project.

Bolino et al. (2002) stated cognitive social capital provides a common perspective that enables similar perceptions and interpretation of events. The purpose of this common perspective is to increase the level of understanding among team members. These

authors' propositions, although not empirically tested, stated that cognitive social capital contributes to organizational performance through social participation and advocacy participation. Social participation provides the narrative of the organization that can occur during required business activities and also through optional functions and social events. Advocacy participation encourages sharing, voicing of opinions, and participation. Wasko and Faraj (2005) stated frequent interactions could lead to learning, skill development, knowledge, and common conventions that contribute to cognitive social capital. These authors, however, did not draw a distinction between business and nonbusiness activities for developing shared interpretations and meanings within the group.

Prior findings by researchers show how shared experiences can have a positive association on shared meaning and cognitive understanding, but of each of the social capital dimensions it is the cognitive dimension that has received less research attention than the structural attributes of social capital (Mäkelä & Brewster, 2009).

Knowledge Integration

Knowledge is an important organizational resource and capability that can be a competitive advantage (Grant, 1996b). Okhuysen and Eisenhardt (2002) stated, "a fundamental activity of groups is the integration of individual knowledge for collective knowledge" (p. 370). The need for knowledge integration in project teams is important because teams consist of a diverse group of individuals coming together to achieve a common goal. The project leader has the responsibility to integrate this disparate knowledge across multiple disciplines (Fong, 2003) to achieve the desired project

outcomes. Knowledge integration refers to the knowledge application (Grant, 1996B), the synthesis of disparate knowledge (Alavi & Tiwana, 2002; Fong, 2003), or a collective process that shares individual knowing and combines the individual knowledge to redefine it into new knowledge (Huang & Newell, 2003; Okhuysen & Eisenhardt, 2002).

Nahapiet and Ghoshal (1998) used the term intellectual capital and defined it as the "knowledge and knowing capability of a social collectivity" (p. 253). Their definition focused on defining knowledge within a social context. This aspect resonates in the various knowledge integration definitions that consistently refer to knowledge integration as a collective process to bring together dispersed and differentiated knowledge (Grant, 1996a) from different people and places to create value for situation-specific systematic knowledge (Alavi & Tiwana, 2002).

Wasko and Faraj (2005) empirically tested a model of knowledge contribution using individual motivations, and structural, cognitive, and relational dimensions of social capital. They found that individuals are willing to contribute knowledge when it is perceived to enhance professional reputations, when they have experience to share, and when structurally embedded in the network (Wasko & Faraj, 2005). Okhuysen and Eisenhardt (2002) studied a more structured type of knowledge contribution by focusing on how formal interventions improve the knowledge integration abilities within teams. These authors looked at information sharing, managing time, and questioning others. They found that managing time and questioning others exhibited greater knowledge integration outcomes. Okhuysen and Eisenhardt distinguished between knowledge integration and knowledge sharing and recognized these differences can influence and

improve project team processes. Other studies also distinguish knowledge integration into processes or categories that included creation, application, integration, and retention (Kraaijenbrink, 2012) or collection, interpretation, and assimilation (Roussel & Deltour, 2012).

Huang and Newell (2003) studied knowledge integration within cross-functional project teams based on Grant's (1996a) theory of knowledge integration. To understand the complexity of knowledge integration that involves both tacit and explicit knowledge forms, Huang and Newell used the knowledge integration definition as "an ongoing collective process of constructing, articulating, and redefining shared beliefs through social interaction of organizational members" (p. 167). The definition is also consistent with Fong's (2003) five processes of project knowledge: (a) boundary crossing, (b) knowledge sharing, (c) knowledge generation, (d) knowledge integration, and (e) collective project learning. Both Huang and Newell's and Fong's definitions include the knowledge process of generation, codification, and transfer (Davenport & Prusak, 1998) needed for application within project teams supporting that knowledge is a social process.

Expanding on the importance of knowledge integration and project success, Stashevsky and Koslowsky (2006) specifically studied the knowledge level of teams as a measurement of team performance. They concluded that team performance is a function of knowledge levels and cohesiveness showing a direct relationship between knowledge integration, people-orientation, and results. When team members understand each other better and know what each other does, they can relate to each other and develop cohesiveness as a team that can lead to sharing and positive project results. It is the

project leader's responsibility to build cohesiveness in the team, and knowledge integration is one element for achieving this. Mitchell (2006) studied knowledge integration by examining on time completion of 74 information technology projects and the relationship of both internal and external knowledge to project success. He concluded higher levels of knowledge integration minimized project delays; however, the role of the project leader in the integration process was not discussed in this study.

Mitchell (2006) defined knowledge integration through not only the internal project team knowledge sources, but also through external sources. Bossink (2007) further supported knowledge integration internally and externally with case studies of four projects in the Dutch house-building sector. He found one project failed because the project manager did not collect information and integrate knowledge within the project (Bossink, 2007). The three other projects did integrate specialized knowledge from external sources resulting in the project successes. Govindaraju, Bramagara, Gondodiwiryp, and Simatupang (2015) also found that internal and external integrations were necessary, and internal integration led to process performance of delivering projects on time and on budget, whereas external integration led to product performance or the scope and quality of the end product. A project leader must conduct activities to generate knowledge, share knowledge, and transfer knowledge within the project team and across multiple information sources that are inside and outside the organization (Fong, 2003; Huang & Newell, 2003; Ratcheva, 2009) supporting the study of social capital, knowledge integration, and project success and the a priori model of this study.

Knowledge integration requires horizontal and vertical coordination mechanisms (Mitchell, 2006) and the development of social capital can assist both internally and externally with stakeholders. Thamhain (2004) stated the project leader must be not only technically competent but also socially competent. Internally, the project manager must work with senior management and understand the broad organizational objectives and how the project contributes to corporate success. He stated "effective project managers create a sense of community across the whole enterprise" (Thamhain, 2004, p. 540). Integration with top management is a common theme in successful projects (Barczak et al., 2009; Belassi & Tukel, 1996; Chollet et al., 2012; Fortune & White, 2006; Pinto & Slevin, 1988). Externally, the project manager must focus on customer requirements and client satisfaction (Pinto & Mantel, 1990) and the integration of consultations or knowledge expertise when needed (Huang & Newell, 2003). Albert (2007) examined team success factors and included the need to develop and codify organizational knowledge. Albert specifically focused on a multidisciplinary approach of codifying knowledge through the use of subject matter experts (SMEs) and the understanding of other disciplines as components of team success.

The task- and people-oriented aspects of knowledge integration are complex in project leadership. The complexity comes from the multidisciplinary team members' composition, technical requirements of projects and project management tools, tacit and explicit knowledge forms, and internal and external knowledge sources and stakeholders. Project leaders need to build on prior team member experiences and create greater collaborative efforts that will cohesively bring a project team together for a common goal

(Huang & Newell, 2003). Understanding knowledge integration is difficult because it requires a focus on the behavioral aspects of projects that have largely been ignored in the project management literature. The recent findings of the empirical research are evolving project management to focus on the importance of project leadership and the need to better understand the behavioral elements of projects. The complexity of project leadership and the need for knowledge integration skills are important to understand and knowledge management practices can aid the project leader in integrating, storing, and reusing knowledge from projects and its team members.

Knowledge management practices. Knowledge management provides a framework for knowledge integration and fosters the creation, dissemination, and embodiment of knowledge within an organization for new uses and innovation. Project teams can use knowledge management practices as a means of integrating knowledge within the project through both codification (explicit) and personalization (tacit) strategies (Kasvi, Vartiainen, & Hailikari, 2003). Nahapiet and Ghoshal (1998) argued that social capital creates organization knowledge.

PMI (2008) identified key knowledge areas important to project management. Integration, as stated within the knowledge areas, is the "characteristics of unification, consolidation, articulation, and integrative actions that are crucial to project completion, successfully meeting customer and other stakeholder requirements, and managing expectations" (PMI, 2008, p. 77). Although the knowledge areas of PMI do integrate internal and external stakeholders similar to knowledge integration studies by Mitchell (2006) and Bossink (2007), they do not address the project leader competencies of

integration involving concerns for people and knowledge. PMI focused on routine tasks performed within a project team to provide integration including project scope statements, project charters, work breakdown structures, project status reports, and risk management activities. Reich and Wee's (2006) research parallels the task focus in the PMI's knowledge areas. Reich and Wee examined project management processes in relation to knowledge management principles. The review of the PMBOK® Guide's eight knowledge areas revealed most knowledge management activities within project management consist of technical processes that exist in explicit forms, such as project charters, project scopes, and project management plans (Reich & Wee, 2006). They found no tacit knowledge integration within the PMBOK® Guide. The authors did not discuss project leadership as a means to foster and facilitate knowledge integration in their article; however, they did discuss the use of knowledge maps, knowledge inventory, and lessons learned with regard to knowledge management practices (Reich & Wee, 2006).

Ajmal and Koskinen (2008) identified different knowledge transfer processes between functional organizations and project-based organizations. Functional organizations neatly organized and departmentalize knowledge; whereas, project-based organizations have individual team members transmitting dispersed knowledge (Ajmal & Koskinen, 2008). There is a need to integrate knowledge better within the team and throughout the organization because project knowledge is "infrequently captured, retained, or indexed so that people external to the project can regain and apply it to future tasks" (Ajmal & Koskinen, 2008, p. 9). These authors stated leadership is lacking in the

knowledge transfer process and organizational culture is a critical component of knowledge management practices within project-based organizations because "the biggest challenge for knowledge transfer is not technical (which can be overcome with IT systems), but cultural" (Ajmal & Koskinen, 2008, p. 12). The research shows task-orientation can aid in the implementation of knowledge management practices as project managers are effective at process. The challenge of implementing knowledge management practices within a project is, once again, the relationship-oriented focus needed to use the knowledge stored within the processes for the creation of new knowledge that can benefit future projects and innovation.

The focus on knowledge integration was about the behavior side of project management. Knowledge management practices aid knowledge integration through the development, transfer, and use of knowledge through social activities (Brookes, Morton, Dainty, & Burns, 2006; Jackson & Klobas, 2008). Jackson and Klobas stated knowledge is a social process. Newell et al. (2004) stated individuals need to access their social capital to integrate and access dispersed knowledge. The knowledge integration literature discussed eludes to the social process of knowledge and knowledge integration. Day, Gronn, and Salas (2004) integrated social capital within their team leadership model. They based their model on a "leadership-as-outcome perspective," which emphasizes the development of team leadership within the team and its use as a resource for future activities. This model supports the need to build on prior knowledge integration and the need to use past experiences for future success (Ajmal & Koskinen, 2008). Consistent with Fong's (2003) knowledge creation processes, the basis of knowledge generation lies

in social networks and collective project learning that is nonlinear and interwoven throughout many project sources and resources. All teams consist of a group of individuals brought together to achieve a common goal; all teams start with the individual. Social capital focuses on building relationships among individuals that will enhance the output of the team with cooperation, connectivity, and resource exchange (Day et al., 2004). Project teams need to bring human capital, defined as knowledge, skills, and abilities, together through the project leader's social capital for knowledge integration and project success.

Project Management Success Factors

A key focus of the literature review on project management success factors was to understand the elements linked to positive project outcomes. A review of the literature revealed a vast number of critical success factors and a lack of agreement on the most important success factors.

Fortune and White's (2006) exhaustive literature review on project critical success factors consisted of 63 publications. They identified the top three cited factors as top management support, setting clear and realistic objectives, and project plans. However, of all the articles reviewed, only 17%, or 11, of the articles cited all three of these factors together. Fortune and White further stated 27 critical success factors that have been cited 397 times by the 63 publications for an average of 14.7 critical success factors in each publication. The complexity of these citations demonstrates a lack of agreement on project success factors.

Because of this complexity and lack of agreement on critical success factors, researchers have defined the difference between project management success and project success (Anantatmula, 2010; Baccarini, 1999; Cooke-Davies, 2002, de Wit 1988). Project management success is process oriented and project success is the effective use of the end product or the overall project output. Cooke-Davies (2002) defined success factors as the inputs to the management process that leads to the project success. Most of the literature on the critical success factors ends up integrating both project management success and project success. The intermingling of both project management success and project success is related to the overall project and it is difficult to isolate each one in the discussion of project critical success factors. Baccarini (1999) would not agree with this intermingling and integration as he defined project success at the two levels of project management success and project success with the former process oriented and the later defined as use of the end product. However, process (how we do things) and behavioral elements (why we do things) should not be isolated as they both contribute to the goal, purpose, inputs, and outputs of a project within the logical framework proposed by Baccarini despite his separation of success levels. The intent of my research study was not to produce a list of project critical success factors, but it did attempt to evaluate how a project leader's social capital and knowledge integration abilities relate to project success.

Project management success cannot focus on process only. Tasks cannot be isolated from people, as people are part of the project management system. Similarly, Jugdev and Müller (2005) discussed differences in their literature review through the

terms of efficiency and effectiveness. They stated the project management literature continues to focus on operational, or task-oriented, aspects by focusing on value creation through operational efficiency; where, “efficiency is widely known as doing things right, and effectiveness as doing the right things” (Jugdev & Müller, 2005, p. 20). These authors stated the focus on project management success and project success around efficiency suspends project management research as an operational asset that is task-focused. Project management needs to evolve and include both the how and why, efficiency and effectiveness, and task and behavioral aspects to view project management as a strategic asset that creates value and leads to a competitive advantage. Jugdev and Müller specifically stated “our views on project success were narrowly defined over the years” (p. 21). The narrow definition is a result of the operational focus of project management and the separation of processes and results in the development of project success factors.

Kloppenborg and Opfer (2002) supported the project management literature narrow focus based on a review of 3,554 articles written between 1960 and 1999. The most cited knowledge area (64%) was cost, time, and the least cited knowledge area (4%) was human resources. Most research focuses on managing projects “as technical systems instead of behavioral systems” (Belout, 1998, p. 22). Kloppenborg and Opfer also identified future research opportunities to include “the evolution of the project manager’s role to demonstrate more leadership than project management” (p.13) supporting the need for project leadership research as an element of project success.

The literature supports the need to focus on both task- and behavior-oriented elements that contribute to project success. One legacy aspect of project management is the project triangle that focuses on three main areas of trade-offs in project success, including time, cost, and scope (Atkinson, 1999; PMI, 2009). These project success factors take a process-oriented and task driven perspective focusing on meeting the defined schedule, staying within the budget, and producing functional and technical specifications based on the project scope (Baccarini, 1999). Other studies specifically focus on the behavioral aspects of project success factors. Ram et al. (2013) found that behavioral critical success factors impacted project success more than technical success factors in ERP projects. Studies about knowledge creation, sharing, and integration found these aspects positively associated with project success (Aslam et al., 2003; Cooke-Davies, 2002; Newell et al., 2004; Robert et al., 2008; Weck, 2006).

Korrapati and Kocherla (2013) stated the tri-factor theory of project success includes three important success factors but the challenge is that IT projects continue to fail at a high rate, indicating the need for additional factors to measure project success. These researchers focused on the behavioral aspects of projects and studied managerial styles relationship to software development project success. Korrapati and Rapaka (2009) also studied leadership styles in determining IT software successes and failures in offshore centers in India. Given the limited studies and the limited focus on project leadership as a success factor, there is a continued emphasis on the task-oriented processes of project management and a void in the literature on the behavioral aspects of project leadership. The review of the critical success factors identified future

opportunities for the development of project leadership competencies focusing on knowledge integration skills and social capital development as emerging project leadership competencies (Ratcheva, 2009). The framework of this study attempted to integrate both the task- and the behavioral-oriented perspective of projects by integrating both within the a priori model to understand how project leadership and its task and behavioral aspects may or may not contribute to project success.

Project Leadership. Project managers must deal with both task and behavioral aspects of project management. Research has primarily focused on the tasks competencies of project management, but a few studies have integrated the behavioral aspects of project leadership on project success (Jacques et al., 2008; Kloppenborg et al., 2003; Thamhain, 2004). For example, PMI commissioned Turner and Müller (2006) to study project leadership styles and the relationship to project success because of the lack of research studies about leadership style and project manager competency as an element of project success. Their research found that a project manager's competency of personal characteristics positively correlated to project success, and different project manager competencies correlate with different types of projects and at different stages of the project life cycle. Balkundi, Kilduff, and Harrison (2011) specifically studied charismatic leadership style and found charismatic leaders as high performers, but the extent of the leader's charisma depended on the leaders' centrality and their structural social capital. These authors proposed a centrality-to-charismatic model that is contrary to Bono and Anderson's (2005) study that found the charismatic leadership style influenced centrality. Both studies found that charismatic leadership, regardless of how it was developed, leads

to team performance. Trent (2004) also identified the importance of leadership and team performance by listing team leadership skills as an important project factor given the role project leaders have on the team dynamics, individual followers, and the organizational success. He indicated that project leaders are involved with multiple levels within an organization, further supporting the need for project leaders with diverse skills.

Anantatmula (2010) argued the relationship between project leadership roles and responsibilities and project outcomes. This author developed a list of common people-related factors that may relate to project success and ranked the order of priority based on survey results. These ranked factors included "defining roles and responsibilities, communicating expectations, creating clarity in communication, establishing trust, employing consistent processes, facilitating support, and managing outcomes" (Anantatmula, 2010, p. 18). A project performance model was then developed to illustrate how the rankings establish a givens-means-ends model to understand the relationships among the factors. The conclusion was that project outcomes are dependent on project leaders establishing trust and open communications within the project team. Boyatzis and Ratti (2009) evaluated effective and ineffective Italian leaders and categorized project managers into three categories of emotional, cognitive, and social intelligence competencies. Kaminsky (2012) evaluated nontechnical leadership practices on project success within information technology projects and found both technical and nontechnical practices are important for project success. Technical factors included time, cost, and quality management and nontechnical factors included adaptability, delegation, and facilitating learning. However, Kaminsky's study did not measure project success

based on the identified leadership factors and only conducted survey research to identify the nontechnical leadership factors viewed as critical to project success.

Project managers need diversity of skills. Jacques et al. (2008) analyzed the leadership skills between general managers and project managers to understand better the diversity of skills needed by project managers. Their study concluded that project managers are more people focused than general managers; general managers are more concerned with tasks. The authors also proved project leaders have a better balance between the two concerns of task and people than general managers. The study by Jacques et al. contrasted with research findings from Mäkilouko (2004) on multicultural project leadership. The researcher studied three project leadership styles as ethnocentric (task-oriented), synergistic (people-oriented), and polycentric (task- and people-oriented). Mäkilouko found task-oriented or ethnocentric leadership styles with 40 out of 47 project leaders and only seven leaders identified with people-oriented or synergistic leadership and a blend of task- and people-oriented or polycentric leadership styles. Differences between these two studies may be attributed to the research settings between education settings (Jacques et al., 2008) and multicultural business settings (Mäkilouko). Business settings can require more accountability of the project leader, and different leadership styles may be necessary given responsibilities to various stakeholders outside the project team. The differences in leadership focused on task and people are also consistent with Turner and Müller's (2006) research that different projects require different leadership competencies.

Recognizing the leadership literature is vast, this literature review on project leadership focused on both the task- and behavioral-oriented studies of project success. This literature review does not attempt to study all the project leadership competencies in the literature exhaustively. It attempted to identify those main aspects of behavioral-oriented leadership actions to understand if studying a project leader's social capital is relevant to knowledge integration and project success. A key finding was that project leaders must integrate both the task and behavioral aspects of a project to achieve success. Project leaders have an important behavioral role within project teams and the common literature themes of trust, communication, and relationships fit within the social capital constructs used in the model for this study. The a priori model of this study attempted to develop a better understanding of the behavioral aspects of projects and, specifically, how a project leader's social capital can contribute to knowledge integration and project success.

Summary and Conclusions

Social capital is the network of relationships accessing and utilizing various resources to achieve results. The relationship of multidisciplinary team members, the use of various internal and external resources, the need and ability to integrate knowledge from diverse sources, and the focus on project results support the need to understand a project leader's social capital. The seminal theorists' definition of social capital illustrated that social capital creates value. Nahapiet and Ghoshal (1997) brought social capital into organizational research by defining organizations as social entities and developing a model of how social capital creates value within firms through structural,

relational, and cognitive attributes. All three of these dimensions are elements of team performance; however, there is limited empirical research identifying how a project leader's social capital is related to project team knowledge integration and project success (Brookes et al., 2006; Jackson & Klobas, 2008; Tansley & Newell, 2007). It is the project leader's responsibility to foster a team environment for knowledge sharing, integration, and application that can lead to project success. Figure 2 contains a summary of the theoretical foundations of the a priori model of this research study, based on the literature review presented in this chapter. The research design process, described in Chapter 3, supports the literature findings of the theoretical construct and the framework for this study that attempted to understand the behavioral aspects of project teams.

Social Capital: utilization of relationships accessing potential and available resources gained through human interactions that can be combined and exchanged for potential benefits (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998)

Structural	Relational	Cognitive
Ability to access information in appropriate content	Benefits of relationship and how it affects behavior	Sharing of context for information exchange
Bridging relations: - External ties - Knowledge heterogeneity - Network range - Vertical relationships (top management support) Bonding relations: - Internal ties - Knowledge homogeneity - Network depth - Horizontal relationships - Managing complementary and conflicting resources	Levels of Trust: - Commitment trust (project goals) - Companion trust (working together towards collective approach) - Competence trust (technical knowledge and expertise) - Trust, norms, obligations, expectations, and identifications - Level of engagements and commitment - Clan Control (creates norms through social activities) - Reciprocity (supports stability and group embeddedness)	Explicit vs. tacit exchange: - Codification / written - Verbal / personal experience Contextual elements: - Shared language and vocabulary - Common experience - Collective narratives Knowledge contributions: - Expertise integration - Motivated to share - Believe contributions matter and add value - Individual expertise / tenure of experience - Shared mental models
Provides different types of knowledge for integration	Type of structural relations determines types of project leadership trust needed	Facilitates knowledge contributions to provide value

Knowledge Integration: the ability to recognize, combine, and use knowledge gained form others through sharing, collaborating, and communicating to create new knowledge

- Project knowledge processes: (a) boundary crossing, (b) knowledge sharing, (c) knowledge generation, (d) knowledge integration, and (e) collective project learning
- Combines technical and social competences
- PMI identified integration as one of eight key knowledge area. Defined integration as the "characteristics of unifications, consolidation, articulation, and integrative actions that are crucial to project completion, successfully meeting customer and other stakeholder requirements, and managing expectations (PMI, 2008, p. 77)

Project Success: the closure of a project from beginning to end meeting the project scope, time, and cost

- Complexity and lack of agreement in the literature on project critical success factors
- Project management success (process-oriented) vs. project success (behavioral-oriented)

Figure 2. Summary of a priori model variables based on the literature review. Author constructed.

Chapter 3: Research Method

Introduction

In this study, there is a posited relationship between a project leader's social capital and knowledge integration within the project team and its project success. The a priori model (see Figure 1) developed attempted to model these relationships to allow for the study of the structural, relational, and cognitive variables of social capital theory. The purpose of this chapter is to describe the quantitative research methodology of this study and to explain the research design of and rationale for the a priori model of this study. Included are (a) a detailed discussion of the research methodology, including a discussion on the proposed target population and sampling methodology; (b) an explanation of the self-designed survey instrument (see Appendix A), and (c) a discussion of the results of the pilot study of the survey instrument to address the instrument's validity, reliability, and the operationalization of the model constructs. The chapter concludes with a discussion about data collection and analysis procedures, threats to validity, and the ethical considerations of the study.

Research Design and Rationale

Creswell (2009) identified the three primary types of research design as quantitative, qualitative, and mixed methods. For a research design to deliver valuable and meaningful research outcomes, he suggested evaluating the context of the research and its desired results. A research study tends to take on characteristics of its research design based on the research strategy employed and the specific methods used for implementing these strategies (Sjoberg, 2011).

Social capital theory informed the research design for this study, which involved the use of a quantitative strategy of inquiry addressing a deterministic approach. Creswell (2009) stated that a deterministic approach is part of a postpositivist view because while researchers cannot be positive about study findings, they can determine, through empirical observation and measurement, what causes probably determined effects or outcomes. Because the goal of this study was to identify and assess if and how social capital relates to outcomes, the deterministic, postpositivist research design used in this study was appropriate. Although it is difficult to measure behavior and actions of others, the reductionistic lens used in this study enabled a focus on three specific aspects of social capital (structural, relational, and cognitive dimensions) in an attempt to explain, based on participant observations, the realities within a project team. Understanding these social capital realities and validating the claims of the a priori model constructed are within the context of this study. The quantitative research approach enabled a specific focus on understanding these observations and the relationship between the variables of the study (Creswell, 2009) from the perception of the team members.

The choice of a quantitative, correlational research approach for this study was made to gain insights into the social capital and knowledge integration abilities of project leaders, and to understand how these behavioral and relational skills may or may not correlate to project success. This type of study allowed for the exploration of variables and the relationships of variables through hypothesis testing (Creswell, 2009; Swanson & Holton, 2005). A quantitative approach enabled the testing of the proposed theoretical

model and hypotheses (see Table 1) based on the literature review of how to measure social capital and knowledge integration within a project team.

The use of a quantitative approach also minimized the potential for bias because it did not involve the subjective evaluation of data (Creswell, 2009). Human persuasion could be prevalent in a study of behavioral and relational aspects of social capital because such a study attempts to understand the actions and behaviors of the project leader. However, the quantitative survey and statistical analysis approach selected relied on objective methods for data collection and analysis, reducing opportunities for bias or human persuasion and focusing on the testing of the a priori model of the study. A qualitative design was not appropriate because an exploratory analysis of the various factors of social capital was not part of this study.

A quantitative approach enabled the alignment of the a priori model under study with research questions that addressed team members' perceptions of the social capital of project leaders and its relationship to knowledge integration and project success. A social capital framework, as defined by Nahapiet and Ghoshal (1998), served as the foundation for the conceptual model linking the relational, structural, and cognitive dimensions of social capital to knowledge integration and project success. The Likert scale survey questions collected data about these specific dimensions of social capital and the knowledge integration abilities of project leadership.

The study was confirmatory in nature because it attempted to determine the extent the a priori model was consistent with the empirical data collected. Participant interviews may provide insight into different or more specific elements of social capital and a

qualitative approach may have merit, but the complexity and exploratory aspects of such a design serve a different purpose and seemed beyond the scope of this study. It is important to first understand the potential relationship of social capital on knowledge integration and project success. It is only then that additional qualitative, exploratory research could help to redefine the social capital constructs within a project team. Given the complexity of different types of projects within the project management realm, other qualitative research designs such as case study or ethnographic methodologies may be too narrow in scope and limit the generalizability to various project management projects.

A quantitative research design best matched the purpose of this study and provided a means to measure intangible aspects of social capital, knowledge integration, and project success. In principle, a project leader's social capital and knowledge integration abilities are intangible and unobservable, and thus cannot be measured or assessed. These unobservable variables are latent, or endogenous, variables. To attempt to measure these latent variables, researchers assign observable, or exogenous, variables that influence the unobservable and assist in explaining the relationship of the observed variables to the unobserved variables, where essentially one aids in measuring the other (Bollen & Lennox, 1991; Savalei & Bentler, 2006).

The exogenous, unobservable, independent variables in this study were the components of social capital that Nahapiet and Ghoshal's (1998) defined as relational, structural, and cognitive. Knowledge integration was the endogenous, unobservable, dependent variable of the study, and project success was the observable, dependent variable. Nahapiet and Ghoshal's framework allowed for a study design to measure latent

variables using survey research methods and SEM, and served as a tool to study the degree to which social processes relate to knowledge integration between people and groups. The study followed the premise that social capital and knowledge integration leads to positive outcomes.

Research Methodology

Social capital theory is the theoretical framework used to understand the interrelationships between multiple social capital variables, knowledge integration, and the project success of project teams. The objective was to study both the relationship of these social capital variables on knowledge integration, and to evaluate if social capital is related to a project leader's ability to integrate knowledge within a project team. Because social capital is multifaceted and some social capital variables are latent and difficult to observe, SEM "allows the expression of all of these relationships within one inclusive model rather than requiring the researcher to break up the relationships into a series of discrete hypotheses tested by separate analysis" (Markus, 2006, p. 236). Thus, the survey research method and use of SEM as a statistical analysis tool was appropriate for testing the measurements defined in the model for the latent variables, and for testing the actual model structure of the a priori model.

The use of SEM allows for both the measurement and the analysis of two elements of the a priori model. First, analysis of the measurement model provided a way to link multiple observable indicators to each latent or unobservable variable to understand the measurement model and the behaviors of the social capital and knowledge integration dimensions in the study (Long, 1983). Second, the structural part of the model

provided a framework for an overall analysis of a project leader's social capital and its relationship with knowledge integration and project success. Separate analysis of social capital would be difficult because of the covarying interrelationship of the structural, relational, and cognitive social capital variables. SEM integrates these relationships. Figure 3 highlights both the measurement model and the structural model in an expanded a priori model.

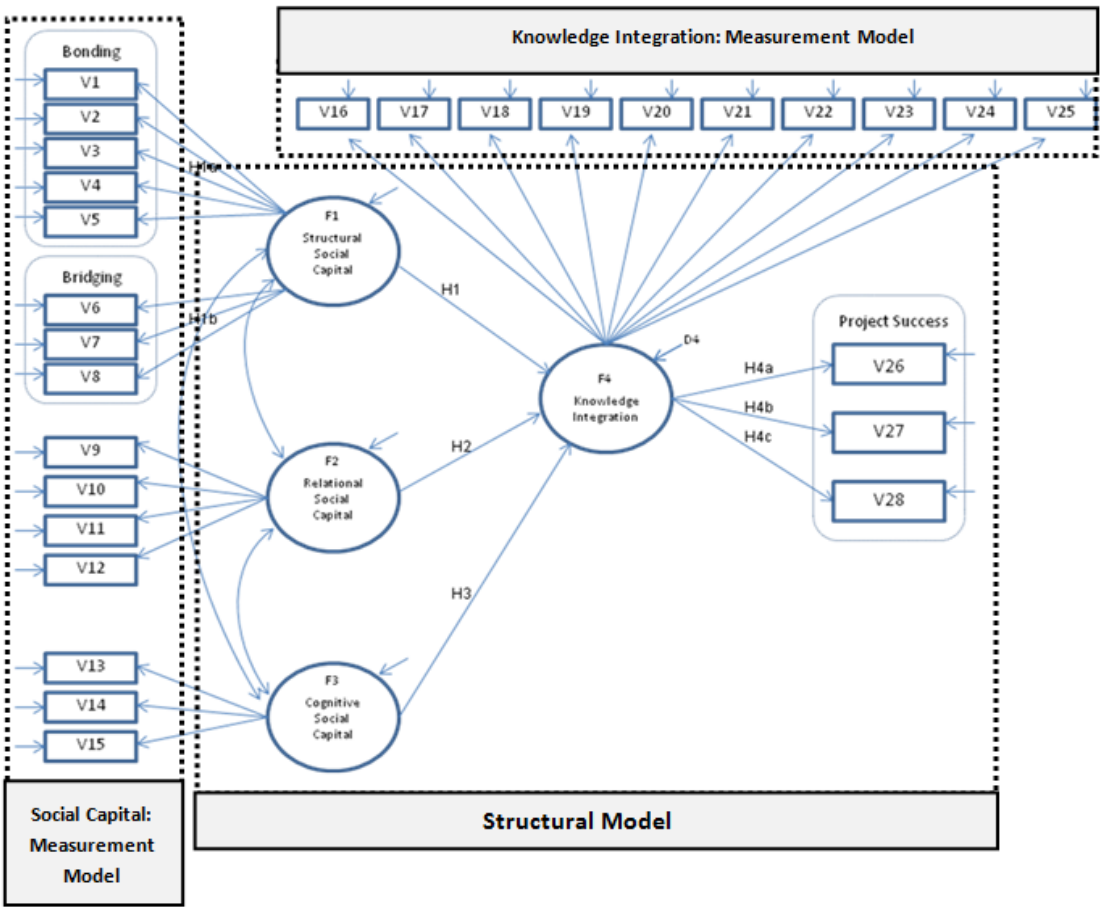

Figure 3. Expanded a priori theoretical model illustrating the structural model and the measurement models. Author constructed.

The use of SEM was most appropriate for this study because it did:

> incorporate multiple independent and dependent variables as well as hypothetical latent constructs that clusters of observed variables might represent. They also provide a way to test the specific set of relationships among observed and latent variables as a whole and allow theory testing even when experiments are not possible. (Savalei & Bentler, 2006, p. 1)

SEM allowed for analysis of the social capital variables related to the knowledge integration abilities within a project team and provided a comprehensive way to evaluate a complex, intangible topic. The structural model enabled the testing of the theoretical fit of the a priori model with SEM because it provided an opportunity to test if social capital does have a relationship with project management, and to better understand the desired project managers' behavioral skill set. It is possible to propose alternative theoretical models post hoc based on the data analysis and fit indices if the hypothesized overall model is rejected. This is important, and desirable, because multiple social capital cause variables may relate to the mediating and resulting variables in different ways, allowing the researcher to propose the best social capital theory model of knowledge integration within a project team.

Target Population

The research population of this study consisted of project management professionals that belong to various PMI chapters in North America. PMI is a non for-profit membership association for project management professionals and the local, autonomous chapters were the source of online survey distribution to project

management professionals via LinkedIn membership groups and chapter newsletters, as appropriate. The PMI sampling pool includes global membership of 437,576 with 280 PMI chapters (PMI Today, 2014). PMI members can also enroll in various geographical chapters for networking and skill development opportunities. Approval to conduct research with its members was sought from various North American PMI chapters. An advantage of the PMI population is the various fields and industries the global members represent and the cross-section of the population that can be drawn in this study.

Singleton and Straits (2005) defined sampling frame, or the operational definition of the target population, as "the set of all cases from which the sample is actually selected" (p. 116). In this study the sampling frame consisted of all members of PMI chapters that provided approval to participate in the study.

Sampling Method

A convenience sample of participants voluntarily accessed a survey hyperlink on participating PMI chapters LinkedIn group pages or a distributed newsletter. There were no limitations set on the participants based on specific types of organizations, industries, or organizational sizes. Given the broad reach of the sampling frame, it was important to screen participations having recent project management experience to minimize threats of external validity for survey responses. An eligibility qualification question asked participants if they had worked in a project team, as a project member, in the past 3 years. Only including participants with experience on a project team in the past 3 years minimized the external validity threat based on the desired characteristics of the sample to provide accurate inferences from the data collected.

Sample Size. SEM is appropriate for the complex, intangible examination of social capital and for testing the overall model fit of social capital theory within project teams, but it does require a large sample size. Jackson (2003) studied various approaches to estimating sample size in SEM and stated it is difficult to state how large a sample size should be. Researchers have not reached a consensus on the preferred sample size estimation method (Jackson) and various sample size techniques have been identified in the literature, including minimum sample size, number of observations per variables, power analysis, and parameter estimate ratios (N:q). Varying degrees of empirical research support each of these sample size techniques (Jackson), illustrating one is not preferred over another, that sample size should not be thought of in absolute terms, and that determining the appropriate sample size is challenging and based on model features.

Based on the literature review on sample size, a general rule is a minimum sample size of 100 (Kline, 2011), with preference for 200 or 5 to 20 times the number of parameters estimated, whichever is larger (Lei, 2006; Marsh, Hau, Balla, & Grayson, 1998; Nasser & Wisenbaker, 2003). Kline (2011) stated "sample size as the ratio of cases to the number of model parameters that require statistical estimates" (p. 12) should be considered. Based on the theoretical model of this study, a sample size range of 200 from the minimum recommended sample size or a sample range of 285 (5 x 57 free parameters) to 1,140 (20 x 57 free parameters) was recommended based on parameter estimate ratios. The most optimistic sample size goal of this research study was 285 to incorporate both the minimum recommended sample size and the minimum accepted parameter estimate ratio, but acceptable sample size was evaluated based on the various

literature recommendations discussed and the sample size achieved.

Survey Instrument Design

The a priori theoretical model was used to empirically examine a project leader's social capital and its relationship to knowledge integration abilities within a project team and project success. Each construct of the a priori model had survey questions developed to measure the constructs.

The first step in the survey design was to provide a definition for each construct of the a priori model. Table 2 provides a summary of the theoretical model constructs and a common definition for each construct based on a review of the literature, presented in Chapter 2, which supported the development of the survey questions.

Table 2

Proposed Theoretical Model Constructs

Construct	Code	Definition	Sources
Social Capital	SC	Potential and available resources gained through human interactions that can be combined and exchanged for potential benefit	Nahapiet & Ghoshal (1998); Tsai & Ghoshal (1998)
Structural	STRUC	Accessibility to knowledge resources; Range of information accessed by project leader (internal sources & external sources)	Burt (2000); Granovetter (1992); Nahapiet & Ghoshal (1998); Tsai & Ghoshal (1998)
Relational	RELAT	Trustworthiness of project leader; Norms of cooperation facilitated by project leader	Barney & Hansen (1994); Nahapiet & Ghoshal (1998); Tsai & Ghoshal (1998)
Cognitive	COGNT	The capability to share knowledge through common meaning; Shared, collective understanding of common meaning	Nahapiet & Ghoshal (1998); Tsai & Ghoshal (1998)
Knowledge Integration	KI	The ability to use knowledge gained from others through sharing, collaborating, and communicating; The ability to recognize and anticipate the value of knowledge received from others	Burt (2000); Cohen & Levinthal (1989, 1990); Grant (1996a, 1996b); Okhuysen & Eisenhardt (2002)
Project Success	PS	The closure of a project from beginning to end to meet the project scope, project timeline, and project budget	PMI (2008)

Survey questions were then developed based on the proposed model construct definitions and the literature review conducted in Chapter 2 (Appendix B). The survey questions were edited and reviewed to ensure only one item was contained within one questions, eliminating any double barreled questions, and to ensure the focus, clarity, and brevity of each question (Alreck & Settle, 1995). The survey questions focused on the

project member's perceptions of the behavioral aspects of the project leaders. The use of perceptions to research social capital and team relationships is consistent with prior studies and is supported by the literature review conducted in Chapter 2. Table 3 provides a summary of these literature findings.

Table 3

Literature Summary: Research Using Perceptions

Authors	Research Instrument	Research Method
Tsai and Ghoshal (1998)	Questionnaire; Answer based on own experience in recent past	Path analysis & MRQAP (SNA)
Aquino and Serva (2005)	Questionnaire; Measured perceptions of team and management	OLS
Chen, Chang and Hung (2008)	Questionnaire; Evaluated importance of social capital dimensions and assessed the creativity of teams	Factor analysis
Schenkel and Garrison (2009)	Questionnaire; Measured perceptions of team social capital	PLS
Yoo, Vonderembse and Ragu-Nathan (2011)	Questionnaire; Measured perceptions of knowledge within team along various constructs (intrinsic, contextual, actionable, knowledge quality)	SEM
Chang, Wong, Li, Lin and Chen (2011)	Questionnaire; Perceptions of team working relationships. Respondent frame of reference was a specific project involved in	PLS

Asking for a project member's perception was also consistent with the idea that social capital is an unobservable, latent variable accessed through observable actions of

an individual with others. Team member perceptions of specific actions imply elements of the social capital dimensions under study in this research plan.

A Likert scale was used to ask for team members' perceptions and provided a comparable scale for rating abilities across questions. The scale allowed the respondent to provide their perspective on the project leader's behavior. There is no right or wrong answer with a Likert scale since it provides only a degree of strength relative to the question (Spector, 1992) and this is especially helpful when measuring a project member's perception, as well as providing "…an easy, simple task to the respondent, ensuring cooperation and accuracy" (Alreck & Settle, 1995, p. 126). Table 4 provides a review of the survey questions based on each construct, with specific questions asked shown in Appendix A.

Table 4

Survey Questions by Theoretical Model Constructs

Survey Questions	# of Survey Questions	Model Constructs
Q1-Q5	5	Structural social capital (bonding)
Q6-Q8	3	Structural social capital (bridging)
Q9-Q12	4	Relational social capital
Q13-Q15	3	Cognitive social capital
Q16-Q25	10	Knowledge integration
Q26-Q28	3	Project success
Sub-Total	28	All model construct questions
Q29-Q37	9	Demographic questions
Total	37	Total survey questions (model constructs and demographic)

Appendix B contains a summary of the survey questions and the literature support for each question.

Pilot Study Results

The purpose of the pilot study was to test the reliability of the survey instrument developed for the a priori model of this study (Sjoberg, 2011). The development of the questions and scales used in the survey enabled the measurement of social capital in project leadership, knowledge integration, and project success. Expert review, provided by two faculty members from Walden University's School of Management, was obtained during the survey development and design stage to ensure content validity. The pilot

study provided the ability to test the self-designed research instrument, using a representative sample, and it followed the process proposed by Spector (1992) to conduct research properly as: (a) define constructs, (b) design scale with instruments, (c) administer pilot test, (d) item analysis with reliability analysis, and (e) validation and norm. The following provides a summary of the outcomes from the pilot study, including the pilot study sample, the item reliability analysis conducted, and validation and refinement of the survey instrument used in this study.

Pilot Study Sample. The sample pool for the pilot study consisted of students from the Center for the Professional and Continuing Studies at Mount St. Mary's University. The adult student population at the time of the pilot study was 413 students (349 MBA, 64 adult undergraduate and certificate programs). The sample was selected because it provided access to a diverse population of working adults that have project team experience in the workplace. Despite criticism of using college students for samples (Gordon, Slade, & Schmitt, 1986), this specific sample consisted of nontraditional, working adult students with job experience and they are an appropriate sample because the survey questions are relevant to the respondents with project experience (Ferber, 1977). Essentially, the adult graduate and undergraduate students are employees in business and can be an appropriate sample pool for the pilot study (Greenberg, 1987; Remis, 1986). The pilot study included an eligibility screening question and only those with project management experience in the past 3 years were eligible for participation.

Reciprocity was addressed between the researcher and the participants (Creswell, 2009). Because I am a faculty member at Mount St. Mary's University, the pilot study

was administered during the summer term when I was not teaching classes at the University or in the Center for Professional and Continuing Studies. If former students participated in the study, I would have been unaware of their participation because each survey was anonymous.

Over the two week data collection period, an attempt was made to improve the survey response rate. Sheehan (2001) suggested that follow up may improve response rates, and I did send a follow up email one week after the original survey request was sent. The administration of the survey in person could have also improved the response rate (Sheehan, 2001); however, this was not done because it could have had an ethical dilemma regarding reciprocity concerns because of my faculty status with the student population used in the pilot study.

Johanson and Brooks (2010) illustrated that there is no accurate sample size for pilot studies. These authors cited various articles recommending 10-30 participants, at least 12 participants, 10 cases, or 10% of project sample size as acceptable ranges of a pilot study sample. Their final recommendation, based on their study, is a pilot study sample of 24-36 participants. The pilot study I conducted returned 29 surveys or a 7.022% response rate. The sample size of this pilot study is within the recommended range discussed in the literature and it is coupled with appropriateness of the sample with working adults and the eligibility question requiring project management experience to participate. Appendix C provides the pilot study sample responses to the demographic questions.

Reliability Analysis. Analysis was conducted to test the survey instrument's reliability by examining its internal consistency (Carmines & Zeller, 1979). Cronbach's alpha (α), also known as coefficient alpha, measures internal consistency or the degree of responses that are consistent across items within a measure (Kline, 2011; Streiner, 2003). Because the survey design used various constructs of social capital, knowledge integration, and project success, it was important to evaluate Cronbach alpha for the grouping of questions for each construct (see Table 4 above) to understand the degree of homogeneity or heterogeneity of the questions, or if the questions consistently measure the same things. The reliability analysis results were used to refine the survey instrument for this study. Table 5 provides the results from the pilot study reliability analysis.

Table 5

Pilot Study Reliability Analysis

	Cronbach's Alpha	Cronbach's Alpha based on standardized items	N of Items
Total Survey	.917	.925	26
Structural	.667	.674	6
- Bonding	**.408**	.409	3
- Bridging	.639	.655	3
Relational	.861	.867	4
Cognitive	.644	.702	3
Knowledge Integration	.779	.812	10
Project Success	.789	.782	3

Every survey question cannot be perfectly written, and every survey question cannot perfectly measure the construct. Thus, a range of Cronbach's alpha scores is acceptable. Alpha is measured as a value from 0 to 1.0 (Spector, 1992). The larger the alpha value, the greater the internal consistency. The literature stated that an alpha of .90 is excellent, .80 is very good, .70 is good, and <.50 is cautionary as it is mostly due to random error (Spector). The resulting Cronbach alpha of .917 confirmed the instrument reliability. The amount of questions on the survey influenced this large Cronbach alpha, and the alpha lowers when each section of the survey is analyzed separately for each of the model constructs because of the fewer survey questions that measure each construct.

Nonresponse items and the completeness of responses were reviewed to determine the treatment of any missing data. The pilot study concluded with a very small amount of item nonresponse with 0.985% of missing data from the 29 surveys received. This percentage of missing data was calculated by dividing the 10 nonresponse items from the total 1,015 item responses available (29 surveys x 35 questions in pilot survey). DeLeeuw (2001) stated that a missing data rate of less than 2% is considered small.

Missing data from this pilot study was extremely small with minimal impact on the data analysis. Because of the small amount of item nonresponse, missing data was treated using listwise deletion. Listwise deletion provides complete case analysis because it only includes cases with complete data in the analysis. The survey is dropped from the data analysis when it is missing data from a question. Because of small rate of missing data and that only one nonresponse item was on the same survey question, listwise deletion was acceptable because it provides unbiased, accurate standard error estimates,

and results in adequate power (DeLeeuw, 2001). If the missing data was significant, the other missing data techniques to consider include mean imputation and multiple imputation. Each technique has pros and cons and would be evaluated based on the sample size and amount of missing data (Downey & King, 1998).

The goal of the pilot study was achieved and the self-designed survey instrument was refined based on the results of the reliability analysis. Although a higher reliability is desired based on the literature, the higher reliability result must be balanced with the number of items in the scale. For example, the Cronbach's alpha for each construct would increase by only adding additional survey questions. However, this would only increase the alpha and not guarantee internal consistency of each question (Streiner, 2003). Thus, the mid to high range of alpha of each construct is satisfactory because it reflects more of the inter-item correlation than the false inflation by the number of items in the scale because this survey reflects a small number, 3-10, of survey questions in each construct. Given the desired statistical range and the lower than acceptable alphas for the structural and cognitive dimension, changes made to the survey instrument included the rewording of questions and the addition of questions (Sjoberg, 2011). Appendix A shows the amended survey instrument used in this study.

Data Collection

PMI is a professional membership organization that advances project management education and research. PMI has a Survey Links Program for sponsored research and individual chapters conduct their own research and learning events. Individual chapters are geographical organizations of local members designed to create

learning communities and networking connections. Access to the targeted population of North American PMI chapters needed approval from both Walden University's IRB committee and the individual PMI chapters. Once Walden University's IRB provided approval, individual PMI chapters approved distribution of the survey via its LinkedIn group page or its monthly newsletter to its members. The online survey was made available to PMI members for participation and data were collected for a minimum of 30 days from the survey posting date from approved PMI chapters.

An online survey was administered via the individual chapter's LinkedIn group page or newsletter once agreement to participate in the study was given. A hyperlink provided access to the survey developed for this study (see Appendix D). The survey data was collected after a minimum of 30 days from the posting date. Participants consented online before gaining access to the survey (see Appendix E). Participants could opt out at any point in the survey. Given the survey's continuous access on each PMI chapter's LinkedIn group page, no specific follow up was possible because of the open access to the survey link.

Participation in the online survey was voluntary. Participants remained anonymous because the survey was accessible through QuestionPro, a third-party online survey software system, with the hyperlink from the PMI chapter LinkedIn webpage. In addition to each participant providing online informed consent before they can access the survey questions, a specific screening question was used to screen participants for eligibility to participate in this study. Even though PMI is a membership organization targeted to project management professionals, each chapter's LinkedIn group page is not

a closed group. If the group page is public, its group page is available to the public and anyone accessing a chapter's public group page can access the survey. Therefore, the sampling frame consists of all individuals with access to the PMI chapter's group page that may or may not have project management experience.

QuestionPro stored the raw data, which was available for download into a Microsoft Excel spreadsheet for statistical analysis. Because I created the account within QuestionPro to post the survey, the data was only available to me and accessible through the userid and password I created with the QuestionPro account. The data files retrieved from QuestionPro are on a password protected hard drive that is part of my personal computer.

Demographic Data. In addition to specific survey questions aimed at gathering data to test the a priori theoretical model of this study, demographic questions aided in understanding (a) who is completing the survey, or to provide the participant statistics, and (b) the type of project the respondent is using to complete the survey, or to provide the project statistics. Questions 29 through 37 collected demographic data on the survey (see Appendix A).

Data Analysis

Data analysis occurred after the thirty day data collection period from the time of the posting, and the data analysis occurred in three parts: (a) data screening, (b) descriptive statistics, and (c) structural equation modeling. AMOS was the data software analysis package used for the data analysis.

Data screening. After data collection, the next step was to prepare the data for data analysis, a process known as data screening. Schumacker and Lomax (2015) identified possible data screening issues such as missing values, outliers, nonnormality, and linearity. Each of these issues was addressed in the data screening process because they impact both the descriptive statistics and the structural equation modeling.

Similar to the pilot study process, the data were reviewed for missing values. The type of missing data technique employed depended on the amount of missing data. Based on the pilot study results, very small amounts of data were missing and listwise deletion was used. Kline (2011) defined outliers as "scores more than three standard deviations beyond the mean" (p. 54). The outliers were also reviewed to ensure no data entry errors or missing data codes. A possible outlier could result from a response that did not meet the eligibility requirements, but this was not an expected occurrence. A normality assessment was conducted for skew and kurtosis because structural equation modeling statistics can be affected if the variables are not normally distributed. In the case of nonnormality, alternative analysis must be assessed in the structural equation modeling process. SEM also assumes variables are linearly related to each other (Schumacker & Lomax, 2015), as nonlinearity can reduce the magnitude of correlations, and this was examined before the structural equation modeling was conducted.

Descriptive statistics. The mean, standard deviation, and range were calculated to summarize distribution and how the variables were distributed. Cronbach's alpha was calculated, similar to the pilot study, to analyze internal consistency reliability of the

survey responses. The measurement of scale is ordinal from the Likert scale questions indicating degree of agreement among a 5-point scale.

Structural equation modeling. To analyze the variables and hypothesized relationships presented in the a priori model, this research study used structural equation modeling. A structural equation model consists of one or more equations with variance or covariance specifications (Schumacker & Lomax, 2015). These pictorial equations present the theory and relationships of the model. Structure equation modeling (SEM) is a two step statistical approach to hypothesized modeling (Anderson & Gerbing, 1988). First, SEM allows for the examination of the relationships of latent variables to the observed variables to analyze the measurement model. Second, SEM allows for the examination of the theoretical relationships among the latent variables presented in the a priori model to analyze the structural model.

Latent variables (or the measurement model) yield correlations and regression coefficients among the latent constructs. Confirmatory factor analysis was conducted to analyze the measurement model, assess the reliability of the constructs, and assess the correlation relationships amount the model constructs (Kline, 2011).

The structural model focuses on evaluating the goodness-of-fit between the hypothesized model and the sample data (Hancock & Mueller, 2012; Schumacker & Lomax, 2015). The a priori model fit is confirmed or disconfirmed based on chi-square (χ^2) and meeting acceptable fit indices that determine the degree the sample variance-covariance data fits the structural model (Schumacker & Lomax, 2015). A nonsignificant χ^2 is desired and a χ^2 value of zero indicates perfect fit. Several fit statistics apply in SEM,

such as absolute fit indexes, incremental fit indexes, and a parsimony-adjusted index (Kline, 2011). The three most commonly used fit indexes are RMSEA, GFI and CFI. After calculating the fit indexes, they were evaluated for usefulness and limitations (e.g., sample size effect, number of indicators) to determine the most appropriate fit indexes to report. Schumacker and Lomax (2015) suggested reporting more than one fit index, and Hancock & Mueller suggested reporting one from each index type. Table 6 provides a summary of the fit indices used in this study and acceptable cutoff values (Hancock & Mueller, 2012; Kline, 2011).

Table 6

SEM Approximate Fit Indexes

Fit Index	Fit Index Type	Acceptable Level
Steiger-Lind root mean square error of approximation (RMSEA)	Parsimony-adjusted index	≤.06 = good fit 0 = best fit .08-.10 = mediocre fit >.10 = poor fit
Joreskog-Sorbom goodness-of-fit index (GFI)	Absolute fit index	0 = poor fit .90-.95 = good fit 1 = best fit
Bentler comparative fit index (CFI)	Incremental fit index	≥.95 = good fit

Model Identification. Model identification refers to the ability of the statistical analysis to assign an estimate to each model parameter (Kline, 2011). Three types of model identifications include over identified, under identified, and just identified (Hancock & Mueller, 2012). There are 66 model parameters and 57 free parameter

estimates (when a variable is fixed to 1) in the a priori model of this study. The model parameters include: (a) 32 variables (1 for each observed and latent variable), (b) 3 estimated covary relationships, (c) 32 estimated error variances (error estimates for each observed and latent variables) and (d) 22 estimated variables (path from latent variables to observed variables not fixed to 1).

The a priori model of this study is over identified. Over identification means the model "contains fewer parameters to be estimated than unique pieces of information in the variance/covariance matrix" (Hancock & Mueller, 2012, p. 90). The a priori model has 66 model parameters (32+3+32) and this is less than the 528 unique pieces of information in the variance/covariance matrix. Hancock and Mueller (2012) calculated the number of unique pieces of information in the variance/covariance matrix as $p(p+1)/2$, where p = the number of variables in the model. Based on this formula, the calculation for the a priori model in this study is $528 = 32(32+1)/2$. This means there are 528 variances/covariances in the data matrix with 496 below the diagonal line of the data matrix (528 less 32 model parameters), illustrating a possible estimate for each model parameter and indicating that the a priori model is testable. Under-identified models cannot be calculated because there are more parameters to be estimated than data in the covariance matrix ($df \leq 0$). Just-identified models can be algebraically solved because there is only one estimate for each parameter and the model mathematically fits perfectly, but there is no opportunity for hypothesis testing of the a priori model or for the model to fail ($df = 0$).

The a priori model demonstrates satisfactory SEM parameter estimation abilities

given its over-identification. Once data was collected and screened, descriptive statistics were calculated, and the two step statistical analysis was conducted. A confirmatory factor analysis was used to analyze the measurement model and various parameter estimates were analyzed to test the structural model's goodness-of-fit to determine if the data provided evidence to retain the a prior model of this study. Based on the optimal sample size between 100-285, partial least squares (PLS) analysis is an option if the sample size is not met and as low as 50 (Chin & Newsted, 1999) to adjust the model fit analysis abilities.

Threats to Validity

The research design presented has moved from the conceptualization stages, with the development of the a priori model, to the operationalization of the survey instrument, or the process of converting theory into application through data analysis (Singleton & Strait, 2005), with the main focus of the pilot study ensuring construct validity. The survey measurements are valid if the operational definitions represent the variable; validity focuses on measuring what it is supposed to measure. Reliability focuses on measuring repeatedly and with consistency and dependability (Singleton & Strait, 2005). Both these terms, validity and reliability, measure the quality of what is being studied to draw correct inferences from the data collected.

The use of the eligibility question to include the appropriate sample for this study aided in minimizing external validity threats. The sample characteristics desired must reflect the right participants participating. With regards to internal validity threats, one challenge was the history or memory of the participant to address specific questions that

relate to a specific project. Asking for project management experiences specific to a completed project aims to provide a complete picture of project team experiences and is designed to minimize incomplete responses. Given that participation in the study was voluntary and participants could withdraw at any time, internal threats to validity were present and may have inhibited the ability to draw correct inferences. As such, missing data potential was addressed in the data analysis stages.

Ethical Considerations

Research ethics focus on the moral dimensions of a research study and its execution (Singleton & Straits, 2005). Singleton and Straits cited data collection and analysis, treatment of participants, and responsibility to society as three areas of research ethics.

This research study was approved by both Walden University and PMI to comply with the university's ethical standards, U.S. federal regulations, and the PMI's ethical standards and considerations. Similarly, the pilot study received Walden University IRB approval and the approval number was 07-15-11-0044563. The pilot study also received approval from Mount St. Mary's University.

Participation in the research study was voluntary and recruitment occurred through select PMI chapters in North America. Participant consent occurred online before access to the survey was provided (see Appendix E). The online consent form also provided details and information to participants that they can withdrawal from the survey at any time, without any obligations. No sensitive information was asked for and all data gathered was through indirect contact with the use of a survey instrument, resulting in no

face-to-face contact. Given the use of a third-party survey administration site, the anonymity and confidentiality of both the participants and the data was maintained. The independent, third-party survey company numerically coded each survey, ensuring the anonymity of respondents. Access to the research data is limited to this researcher because the third-party survey administration site has controlled, secured access to the data collected.

No potential conflicts of interest exist between the research and my ability in conducting this study. I also completed The National Institutes of Health (NIH) Office of Extramural Research web based training course "Protecting Human Research Participants," certification #706814, to further bring awareness to the ethical responsibilities in conducting research. The data collected from the participants is related to past projects and is not specific to a current, in-process project. Based on the post project data collected, there are no anticipated positive or negative consequences of participation.

Summary

The focus of this chapter was to describe the research methodology selected for this study and its purpose in understanding the role of a project leader's social capital on knowledge integration and project success. A theoretical a priori model formed the basis of the survey instrument used in this quantitative, correlational study. A pilot study was conducted on the survey instrument to address the validity, reliability, and ethical considerations of this study. A final survey instrument was presented and the target population, sampling method, data collection and data analysis process provided a

complete overview of the research design and approach for conducting this study. Chapter 4 contains the findings of the quantitative analysis conducted, related to the research questions and the associated a priori model and hypotheses.

Chapter 4: Results

Introduction

The purpose of this study was to develop an understanding of how project leaders' behavioral and relational skills relate to knowledge integration and project success. The focus of the research design was to examine relationships to understand the underlying dimensions of social capital that relate to project team knowledge integration abilities and project success, supported by the central research question: To what extent does a project leader's social capital relate to the knowledge integration abilities of a project team and its project success? The secondary research questions include the following:

1. From the perception of project members, to what extent does a project leader's perceived social capital relate to knowledge integration within project teams?
2. From the perception of the project members, to what extent does a project leader's ability to integrate knowledge relate to project success?
3. From the perception of the project members, to what extent do different social capital dimensions more or less relate to knowledge integration and project success?

An a priori model (see Figure 1) with hypotheses was developed to study the underlying relationships between a project leader's social capital, knowledge integration, and project success, and to address the lack of empirical studies on the behavioral and relational aspects of project management. The pilot study, whose results appear in

Chapter 3, served to test the survey instrument for reliability. The contents of this chapter focus on the data collection and the data analysis processes, including descriptive statistics, measurement model results using confirmatory factor analysis, structural model results using SEM, the hypotheses testing results, and the appropriate model modifications for model fit. A summary of key findings and outcomes from the statistical analyses conducted, based on the research questions and the hypotheses, conclude this chapter.

Data Collection

Following IRB approval for data collection, PMI was contacted to request permission to participate in its Survey Links Program to provide members access to the survey via PMI's website. However, PMI informed me that because of a change in its policy, it no longer posted non-PMI sponsored research. Instead, each PMI chapter could be contacted individually to solicit participation. After obtaining reapproval from IRB (#12-30-14-0044563) for the change in my data collection method from the PMI Survey Links Program to individual PMI chapters, a list was compiled of all North American PMI chapters to contact by focusing on chapters that had membership greater than 500 and an active LinkedIn group page for survey distribution. A total of 41 North American chapters (N = 88,306 members) were contacted for approval to post the survey link on its PMI chapter LinkedIn group page or via its newsletter for distribution to participating chapter members. A total of six chapters (14.6%) provided approval, thus giving me access to a sample size of 24,823 members, or 28.1% of the population. Five chapters

posted the survey on their LinkedIn group pages (Appendix D), and one chapter distributed the survey link via its monthly newsletter, as summarized in Table 7.

Table 7

Approved PMI Chapters

Chapter	Membership	Survey Distribution
Montreal Chapter	6,826	LinkedIn
Houston Chapter	5,343	Newsletter
Chicagoland Chapter	5,073	LinkedIn
New Jersey Chapter	3,858	LinkedIn
Los Angeles Chapter	1,909	LinkedIn
Mass Bay Chapter	1,814	LinkedIn

The total population of approved North American PMI chapters participating in the survey consisted of 24,823 members. The qualifying survey question required participants to have worked on a project within the past 3 years. A total of 108 survey responses resulted in a response rate of 0.435%. The survey was available a minimum of 30 days for each chapter once the survey was distributed to its members. Given that approval and email exchanges occurred over various days and timeframes, the survey was open on QuestionPro for 90 days, and some chapters had access for more than 30 days if they responded early in the approval process.

After importing the data into SPSS 21 for descriptive statistical analysis, the participation and project statistics were analyzed to better understand the sample characteristics. Table 8 provides a summary of the demographic characteristics of the

sample (n = 108). Two thirds (66.7%) of the respondents were male, 64.9% were 51-60 years old, and 45.4% had graduate degrees. Responses from the six chapters were fairly representative, except for the lower response rate from the Texas chapter (0.1487%), possibly resultant from the chapter's use of a newsletter instead of the internet for survey distribution.

Table 8

Demographic Characteristics

Factor	N	%	Factor	N	%
Gender			Age		
Female	36	33.3%	< 30 Years	2	1.9%
Male	72	66.7%	30-40 Years	5	4.6%
			41-50 Years	22	20.4%
			51-60 Years	69	63.9%
			> 60 Years	10	9.3%
Education			Location		
High School	6	5.6%	Canada	27	25.0%
Some College	2	1.9%	IL	20	18.5%
Associates Degree	22	20.4%	CA	19	17.6%
Bachelor Degree	28	25.9%	MA	19	17.6%
Graduate Degree	49	45.4%	NJ	15	13.9%
Post Grad Degree	1	0.9%	TX	8	7.4%

Even though a nonprobability sampling approach does not include random selection and does not depend on the rationale of probability theory to represent the population, the use of purposive sampling did focus on a specific, predefined group of individuals with specific expertise for the sample to proportionally represent the population. The majority of the participants had significant project experience, with 43.5% having over 15 years and having participated in more than 16 projects over their

career; this appears to be appropriate given the previously mentioned age demographic. However, the majority of the respondents (69.4%) had never been a project leader, and PMI certification was fairly split with 43.5% holding PMI certification and 56.5% not holding any PMI certification. The responses included both smaller (5-20) and larger (>50) project teams that had varying project durations, as shown in Table 9.

Table 9

Project Characteristics

Factor	N	%	Factor	N	%
PMI Certification			Have Ever Been Project Leader		
No	61	56.5%	No	75	69.4%
Yes	47	43.5%	Yes	33	30.6%
PM Experience			Project Duration		
0-5 Years	14	13.0%	< 6 months	32	29.6%
6-10 Years	30	27.8%	6-18 Months	26	24.1%
11 to 15 Years	17	15.7%	>18 months	50	46.3%
>15 Years	47	43.5%			
			Project Team Size		
Total Projects Participated In			< 5	9	8.3%
1-5	9	8.3%	5-10	24	22.2%
6-10	15	13.9%	11-20	23	21.3%
11-15	7	6.5%	21-50	11	10.2%
>16	77	71.3%	> 50	41	38.0%

The data screening process showed 15 nonresponse items from the 108 surveys completed. This reflects 0.496% of missing data from the possible 3,024 data points (28 questions x 108 responses). DeLeeuw (2001) stated that a missing data rate of less than 2% is considered small. Thus, the missing data for this study was extremely small. Given the small amount of missing data and the minimum sample size obtained, no cases were dropped from the analysis. The missing data was replaced with the mean to include all

cases in the sample size. Further analysis was conducted to understand the type of questions with missing data. Missing data was concentrated around three questions (Q13, Q16, Q25). Question 13 focused on cognitive social capital and asked if the project leader could acquire resources for the project and the team. Questions 16 and 25 focused on knowledge integration and asked if they had access to project data (Q16) and if the project team developed new ideas (Q25). Two of the questions, Q13 and Q25, were likely difficult for the project member to observe and a possible reason for the lack of response. However, Q16 asked about a directly observable activity, and the reason for the missing response to this question is unclear. Table 10 shows a summary of the nonresponse items.

Table 10

Summary of Item Nonresponse

Survey Code	# of Nonresponse	Questions of Nonresponse
#2	2	Q16 KI, Q25 KI
#7	3	Q13 COGNT, Q16 KI, Q25 KI
#9	1	Q8 STRUC (Bridging)
#18	2	Q16KI, Q25 KI
#35	2	Q16KI, Q25KI
#79	1	Q13 COGNT
#87	1	Q13 COGNT
#90	1	Q13 COGNT
#101	1	Q13 COGNT
#105	1	Q13 COGNT

Study Results

Descriptive Statistics

The survey instrument included 28 measurements designed to measure the characteristics of three independent latent variables, one dependent latent variable, and one dependent outcome variable. Table 11 provides a summary of the descriptive statistics for these Likert scaled items (*0 = strongly disagree* to *5 = strongly agree*) of the sample size (n = 108).

Table 11

Descriptive Statistics Summary

			Skewness		*Kurtosis*	
Construct Variable - Measure	*M*	*SD*	*Statistic*	*Std. Error*	*Statistic*	*Std. Error*
Q1STRUC (BONDING) - Access to PL	4.09	0.65	-1.34	0.23	4.15	0.46
Q2STRUC (BONDING) - Rely on others	3.59	0.79	-0.08	0.23	-0.37	0.46
Q3STRUC (BONDING) - Encouraged	3.69	0.84	0.17	0.23	-0.82	0.46
Q4STRUC (BONDING) - Sought knowledge	3.56	0.90	0.19	0.23	-0.81	0.46
Q5STRUC (BONDING) - Time together	3.37	0.87	0.15	0.23	-0.62	0.46
Q6STRUC (BRIDGING) - Acquire	3.20	0.65	0.39	0.23	0.48	0.46
Q7STRUC (BRIDGING) - Knew where to go	3.42	1.14	-0.23	0.23	-1.51	0.46
Q8STRUC (BRIDGING) - Get external info	3.56	0.60	0.01	0.23	-0.37	0.46
Q9RELAT - Outside box thinking	2.98	1.04	0.65	0.23	-0.85	0.46
Q10RELAT - PL trust	3.68	0.86	0.15	0.23	-0.86	0.46
Q11RELAT - Competency trust	3.65	0.89	0.19	0.23	-0.92	0.46
Q12RELAT - Capability trust	4.01	0.73	-1.04	0.23	1.88	0.46
Q13COGNT - Shared info with team	3.56	0.73	0.92	0.23	-0.53	0.46
Q14COGNT - Same goals	3.26	1.15	0.04	0.23	-1.58	0.46
Q15COGNT - Routine meetings	3.59	1.03	-0.62	0.23	-0.94	0.46
Q16KI (TECH) - Project data access	3.81	0.73	-0.56	0.23	0.48	0.46
Q17KI (TECH) - Common system/database	3.93	0.81	-1.83	0.23	4.57	0.46
Q18KI (BEH) - Communicated knowledge	3.52	0.79	0.86	0.23	-0.48	0.46
Q19KI (BEH) - Knowledge from others	4.31	0.92	-1.45	0.23	1.39	0.46
Q20KI (BEH) - Training/Development	2.93	0.85	0.70	0.23	-0.05	0.46
Q21KI (BEH) - Shared information	3.63	0.86	-0.55	0.23	-0.33	0.46
Q22KI (BEH) - Roles defined	3.94	0.41	-2.13	0.23	10.81	0.46
Q23KI (BEH) - Decision making allowed	4.04	0.56	-1.27	0.23	5.33	0.46
Q24KI (INNOV) - Integrated new knowledge	3.60	0.83	-0.23	0.23	-0.44	0.46
Q25KI (INNOV) - Developed new ideas	3.61	0.78	-0.50	0.23	-0.12	0.46
Q26PS - Within budget	3.34	0.89	-0.74	0.23	0.19	0.46
Q27PS - On time	3.17	1.02	-0.29	0.23	-1.02	0.46
Q28PS - Within scope	3.39	0.88	-0.44	0.23	-0.96	0.46

Examining measures of normality was necessary to identify potential violations of normality assumptions. Excessive skewness or high kurtoses have the potential to violate normality assumptions for certain SEM estimators, and they have the potential to reduce

the magnitude of the correlations (Hoyle, 1995). The measures of skewness appeared to be reasonable, except Q22KI (BEH) was highly skewed above the mean (negative skew). Given the short interval ordinal measure of the Likert scale (0-5), kurtosis better captures skewness (Gaskin, 2012). Four construct variables exhibited high kurtosis, defined as greater than 2.0, including Q1STRUCT (BONDING), Q17KI (TECH), Q22KI (BEH), Q23KI (BEH). All four variables are positive, clustering the responses around similar answers with 94.5%, 88.9%, 92.6%, and 93.5% of responses answering *agree/strongly agree*, respectively. The high kurtosis could indicate underestimation of the chi-squared fit test measuring the quality of the solutions and the interpretation of the significance of factor loadings involving these variables (Hoyle, 1995).

Measurement Model

Factor models are the measurement models in SEM. In the a priori model there are three exogenous latent independent variables that regress on one endogenous latent dependent variable and one observed dependent variable. Hence, there are four measurement models in the a priori model (see Figure 3). Confirmatory factor analysis (CFA) attempts to examine the relationships between the observed variables and the latent variables of the measurement models, whereas SEM estimates the regressions of the latent variables in a proposed model representative of all the variables estimated.

Schumacker and Lomax (2015) identified the need for assessing the fit of the model (structural model) independently from assessing the fit of the observed variables to the latent variables (measurement model). The reason for this two step approach is because the latent variables are evaluated for measurement adequacy before they are

analyzed in the structural model. The purpose of the measurement model is to evaluate the quality of the observed variables to determine if they are reliable and sensitive to the latent factors on which they load. CFA was used to statistically test this and to examine the factor loading, reliability coefficients, and the amount of variance explained by the latent variables. This section is the first step in analyzing the measurement model of the factors in the a priori model and, specifically, the relationship of the predictors on the latent factors using CFA. Amos 21 was used for both the measurement and structural modeling. Maximum likelihood (ML) was used to estimate the model parameters based on providing estimates that have the maximum probability of reproducing the observed variables. While evidence of multivariate kurtosis ML may be problematic, given the small sample size it was determined ML was the best alternative and was used for this analysis (Bryne, 2010). Asymptotic distribution free estimation may perform best with nonnormal data but it performs poorly with small sample sizes and requires sample sizes greater than 10 times the number of parameters (Brown, 2015; Bryne, 2010); a minimum sample of 280 for this a priori model is needed for its use and is not feasible.

Structural Social Capital. Relations and access to others for information defines the structural constructs of social capital. Researchers describe the measures of structural social capital by studying both bridging (external) and bonding (internal) relations and its effects on other constructs. The literature recognized that different relations may provide a complementary benefit to the project team, as access to one element may increase the value to the other (Ennen & Richter, 2010). By including both types of observed variables in this study, there is the opportunity to understand the combination effect from

both the external and internal structural relations on knowledge integration and project success.

The initial model reliability for all eight observed variables related to structure social capital, using Cronbach's alpha to test internal consistency, was α = .880 and implies the observed variables provide a reasonable measure of the latent variable. However, the overall measurement model's goodness-of-fit was poor when analyzed. Model modifications occurred to achieve an acceptable goodness-of-fit. Table 12 provides a summary of the initial model and the final model-fit indices.

Table 12

Measurement Model Results: Structural Social Capital

Model	α	x^2	df	P	x^2/df	GFI	CFI	RMSEA
Initial Model	0.880	213.315	20	0.000	10.666	0.734	0.701	0.301
Final Model	0.831	7.863	3	0.049	2.621	0.972	0.982	0.123

The final model resulted in removing Q5BOND and Q6BRIDG because of the initial standardized low factor loading of .513 and .357, respectively. Further analysis of the modification indices revealed two covariance of error terms for improved model fit with modification indices of 31.592 (e8<->e7) and 22.461 (e7<->e1). A result of these modifications was a Heywood case in Q3BOND with both a correlation greater than 1 and a negative error variance, supporting the decision to remove this path loading on structural social capital because of parameter feasibility (Byrne, 2010). The final structural social capital measurement model provided appropriate goodness-of-fit indices and a nonsignificant χ^2 meaning the theoretical model reproduced the sample variance-covariance relationship. The squared multiple correlations (R^2 = .53, .59, .53, .55, .49)

between individual items and the latent variable indicate the variance explained. The final structural social capital measurement model is illustrated in Figure 4 and Appendix F contains the CFA results.

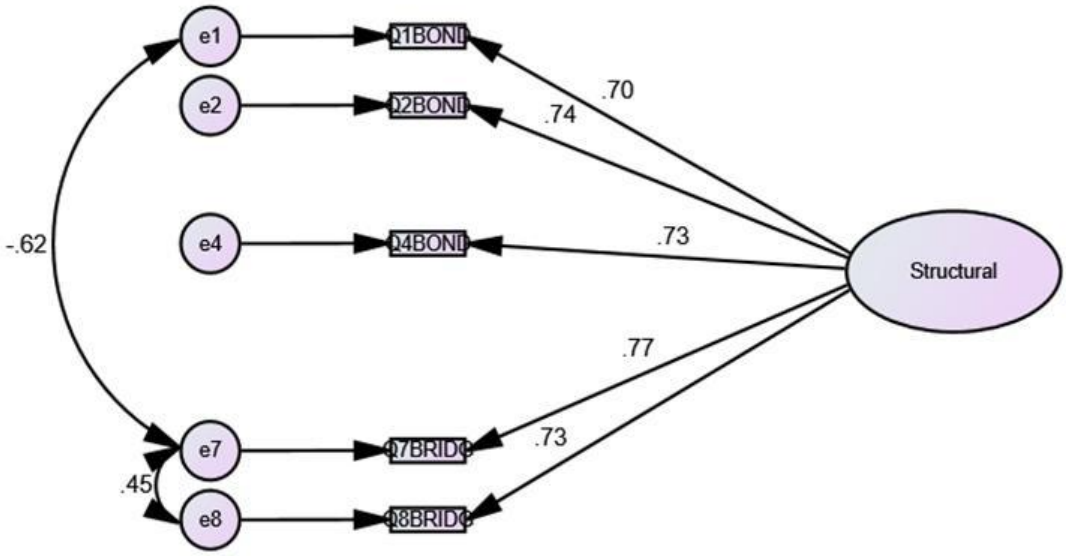

Figure 4. Structural social capital measurement model. Author constructed.

To summarize, the CFA results showed that five of the eight observed variables for structural social capital effectively represent the measurement model. The factor loadings and goodness-of-fit indices are appropriate. Because only two observed measures for bridging remained, the ability to test bridging and bonding separate loading on the latent variable was impossible. The recommendation is a minimum of three manifest variables for each latent variable (Byrne, 2010).

Relational Social Capital. The relational constructs of social capital focus on benefits of relationships and how they affect behavior of an individual and a group. The literature links trust and relational social capital. Various types of trust are based on the

structure of relationships and how trust is derived from position, experience, and expectations (Dirks 2000; Gillespie & Mann, 2004; Nahapiet & Ghoshal, 1998; Tansley & Newell, 2007). By including measures of trust in this study, there is an opportunity to understand how a project leader's relational social capital can facilitate knowledge exchange of individuals for a group benefit that can lead to project success.

The initial model reliability for the four observed variables related to relational social capital, using Cronbach's alpha to test internal consistency, was $\alpha = .862$ and implies the observed variables provide a reasonable measure of the latent variable. The goodness-of-fit indices were appropriate for the measurement model, as shown in Table 13, but there was an issue of parameter estimate feasibility and appropriateness in Q11RELAT that required model modification.

Table 13

Measurement Model Results: Relational Social Capital

Model	α	x^2	df	P	x^2/df	GFI	CFI	RMSEA
Initial Model	0.862	11.142	2	0.004	5.571	0.953	0.970	0.207
Final Model	0.862	2.528	2	0.282	1.264	0.989	0.998	0.050

Q11RELAT is referred to as a Heywood case because it had both a negative error variance (-0.19) and a correlation greater than one (1.11). Heywood cases are parameter estimates that have out of range values possibly caused by a multitude of issues, including multicollinearity, small sample size, nonnormality, and model misspecifications (Brown, 2015). Brown (2015) also stated "compared to other estimators, ML is more prone to Heywood cases" (p. 64). If the unobserved Q11 variable was removed from the measurement model, the degrees of freedom would be zero and a

just-identified model. With just-identified models, the parameters are not estimated and goodness-of-fit would not apply (Brown, 2015). Because dropping Q11 would result in a just-identified model and the parameter estimates would perfectly reproduce the input matrix, the negative error variance was fixed to zero because the magnitude of the error variance was small (Chen, Bollen, Paxton, Curran, & Kirby, 2001; Gaskin, 2012). Another possible contributing factor to the Heywood case in the relational measurement model is not only the smaller sample size, but also fewer indicators per latent variable and low communalities of the manifest variables (Chen et al., 2001).

Further analysis of the modification indices revealed two covariance of error terms for improved model fit with modification indices of 27.561 (e9<->e6) and 10.180 (e9<->e8). The final structural social capital measurement model provided appropriate goodness-of-fit indices and a nonsignificant χ^2 meaning the theoretical model reproduced the sample variance-covariance relationship. The squared multiple correlations (R^2 = .46, 1.0, .46, .55) between individual items and the latent variable indicate the variance explained. The final relational social capital measurement model is illustrated in Figure 5 and Appendix F contains the CFA results.

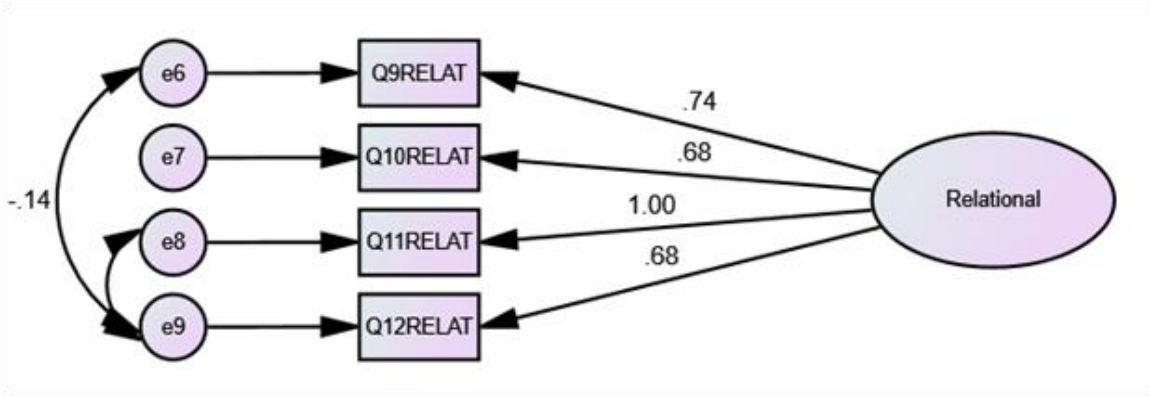

Figure 5. Relational social capital measurement model. Author constructed.

To summarize, the CFA results included all four observed variables for relational social capital to effectively represent the measurement model but the model was adjusted for the Heywood case in Q11RELAT. Although the recommendation is a minimum of three manifest variables, it was not feasible in this measurement model because the removal of Q11RELAT would have resulted in a just-identified model (Byrne, 2010). The factor loadings and goodness-of-fit indices are appropriate as modified.

Cognitive Social Capital. The cognitive constructs of social capital focus on the sharing of context for understanding and knowledge exchange. The literature delineated cognitive exchanges to explicit and tacit formats that include both codification and verbal expressions, respectively. Within project management, various forms of cognitive sharing occur through the project management processes. The literature concluded that there is a gap in this type of empirical research with project management but it is important to understand because it is associated with knowledge sharing and exchange.

The initial model reliability for the three observed variables related to cognitive social capital, using Cronbach's alpha to test internal consistency, was $\alpha = .551$ and

implies the observed variables do not provide a reasonable measure of the latent variable. While the fewer survey questions can contribute to this low reliability result, it is a difference from the pilot test of the instrument survey where the alpha was at an acceptable level ($\alpha = .702$). In addition to this low reliability, the cognitive social capital measurement model resulted in an improper solution. It achieved nonconvergence and the ML estimation process was unable to find a minimum fit. Q13COGNT also resulted in a large negative error variance (-4.818) and a large nonsignificant estimate ($\beta = 3.026$, $p = .714$) that could have lead to the nonconvergence. It was determined that it was inappropriate to fix the negative error variance to a small positive number given its distance from zero (Chen et al., 2001). Removing of Q13COGNT would not have achieved a solution given the minimum of three manifest variables needed and the resulting underidentified model (Brown, 2015). An increase in the iterations did not achieve convergence of the cognitive social capital measurement model, resulting in no further analysis and its removal from the structural analysis.

Knowledge Integration. Knowledge integration is an organizational resource and capability that can lead to a competitive advantage (Grant, 1996b). Chapter 2 contained the definition of knowledge integration as a collective process that brings dispersed and differentiated knowledge from different people and places together to create value. The measures of knowledge integration focus on application, synthesis, and combination of knowledge to use and create new knowledge. The observed measures are task- and people-oriented aspects of knowledge integration activities to better understand the

complexity of knowledge integration through a focus on the behavioral aspects of project teams.

The initial model reliability for all ten observed variables related to knowledge integration, using Cronbach's alpha to test internal consistency, was α = .853 and implies the observed variables provide a reasonable measure of the latent variable. However, the overall measurement model's goodness-of-fit was poor when analyzed. Model modifications occurred to determine an acceptable goodness-of-fit. Table 14 provides a summary of the initial model and the final model-fit indices.

Table 14

Measurement Model Results: Knowledge Integration

Model	α	x^2	df	P	x^2/df	GFI	CFI	RMSEA
Initial Model	0.853	507.315	35	0.000	14.495	0.594	0.531	0.355
Final Model	0.927	23.73	7	0.001	3.39	0.935	0.972	0.149

The final model resulted in removing Q17KITEC, Q18KIBEH, Q22KIBEH, and Q23KIBEH because of the initial standardized low factor loading of .327, .225, .139, .431, respectively. The proportion of variance explained by each of these observed variables on the knowledge integration factor ranged from 1.9% to 18.5%, further supporting removing the variables (R^2 = 10.7%, 5.1%, 1.9%, 18.5%, respectively). Q18KIBEH had a nonsignificant *p*-value and Q22KIBEH had a nonsignificant critical ratio and *p*-value (C.R. = 1.406, $p = 0.16$). Three of these observed variables contributed to the kurtosis issues discussed with the descriptive statistics analysis.

Further analysis of the modification indices revealed two covariance of error terms for improved model fit with modification indices of 28.776 (e20<->e25) and

20.152 (e19<->e21). The final structural social capital measurement model provided appropriate goodness-of-fit indices, with RMSEA improved and closer to an acceptable range (RMSEA = 0.149). The χ^2 statistic also showed improvement, but the significant χ^2 *p*-value means the observed and implied variance-covariance matrices differ. Byrne (2010) stated that sample size can influence the sensitivity of the χ^2 statistic because the covariance analysis is "…grounded in large sample theory" (p. 76). It is because of the χ^2 limitations that other goodness-of-fit indices are evaluated (Byrne, 2010). Overall, the model solution is acceptable and does adequately describe the sample data. The final knowledge integration measurement model is illustrated in Figure 6 and Appendix F contains the CFA results.

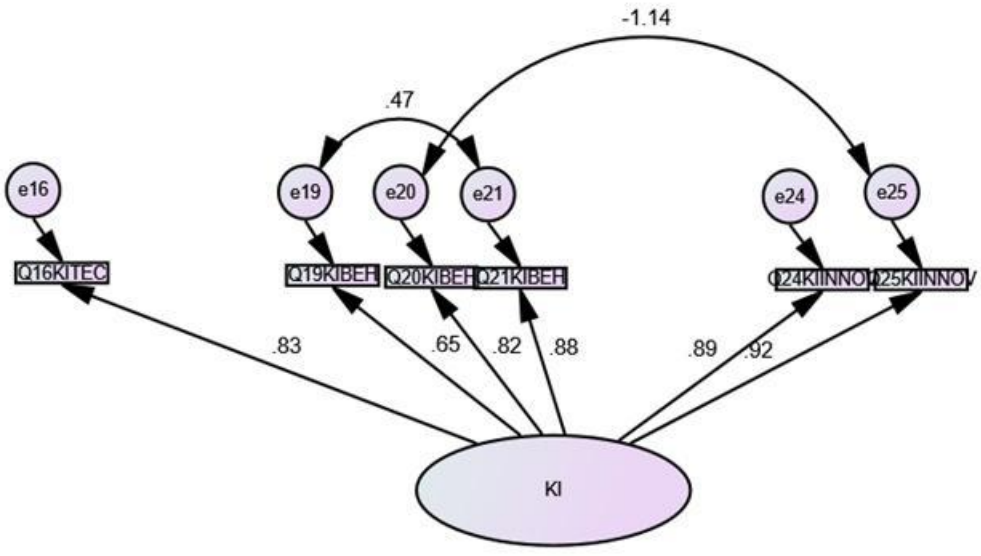

Figure 6. Knowledge integration measurement model. Author constructed.

To summarize, the CFA results included six observed variables for knowledge integration to effectively represent the measurement model. The four removed variables

were also associated with the high kurtosis and improved the solution quality by removing these variables. The factor loadings and goodness-of-fit indices are appropriate as modified.

Reliability and Validity Tests

Reliability measures internal consistency and the consistency of the item being measured, whereas validity measures the accuracy of measuring the intended item and the ability to measure a construct (Schumacker & Lomax, 2015). Reporting the Cronbach's alpha for the scales used within each of the measurement models addressed reliability. Cronbach's alpha exceeded the acceptable level of .70 for all scales where the measurement model was modified, ranging from 0.831 for structural social capital to 0.927 for knowledge integration.

Two subcategories of construct validity, convergent validity and discriminant validity, are necessary in SEM (Byrne, 2010). Convergent validity is the extent the observed measures of the same factor relate, or how well the observed variables explain the latent variable. Discriminant validity measures the extent the observed measures explain another factor, or how well the latent variables are better explained by other observed variables. Factor loading is a measure of convergent validity and how well an observed variable converges on the assigned latent construct. All factor loadings of the measurement models are greater than .50 and range from .65 to 1.0. Average variance extracted (AVE) also measures convergent validity and refers to the amount of variance captured by the latent variable. AVE > .50 is acceptable because the variance due to the construct is greater than the variance from the measurement error (Fornell & Larcker,

1981). Composite reliability (CR) measures the reliability of the construct based on the various, related observed variables; it is similar to Cronbach's alpha except that it takes into account the factor loadings for a composite measure. CR > .70 is acceptable (Gaskins, 2012). Discriminant validity measures if the construct is measuring something different than intended and it is determined by comparing squared correlations to AVE score for each of the pairwise constructs (Fornell & Larcker, 1981; Netemeyer, Johnston, & Burton, 1990). Table 15 contains a summary of the reliability and validity results of the measurement models. The results show adequate convergent and discriminant validity of the measurement models, and that proceeding with the structural model and theory testing was appropriate.

Table 15

Construct Validity

	Structural Social Capital	Relational Social Capital	Knowledge Integration
Average Variance Extracted (AVE)	0.540	0.616	0.700
Composite Reliability (CR)	0.854	0.862	0.933
Convergent Validity	Established	Established	Established
Discriminant Validity	Established	Established	Established

Structural Model

The second step of the modeling process examined the structural model and tested the specified theory presented in the a priori model. Given the above challenges of the measurement models discussed and the need for modifications as presented, challenges also occurred when testing the structural model of the a priori model in its original form. Jöreskog and Sörbom (1993) provided a summary of possible challenges in SEM data

analyses that reiterates the challenges I also confronted during the data analysis process, by stating:

> The testing of the structural model, i.e., the testing of the initially specific theory, may be meaningless unless it is first established that the measurement model holds. If the chosen indicators for a construct do not measure the construct, the specified theory must be modified before it can be tested. Therefore, the measurement model should be tested before the structural relationships are tested. (p. 113)

As previously discussed, necessary measurement model modifications occurred to ensure the latent variables measured what they intended. Prior to these measurement model modifications, the a priori structural model did not run in its original form and returned a nonpositive definitive matrix effort.

Nonpositive definitive matrices mean a solution is not obtainable because the parameter estimates are not computable. Schumacker and Lomax (2010) identified "this can be caused by correlations greater than 1.0, linear dependency among the observed variables, multicollinearity among the observed variables, a sample size less than the number of variables, the presence of a negative or zero variance (Heywood Case)" (p. 40). Several of these issues occurred in this study, including Heywood cases, multicollinearity, and a smaller than desired sample size. The improper solution challenges were addressed by correcting the observed variables contributing to the issue by removing or, in one case, setting the small negative variance to zero, as appropriate. The cognitive social capital path was eliminated given its measurement model results and

given some observed variables may have crossloaded with knowledge integration predictors.

Multicollinearity. Multicollinearity occurs when two or more variables are highly correlated. Variance inflation factor (VIF) measures how much the regression coefficient variance may increase if various predictors are correlated. By overstating the variance, the predictor variables may be statistically insignificant when they are significant and the more variance there is, the more difficult it is to interpret the results. Appendix G provides VIF results for each latent variable construct and the project success observed variable. VIF equal to 1 means there is no multicollinearity. VIF greater than 5 implies multicollinearity and >10 implies definite multicollinearity and assumes the regression coefficient is poorly estimated (Gaskin, 2012).

Tolerance and VIF measures were obtained by performing multiple regressions with one variable as the dependent variable and the remaining predictor variables as independent variables. The results aligned and supported modifications made in the measurement models previously discussed. However, some multicollinearity issues remained with knowledge integration and this could influence the structural indices. The removal of Q3BOND and Q6BRIDG eliminated most of the multicollinearity issues in structural social capital. The removal of Q11RELATE removed all multicollinearity issues with relational social capital. However, as mentioned, the knowledge integration variables illustrated the most multicollinearity and the removal of Q17KITEC, Q18KIBEH, Q22KIBEH, and Q23KIBEH addressed some of the issue.

Model Modifications

As a final step in SEM, given the poor model-fit indices of both the measurement and structural model analyses, modifications to the a priori model occurred. The purpose of the model modification was to improve the overall fit of the model including factor loadings and overall goodness-of-fit indices. The previously presented measurement models and structural model reflect the necessary model modifications.

Given the original structural model issue of the nonpositive definitive matrix and the inability to run the a priori model, model modifications began during the measurement models CFA. Figure 7, and Appendix F, contains illustrations of the structural model modifications and results.

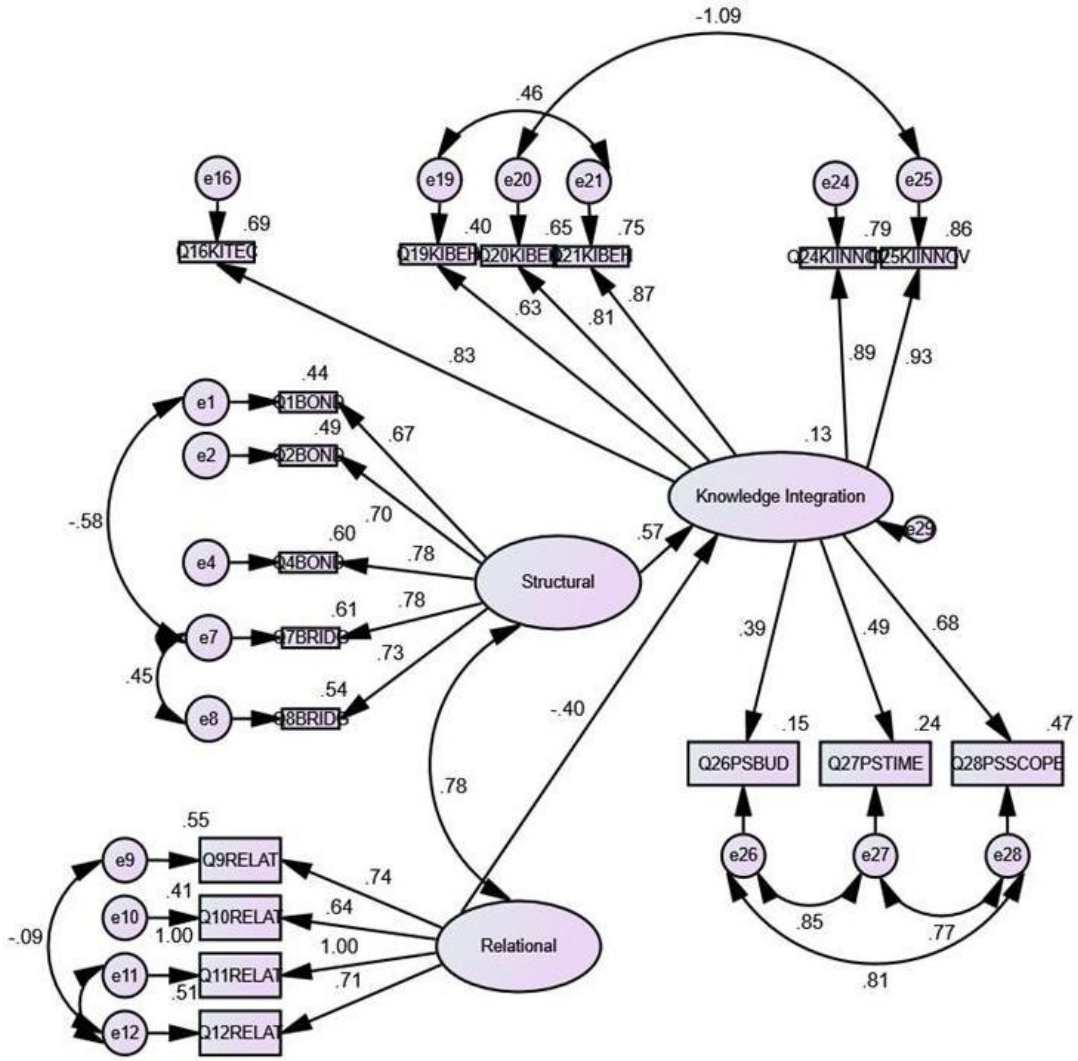

Figure 7. Structural model. Author constructed.

The hypothesized structural model does not fit the data well (χ^2 = 1757.907 GFI = .490, CFI = .486, RMSEA = .349; RMSEA 90% Confidence Interval = .335 - .364). Analysis of the modification indices revealed three covariance of error terms for improved model fit with modification indices of 75.66 (e27<->e26), 66.913 (e28<->e26), and 59.901 (e28<->e27).

Hypotheses Testing

SEM validated the a priori model through hypothesis testing. Table 16 provides a summary of the hypotheses testing results based on the measurement and structural model analyses.

Table 16

Hypotheses Testing Results

Hypothesis	Supported	Significant
$H1a_a$: Structural Social Capital (Bonding) → Knowledge Integration	untested	
$H1b_a$: Structural Social Capital (Bridging) → Knowledge Integration	untested	
$H1_a$: Structural Social Capital → Knowledge Integration	Accept $H1_a$	p =.001
$H2_a$: Relational Social Capital → Knowledge Integration	Reject $H2_a$	p =.008
$H3_a$: Cognitive Social Capital → Knowledge Integration	untested	
$H4a_a$: Knowledge Integration → Project Success (on budget)	Accept $H4_a$	p <.001
$H4b_a$: Knowledge Integration → Project Success (on Time)	Accept $H4b_a$	p <.001
$H4c_a$: Knowledge Integration → Project Success (within scope)	Accept $H4c_a$	p <.001

Given the changes in the measurement model and removing observed variables for structural and cognitive social capital, $H1a_a$, $H1b_a$, and $H3_a$ are not testable hypotheses. For structural social capital there were not enough properly fitting observed variables to warrant separating bonding and bridging social capital. The two different aspects of the structural social capital construct was originally intended to separately measure internal and external relationships, but instead the structural social capital construct analyzed overall relationships, regardless of location. Therefore, $H1a_a$ and $H1b_a$ were not tested based on the model modification in the factor model of structural social capital. $H1_a$ tested the relationship of structural social capital onto knowledge integration.

As shown in Figure 7, the path coefficient between structural social capital and knowledge integration is positive and significant (β = .567 p = .001), rejecting the $H1_o$ null hypothesis, *A project leader's access to both internal and external knowledge resources is not positively associated with the ability to integrate knowledge within a project team*, and concluding that structural social capital did have an effect on knowledge integration.

On the other hand, the path coefficient of relational social capital on knowledge integration is statistically significant but with a negative relationship (β = -.403 p = .008), accepting the $H2_o$ null hypothesis, *A project leader's perceived trustworthiness is not positively associated with the ability to integrate knowledge within the project team*, and concluding that relational social capital had a negative effect on knowledge integration. Both of these results revealed the predictors, or exogenous variables of structural and relational social capital, predicted at least 13% of the variance on knowledge integration with a squared multiple correlation (R^2) of .13.

The cognitive measurement model was not testable because of the failure of the measurement model during the CFA. As a result of this analysis the $H3_o$ null hypothesis was not supported because it was not testable.

Knowledge integration had a positive and significant relationship on all three measurements of project success. The path coefficient of knowledge integration on project success budget is both positive and significant (β = .385 p < .001), rejecting the $H4a_o$ null hypothesis, *A project leader's extent of knowledge integration within a project team is not positively associated with the project completed on budget*, and concluding

that knowledge integration had a positive effect on project success defined by being on budget. The path coefficient of knowledge integration on project success completed on time is also both positive and significant (β = .486 p < .001), rejecting the $H4b_o$ null hypothesis, *A project leader's extent of knowledge integration within a project team is not positively associated with the project completed on time,* and concluding that knowledge integration had a positive effect on project success defined by completing the project on time. Lastly, the path coefficient of knowledge integration on project success completed within scope is both positive and significant (β = .684 p < .001), rejecting the $H4c_o$ null hypothesis, *A project leader's extent of knowledge integration within a project team is not positively associated with the project completed within the project scope,* and concluding that knowledge integration had a positive effect on project success defined by completing the project within the defined project scope and achieving what the project team set out to accomplish. The structural model results showed that project success defined by completing the project within scope had the strongest effect from knowledge integration (β = .684) followed by completing the project on time (β = .486) and then on budget (β = .385). The implications of the structural model are interpreted and discussed in Chapter 5.

Summary

The purpose of this study was to develop an understanding of how project leaders' behavioral and relational skills relate to knowledge integration and project success. Structural equation modeling was used for evaluation of social capital theory and the inference of social capital on knowledge integration and project success. The goal of

the research was to test an a priori model to understand the cause and effect relationships associated with social capital and project success by analyzing if the causal model adequately describes the sample data. This section contained details about the data collection method and descriptive statistics of the sample data, followed by analysis of the measurement and structural models using structural equation modeling.

The measurement models required modifications, including the removal of several observed variables in order to validate the measurement of the latent variables that is necessary before evaluating the structural model. CFA was used to evaluate the measurement models. Multiple regression tests examined the empirical relationships of the structural model and supported the hypothesis testing results. The results identified a significant positive relationship between structural social capital on knowledge integration, but a significant negative relationship of relational social capital on knowledge integration. Knowledge integrate had the strongest relationship with project success defined by completing the project within scope, and the hypotheses testing also indicted knowledge integration significantly had a positive effect on the other two aspects of project success defined by on budget and on time.

Although the measurement models adequately presented goodness-of-fit indices, the structural model did not fit the data well and influenced the interpretation of the results. Chapter 5 contains further analysis and discussion of these findings.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to develop an understanding of how project leaders' behavioral and relational skills relate to knowledge integration and project success. An a priori model was tested to understand the underlying dimensions of social capital that relate to project team knowledge integration abilities and project success, and Nahapiet and Ghoshal's (1998) definition of social capital, which includes three constructs of structural, relational, and cognitive dimensions, was applied in this study. Social capital was posited to positively relate to knowledge integration and project success within a project-based team environment. The results confirmed that structural social capital positively influences knowledge integration, but indicated that relational social capital negatively influences knowledge integration. It was also found that knowledge integration can positively predict project success, with scope having the strongest relationship to project success, ahead of on time and on budget. Overall, the research study findings provided evidence that knowledge integration plays an important role in project success, and that some aspects of social capital contribute positively to knowledge integration while others have negative influence on knowledge integration. Although the measurement models provided goodness-of-fit, interpreting the structural model results requires caution because of the less than satisfactory model fit.

The research findings attempted to fill in the literature gap by adding to the limited amount of behavioral studies in the project management field. Project management research needs to extend beyond a focus on only the technical skills of

project management, and move to a strategic perspective that focuses on aligning resources and competencies, including social and behavioral aspects of projects and project leadership (Jugdev et al., 2009; Suhonen & Paasivaara, 2011). The focus on a project leader's social capital and its relationship to knowledge integration abilities and its potential for project success addressed the intangible aspects of social and behavioral skills. Chapter 4 provided a presentation of the data analysis results. Chapter 5 contains further interpretation of these findings, along with discussions regarding the limitations of this study and the possible implications from the findings, concluding with recommendations.

Interpretations of Findings

Tsai and Ghoshal's (1998) empirical research on value creation, defined as product innovation, showed that social capital facilitates value creation. This study reframed the definition of value creation by measuring social capital and its facilitation of project success by examining three specific research questions.

Research Question 1. *From the perception of project members, to what extent does a project leader's perceived social capital relate to knowledge integration within project teams?* Structural social capital was significant and positively related to knowledge integration, showing that internal and external relationships are necessary for gaining information and new knowledge, and learning from others. Accessing information, seeking out knowledge, getting external information quickly, and knowing where to go for answers are all necessary aspects of structural social capital that positively influenced knowledge integration.

The research study findings prohibited the ability to separate bridging and bonding relationships within structural social capital, and this is consistent with Adler and Kwon's (2002) preference to not separate these relationships because the information and degree of influence or expertise available depends on both the bridging and bonding relations. However, the lack of separation between the types and sources of relationships used within a project does not provide clarity or insights into how each relationship contributes to knowledge integration and project success. The initial intent was to measure bridging and bonding relationships separately, but it was not possible based on model respecification needed to achieve acceptable goodness-of-fit measurement models. This lack of clarity was an undesirable result and continues to limit the current research on the characteristics of structural resources and how they can combine for added value (Ennen & Richter, 2010).

Relational social capital was significant and negatively related to knowledge integration, showing that norms, trust, and respect do not positively contribute to knowledge integration. This finding was surprising. Relational survey questions focused on two areas: (a) project leader skills, defined by competency and capabilities (Q11, Q12); and (b) risk taking and support (Q9, Q10). These findings are contrary to prior research studies with results showing that without trust, there is a lack of ability to coordinate and work cooperatively (Oh et al., 2006), and that trust facilitates increased cooperation and information sharing (Dirks & Ferrin, 2002). What is unclear in the findings is what level of trust must be attained and if different types of trust were properly identified. Tansley and Newell (2007) defined competence trust, commitment

trust, and companion trust. The survey questions in this study focused on competence and companion trust. It did not focus on commitment trust because this is related to top management support. Even though much research has been done on trust, social capital, and top management support (Barczak et al., 2009; Chollet et al., 2012; Karahanna & Preston, 2013; Lui, Wang, & Chua, 2015, Marrone et al., 2007), the focus of this study was not on top management support, and was appropriately not included in the study. Remarking on the relationships between different forms of trust, Tansley and Newell noted it is possible that "different types of trust may be reinforcing, either positively or negatively, so that for example, low levels of commitment trust may negatively impact companion and competence trust, regardless of the PL's displayed knowledge" (p. 365). It is unclear if the project leader trust was high or low on the two trust dimensions of this study and if this contributed to the negative relationship between relational social capital and knowledge integration that is contrary to the literature.

Granovetter (1985) stated that trust grows from interdependence in relationships; this implies that trust occurs over time. Given that projects are time bound, the project duration may have influenced the relational social capital findings. The project characteristics presented in Table 9 show that roughly half the projects were completed in less than 18 months and half took more than 18 months. More specifically, 29.6% of the projects had durations of less than 6 months. It is possible that the project duration influenced the relationship between relational social capital and knowledge integration, given that trust develops over time and this process aligns to the length of projects.

Cognitive social capital was not included in the respecified structural model because of the lack of goodness-of-fit attained during the measurement model analysis. It is important to note that the empirical results of Tsai and Ghoshal (1998) did not find a significant direct effect of cognitive social capital, defined as shared vision, on resource exchange and combination. However, other studies have identified cognitive social capital as having the most significant effect on an outcome, whether it was coproduction (Hsu et al., 2013) or knowledge integration (Karahanna & Preston, 2013).

In summary, while other studies have identified cognitive social capital as most significant (Hsu et al., 2013; Karahanna & Preston, 2013), the results of this study showed that structural social capital had the most significant effect on knowledge integration. This is opposite of the findings by Karahanna and Preston (2013) who found structural social capital to have no significant effect on knowledge integration. In their study, the authors defined knowledge integration as IS (information systems) strategic alignment; thus comparison of findings regarding knowledge integration between their study and this study may not be prudent. The outcomes from this study show that relationships, both bridging and bonding, are necessary and an important aspect of a project leader's ability to create knowledge integration within a project team.

Research Question 2. *From the perception of the project members, to what extent does a project leader's ability to integrate knowledge relate to project success?* Knowledge integration had a significant relationship to project success, showing that project teams must take individuals' specialized knowledge and bring it together to achieve success. Knowledge integration is a collective process that brings together

dispersed and differentiated knowledge from different sources to create value. It includes both task- and people-oriented aspects.

The knowledge integration survey questions focused on three areas that addressed both the task and social aspects of knowledge integration, including (a) technical (Q16), (b) behavioral (Q19, Q20, Q21), and (c) innovation-related (Q24, Q25) observed variables. The findings are consistent with the literature which provided evidence that there is a direct relationship between knowledge integration and results (Govindaraju et al., 2015; Kraaijenbrink, 2012; Stashevsky & Koslowsky, 2006). Kraaijenbrink (2012) concluded, "knowledge integration and its related interactions are a distinctive factor in explaining success and failure" (p. 1093). The key implication is to integrate the knowledge and to continue to use the new knowledge base extensively. However, this is a challenge given the adjourning nature of project teams, and given that knowledge integration is context dependent (Kraaijenbrink, 2012). Organizations need to learn how to capture the knowledge integration from a project and assimilate it to similar projects in the future.

Transforming existing knowledge into new knowledge is a key aspect of knowledge integration. This was supported by the highest R^2 values of the observed measures associated with innovation and the ability to transform a new level of knowledge (Q24, Q25). It is interesting that the observed measure associated with the question (Q19), *I could not have completed my project tasks/responsibilities without knowledge and information from other members of my team,* had the lowest R^2 value. This may be because this question could capture elements of the social capital

dimensions rather than knowledge integration dimensions, or because it vaguely crosses both task- and behavioral-aspects of knowledge integration. Given that knowledge integration reflects both task and behavioral aspects, it is reasonable to conclude, based on the indicators of knowledge integration used in this study, that project managers require both technical and behavioral skill sets to achieve project success.

The findings showed that knowledge integration had the most significant effect on project success defined within scope, followed by project completed on time and then within budget. This is interesting because project scope is the most complex of the three project success factors. Project scope is not only about the final deliverable and its quality, but it is also about meeting external stakeholders' needs. It is also more difficult to measure of the three project success factors. The findings support that knowledge integration is a key process for all three measures of project success, but most significantly for project scope.

Grant's (1996a, 1996b) knowledge-based theory of the firm is further supported by the research finding that knowledge integration supports project success, especially given Grant's theory places knowledge integration as a key characteristic of knowledge and in understanding the role of knowledge in the theory of the firm. This research study, along with other studies (de Boer, Van den Bosch, & Volberda, 1999; Huang, Newell & Pan, 2001), used the knowledge-based view of the firm to support knowledge integration in the research design. The study's findings support that knowledge is a strategically significant resource that can create value. The study's findings also align to Grant's (1996b) view that value is created through the transformation of inputs into outputs.

In summary, knowledge integration has a significant influence on project success. The project manager has the responsibility to provide information to team members when they need it, support project members and encourage them to work together, to provide opportunities and ways for the team to share information, and to allow the information to be transformed and synthesized to a new level of knowledge and application. Some of the observed knowledge integration variables used in this study are both task and behavioral related activities. The overall theme is that the project leader must create an environment that allows knowledge to be shared and applied within a social context. It also showed that the project manager needs both technical and behavioral skills to integrate knowledge within the team. Knowledge integration is defined as a cumulative and collective process and it must occur throughout the project life cycle. Fong's (2003) statement that the project leader's responsibility is to integrate disparate knowledge across disciplines summarizes and supports these findings.

Research Question 3. *From the perception of the project members, to what extent do different social capital dimensions more or less relate to knowledge integration and project success?* The model respecifications resulted in evaluating only two of the three social capital dimensions of this study. These two constructs, structural and relational social capital, have a squared multiple correlation (R^2) of .13. This value summarizes that 13% of the variance in the dependent variable (knowledge integration) is explained by the collective predictors (structural and relational social capital) in the model. The lower (R^2) may be understandable because precise predications may not be possible when attempting to predict human behavior.

The study's findings are consistent with the literature findings and prior studies that showed structural social capital increased value creation (Tsai & Ghoshal, 1998), knowledge sharing (Reagens, Zuckerman, & McEvily, 2004) and overall performance (Reagans, Zuckerman, 2001). The research model of this study included both internal and external relationships and the results show their influence on knowledge integration, consistent with the literature where Rousell and Deltour (2012) found that both types of relationships support the dynamics of knowledge integration.

Although relational social capital was negatively related to knowledge integration, other researchers have found that strongly interconnected or homogenous groups had a negative effect on innovation (Fleming & Waguespack, 2007). The type of project team and its interconnectedness was not a part of this study, but it would seem strong interconnections would lead to higher levels of trust. Karahanna and Preston (2013) found knowledge integration is facilitated by the amount of trust the project team has in the CIO when examining top management support. An assumption identified in Chapter 1 was that social capital was applied as a positive use of resources that will occur within a project team. Although some research studies addressed the negative outcomes of social capital (Adler & Kwon, 2002; Coleman, 1990; Lesser, 2000), this study was built on value creation that can occur from the positive, tangible and intangible outcomes from social capital, thus producing an unexpected result with relational social capital.

In summary, structural social capital positively influenced knowledge integration and relational social capital negatively influenced knowledge integration, with both variables accounting for a low proportion of the variance on knowledge integration. The

outcome on project success contains both observed and unobserved variables and the causal relationship among the latent variables had a positive influence on project success.

Limitations of the Study

This study had several limitations. First, the sample selection process limits generalizability based on the purposive sampling approach. Second, the overall characteristics of the data may have had a significant impact on the results of this study. Statistical analysis was identified as a limitation (MacCallum & Austin, 2000) because the results are dependent on the proper operationalization of the latent variables used in this study. The CFA models demonstrated this limitation as only two of the three social capital dimensions were part of the respecified model. Couple the statistical analysis limitations with the low sample size and caution is required in interpreting the results. SEM often requires large sample sizes because of the multiple observed variables (Schumacker & Lomas, 2015). Chi-square testing is sensitive to sample size extremes in SEM and lack of a defined power function (AMOS). For example, very large sample sizes tend to inflate χ^2 and the model fit may be interpreted as a poor fit when it is not the case (Schumacker & Lomax, 2015). With small sample sizes, the χ^2 test statistic may identify a poor fit and a nonsignificant chi-square compromising the statistical significance tests of the model (Brown, 2015). The power of a study is also dependent on the sample size. Statistical power helps to interpret true relationships in the data and is the probability of rejecting the null hypotheses when it is false, or not making a Type II error in hypothesis testing. Schumacker and Lomax (2015) stated that “The power to reject a null hypothesis and sampling size impacts our decision of whether sample data fit a

theoretical model" (p. 94). A posthoc power analysis was completed using G*Power 3.1.9.2. With an effect size of .50, $\alpha = .05$, n = 108, and *df* = 125, the power = .4818, showing that the respecified model has a 48% change of rejecting the null hypotheses at the .05 level of significance or a 48% certainty the results are correct. An increase in sample size would increase the power. If the optimal sample size was obtained the power = .80 would achieve a smaller effect size = .41. A sample of 179 would have achieved power = .80 with the effect size = .50. The post hoc analysis reiterates that there may be Type II errors as a result of the lower power and that the parameter estimate bias may be higher (Chen et al., 2001). Overall, the small sample size, low power, and poor model- fit indices reinforces the previously stated caution in interrupting the results. Recognizing a model may be an approximation, at best, there is still value in its usefulness without being true (Arbuckle, 2014) because given a large enough sample size, the model would be rejected given the χ^2 test statistic sensitivity to extremes. It is the purpose of the research that must also be evaluated with the results (Arbuckle, 2014).

Third, a single point in time is a limitation because it takes a static view of social capital, knowledge integration, and project success. A more comprehensive understanding of a project team would require a longitudinal study design that accounts for a project life cycle over the entire duration of the project. The time frame, variables, and the particular sample used for this study all limit the generalizability of the findings (MacCallum & Austin, 2000).

Recommendations

The goal of this study was to provide an understanding of the behavioral skills needed for successful project leadership. Specifically, the a priori model sought to understand how a project leader's social capital relates to knowledge integration and project success. Given the statistical limitations discussed based on the small sample size, this study was inconclusive of this understanding but recognized the positive effects knowledge integration had on project success. Future studies could retest the a priori model with larger sample sizes.

Another area for future research is studying the effects of project characteristics, including types of project and effects of project life cycle. Most research on social capital or knowledge integration spans information technology and systems projects (Govindaraju et al., 2015; Lui et al., 2015); broader application to other types of projects could be insightful. Given that knowledge integration was studied in segments, such as collection, interpretation, and assimilation (Roussel & Deltour, 2012), it may be valuable to reframe the observed measures of the knowledge integration latent variable within these phases to better understand what aspects of knowledge integration are most influential to project success.

A final, broad recommendation is to continue empirical research on the behavioral aspects of project management. Suhonen and Paasivaara's (2012) qualitative content analysis of the project management literature confirmed this literature gap and emphasized the need for future studies to concentrate on the human capital and behavioral aspects that contribute to project success. These authors specifically stated that

the project manager is the center of human capital. This study is one contribution to filling the gap in the literature between the technical and behavioral aspects of project management, with a focus on understanding the behavioral aspects of project leadership.

Implications

Theoretical contributions and practical applications are two types of implications to examine. With regard to theoretical contributions, a challenge of this study was to measure intangible, unobservable social and behavioral aspects of social capital. The a priori model provided a foundation for future research to advance an understanding of a project leader's behavioral skills and its relationship to project success. The findings of this study provided an initial look into the relationships between social capital, knowledge integration, and project success. Theoretical advancements have been made on studying the multidimensional nature of social capital that is limited in empirical research, but there is still more work to be done.

The study findings provided empirical support for only two social capital dimensions of structural and relational facets. The poor measurement model of cognitive social capital was inconclusive and there is an opportunity to further develop the measurement of the latent variable by identifying and determining observed variables that can accurately measure the latent cognitive social capital construct within project teams. An additional assumption is to recognize both the positive and negative consequences of social capital.

Beyond the theoretical implications of this study, practical implications are also discussed for the project management field. Knowledge is a strategic asset used to create

a competitive advantage. Relationships are important to project teams because it is the responsibility of the project leader to bring together diverse knowledge for a common purpose. Hiring managers need to assess a project leader's internal and external network along with specific job requirements. There is support to focus not only on the technical skills of project leaders, but to also examine the behavioral skills that are necessary for project success. Project leaders need a delicate balance of both skills. Placing highly competent project leaders in the right project management jobs will support the anticipated growth in the project management field, as discussed in Chapter 1, which is expected to continue until 2020. Further implications for organizations are the development of training projects and implementation of appropriate succession planning processes that can assist in applying the knowledge integration captured across projects of similar context. Both these theoretical and practical implications can result in positive social change by achieving an improvement in project success rates that, in turn, have a direct impact on economic outputs based on the project scope delivered. These successful projects can assist in improving processes, infrastructure, and outcomes that yield economic benefits to organizations and society.

Conclusion

The greatest challenge of this research project was the lack of fit for the structural model and the associated caution in interpreting the findings. Byrne (2010) stated that a well fitting hypothesized model proves to be a challenge and is unrealistic in the majority of SEM empirical research. This research project experienced this challenge. Byrne further emphasized that the statistical findings yield information only on the "…model's

lack of fit" (p. 84) and that the plausibility of the model rests on the judgment of the researcher. Even though the findings of this study require caution when interpreting, there is still value in gaining an understanding in the complexity of behavioral studies and the intangible aspects of social capital and knowledge integration as defined in this study.

Nahapiet and Ghoshal's (1998) definition of social capital conceptualized three social capital constructs that supported their position that organizational advantage is derived from the collective ability of all members to exchange, combine, and integrate knowledge, with social capital facilitating and enabling the knowledge integration. The findings from this study support Nahapiet & Ghoshal's overall social capital theory by showing knowledge integration is based on the project leader's actions to provide opportunity and motivation to share knowledge and to positively contribute to project success. The findings of both how and what facets of social capital contribute to project success enables future researchers to understand better the dimensions of social capital and how to develop and use a project leader's social capital. Project management professionals need not only technical skills, but also behavioral skills that allow them to integrate diverse knowledge across various disciplines. Knowing the competences required by project leaders can improve project success rates and provide economic benefits for projects, organizations, and society.

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Appendix A: Survey Instrument

Think back to a project you were a part of and participated in as a project team member. Answer ALL the following survey questions relative to your experiences on this project team.

Bonding: Structural Social Capital (Q1-Q5)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q1. I had access to the project leader when I needed him/her	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q2. I was able to rely on those I worked with on this project	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q3. The project leader encouraged communication with other team members throughout the project (e.g., client, corporate office, professional organizations, etc.)	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q4. The project manager recognized and sought out the knowledge, skills, and abilities I brought to the project team	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q5. The project team frequently spent time together (e.g., close contact, lunch meetings, formal and informal interactions)	❑	❑	❑	❑	❑

Bridging: Structural Social Capital (Q6-Q8)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q6. The project leader was able to acquire resources for the project and the team members (e.g., money, new members, training, information, equipment, etc.)	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q7. If the project leader did not have the required information or answers to questions, he/she knew how to find the information or was able to refer the project members to others that would have the knowledge	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q8. The project leader was able to get external information quickly	❑	❑	❑	❑	❑

Relational Social Capital (Q9-Q12)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q9. The project leader encouraged the project team to "think outside the box" and take risks	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q10. I had a high degree of trust in the project leader because he/she acted in the best interest of the project and the project team (e.g., he/she was open and honest with me, he/she was supportive, he/she cared about the project and the project team)	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q11. I had a high degree of trust that the project leader had the competence to perform his/her role as the project leader (e.g., required qualifications and skills to perform the job)	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q12. I had a high degree of trust that the project leader had the capability to perform his/her role as the project leader (e.g., the qualities of being a capable leader)	❑	❑	❑	❑	❑

Cognitive Social Capital (Q13-Q15)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q13. The project leader shared important project goals, tasks, and documents with the project team (e.g., project charter, project management plan, etc.)	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q14. The project leader's goals and objectives were the same as the project team's goals and objectives	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q15. The project leader held routine meetings with the project team	❑	❑	❑	❑	❑

Knowledge Integration: Technical (Q16-Q17)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q16. I had access to project information and project data when I needed it	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q17. A common system or database was used by team members to store information in a common location that was available to the project team (electronically or manually)	❑	❑	❑	❑	❑

Knowledge Integration: Behavioral (Q18-Q23)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q18. The project leader communicated knowledge and information related to the project challenges, needs, and/or changes on a regular basis	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q19. I could not have completed my project tasks/responsibilities without knowledge and information from other members of my team	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q20. The project leader encouraged and supported the development of project team member skills through training and developmental opportunities	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q21. The project leader brought together the project team to share new information or specialized knowledge that was relevant to the project	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q22. I was able to accomplish my project tasks because other team members knew their roles and responsibilities on the project team	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q23. The project leader allowed for decision making at the appropriate level	❑	❑	❑	❑	❑

Knowledge Integration: Innovation (Q24-25)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q24. The project team integrated new knowledge into the project tasks and decisions	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Q25. The project team developed new ideas that were incorporated into the project tasks and decisions	❑	❑	❑	❑	❑

All your responses to this survey are based on your experiences with the last project team you were a part of. Again, thinking back to the completion of this same project that you used to answer the previous survey questions, provide information about this project's success by answer the following three questions:

Project Success (Q26-Q28)	Strongly Disagree	Disagree	Undecided /Don't Know	Agree	Strongly Agree
Q26. The project was completed on budget	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided/ Don't Know	Agree	Strongly Agree
Q27. The project was completed on time	❑	❑	❑	❑	❑

	Strongly Disagree	Disagree	Undecided/ Don't Know	Agree	Strongly Agree
Q28. The project was completed within the project scope	❑	❑	❑	❑	❑

You are almost finished. This final section is associated with personal and professional information. A reminder that all information is private and confidential and will only be used in aggregate and not tied to individual responses.

(Q29) 1. Please indicate your gender
a. Female
b. Male

(Q30) 2. Please indicate your age range
a. < 30 years old
b. 30-40
c. 41-50
d. 51-60
e. > 60 years old

(Q31) 3. What is the highest level of schooling that you have completed?
a. High school
b. Some college
c. Associate degree
d. Bachelor's degree
e. Graduate degree
f. Post-graduate degree

(Q32) 4. How many years of project management experience do you have?
a. 0-5 years
b. 6-10 years
c. 11-15 years
d. > 16 years

(Q33) 5. What was the project duration of the project you used to answer this survey?
a. < 6 months
b. 6-18 months
c. > 18 months

(Q34) 6. What was the approximate size of the project team youused to answer survey about (including yourself)?
a. < 5
b. 5-10
c. 11-20
d. 21-50
e. >50

(Q35) 7. How many total projects have you participated in (as a project member or a project leader)?
a. 1-5
b. 6-10
c. 11-15
d. >16 projects

(Q36) 8. Do you hold a PMI® Project Management Credential (e.g., PMP, CAPM, PMI-RMP, PgMP, PMI-SP)?
a. Yes
b. No

(Q37) 9. Have you ever been a project leader of a project?
a. Yes
b. No

Appendix B: Literature Support for Survey Questions

Survey Questions	Sources
Structural (STRUC)	
Bonding: Q1. I had access to the project leader when I needed him/her	Burt (2000); Grant (1996b) – efficiency of integration
Q2. I was able to rely on those I worked with on this project	Burt (2000); Grant (1996b) – efficiency of integration
Q3. The project leader encouraged communication with other team members throughout the project (e.g., client, corporate office, professional organizations, etc.)	Burt (2000); Grant (1996b) – efficiency of integration
Q4. The project manager recognized and sought out the knowledge, skills, and abilities I brought to the project team	Burt (2000); Grant (1996b) – efficiency of integration
Q5. The project team frequently spent time together (e.g., close contact, lunch meetings, formal and informal interactions)	Burt (2000); Grant (1996b) – efficiency of integration
Bridging: Q6. The project leader was able to acquire resources for the project and the team members (e.g., money, new members, training, information, equipment, etc.)	Burt (2000); access
Q7. If the project leader did not have the required information or answers to questions, he/she knew how to find the information or was able to refer the project members to others that would have the knowledge	Burt (2000); referrals
Q8. The project leader was able to get external information quickly.	Burt (2000); timing
Relational (RELAT)	
Q9. The project leader encouraged the project team to "think outside the box" and take risks	Nahapiet & Ghoshal (1998); Schenkel & Garrison (2009)
Q10. I had a high degree of trust in the project leader because he/she acted in the best interest of the project and the project team (e.g., he/she was open and honest with me, he/she was supportive, he/she cared about the project and the project team).	Tansley & Newell (2007); companion trust; Chiu et al. (2006); integrity

Q11. I had a high degree of trust that the project leader had the competence to perform his/her role as the project leader (e.g., required qualifications and skills to perform the job)	Tansley & Newell (2007); competence trust
Q12. I had a high degree of trust that the project leader had the capability to perform his/her role as the project leader (e.g., the qualities of being a capable leader)	Tansley & Newell (2007); competence trust
Cognitive (COGNT)	
Q13. The project leader shared important project goals, tasks, and documents with the project team (e.g., project charter, project management plan, etc.)	Nahapiet & Ghoshal (1998); Miller, Burke, & Glick (1998)
Q14. The project leader's goals and objectives were the same as the project team's goals and objectives	Nahapiet & Ghoshal (1998)
Q15. The project leader held routine meetings with the project team	Nahapiet & Ghoshal (1998); Grant (1996a); Wasko & Faraj (2005)
Knowledge Integration (KI)	
Technical: Q16. I had access to project information and project data when I needed it	Grant (1996a; 1996b); efficiency of integration
Q17. A common system or database was used by team members to store information in a common location that was available to the project team (electronically or manually)	Grant (1996a; 1996b) – efficiency of integration; Cohen & Levinthal (1990) – absorptive capacity
Behavioral: Q18. The project leader communicated knowledge and information related to the project challenges, needs, and/or changes on a regular basis	Okhuysen & Eisenhardt (2002); Information sharing, Communicative
Q19. I could not have completed my project tasks/ responsibilities without knowledge and information from other members of my team	Campion, Papper & Medsker (1996) – interdependence; Okhuysen & Eisenhardt (2002) – questioning others

Q20. The project leader encouraged and supported the development of project team member skills through training and developmental opportunities	Motivational
Q21. The project leader brought together the project team to share new information or specialized knowledge that was relevant to the project	Grant (1996b) – scope of integration; Okhuysen & Eisenhardt (2002) – formal interventions
Q22. I was able to accomplish my project tasks because other team members knew their roles and responsibilities on the project team	Campion et al. (1996) – interdependence; Grant (1996b) – efficiency of integration
Q23. The project leader allowed for decision making at the appropriate level	Grant (1996b)
Innovation: Q24. The project team integrated new knowledge into the project tasks and decisions	Grant (1996b); flexibility of integration
Q25. The project team developed new ideas that were incorporated into the project tasks and decisions	Grant (1996b) – flexibility of integration; Mitchell, Boyle & Nicholas (2011) – innovation
Project Success (PS)	
Q26. The project was completed on budget	PMI (2008)
Q27. The project was completed on time	PMI (2008)
Q28. The project was completed within the project scope	PMI (2008)

Appendix C: Pilot Study Demographic Results

Q27. What was the project duration of the last project you used to answer this survey?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 6 months	14	48.3	48.3	48.3
	6-18 months	7	24.1	24.1	72.4
	> 18 months	8	27.6	27.6	100.0
	Total	29	100.0	100.0	

Q28. What is the approximate size of the project team you responded to this survey about?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 5	8	27.6	27.6	27.6
	5-10	14	48.3	48.3	75.9
	11-20	3	10.3	10.3	86.2
	21-50	2	6.9	6.9	93.1
	> 50	2	6.9	6.9	100.0
	Total	29	100.0	100.0	

Q29. Please indicate your gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	15	51.7	53.6	53.6
	Male	13	44.8	46.4	100.0
	Total	28	96.6	100.0	
Missing	System	1	3.4		
Total		29	100.0		

Q30. Please indicate your age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 30	6	20.7	20.7	20.7
	30-40	11	37.9	37.9	58.6
	41-50	6	20.7	20.7	79.3
	51-60	6	20.7	20.7	100.0
	Total	29	100.0	100.0	

Q31. What is the highest level of schooling that you have completed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Some College	4	13.8	13.8	13.8
	Associate Degree	2	6.9	6.9	20.7
	Bachelor's Degree	15	51.7	51.7	72.4
	Graduate Degree	8	27.6	27.6	100.0
	Total	29	100.0	100.0	

Q32. How many years of project management experience do you have?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 years	16	55.2	55.2	55.2
	6-10 years	9	31.0	31.0	86.2
	11-15 years	2	6.9	6.9	93.1
	> 16 years	2	6.9	6.9	100.0
	Total	29	100.0	100.0	

Q33. How many total projects have you participated in (as a project member or a project leader)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 projects	12	41.4	41.4	41.4
	6-10 projects	7	24.1	24.1	65.5
	11-15 projects	2	6.9	6.9	72.4
	> 16 projects	8	27.6	27.6	100.0
	Total	29	100.0	100.0	

Q34. Do you hold a PMI® Project Management Certification (PMP)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	6.9	6.9	6.9
	No	27	93.1	93.1	100.0
	Total	29	100.0	100.0	

Q35. Have you ever been a project leader of a project?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	79.3	79.3	79.3
	No	6	20.7	20.7	100.0
	Total	29	100.0	100.0	

Note: The nine demographics statistics questions used in the pilot study and the revised survey instrument are the same. The numbering of the nine demographic statistics questions differ based on revisions to the original survey instrument. The demographic statistics questions in the pilot study were numbered Q. 27 – Q. 35. The revised survey instrument, based on the results of the pilot study, is numbered Q. 29 – Q. 37.

Appendix D: PMI Chapter LinkedIn Posting Example

Appendix E: Consent to Participate Letter

Hello,

My name is Sandra Sjoberg and I invite you to participate in a research study to understand the role of social capital in project teams. This study is being conducted as part of my doctoral dissertation at Walden University.

This research study is about the ability of project leaders to integrate knowledge within a project team and the results of this study will help to better understand how a project leader's social capital is related to knowledge sharing within a team and its project success. Your participation will be highly appreciated.

If you have been a member of a project team and the project was completed within the past 3 years, please consider participating in this study. You participation will involve completing a 37 question survey that should take approximately 20 minutes to complete.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can decline to participate, you can skip any questions, or you can withdraw from the survey at any point during the survey.

Your survey responses will be strictly confidential and data from this research will be reported only in aggregate. If you have questions at any time about the survey or the procedures, or you are interested in a copy of the final results, you may contact Sandra Sjoberg at (xxx) xxx-xxxx or by email at xxx@edu. You can also contact the university representatives about your rights as participants by contacting a Walden University representative at 800-925-3366, ext. 1210 or via email at irb@waldenu.edu. You may print or keep a copy of this consent form for your records.

Thank you very much for your time and support. While no compensation is provided for your voluntary participation, please know that I greatly appreciate your time and effort to complete this quick 20 minute survey!

If you meet the survey participation requirement of working on a project team of a completed project within the past 3 years, please start with the survey now by clicking on the <B>Continue</B> button below.

Sincerely,
Sandra D. Sjoberg

Appendix F: Confirmatory Factor Analysis Results

Table F1

Initial Measurement Model: Structural Social Capital

Measure		Construct	Estimate[1]	S.E.[2]	C.R.[3]	P
Q8BRIDG: Project leader was able to get external information quickly	←	Structural	0.713			
Q7BRIDG: If project leader did not have required information, he/she knew how to find the information or was able to refer the project members to others that would have the knowledge	←	Structural	0.723	0.260	7.436	***
Q6BRIDG: The project leader was able to acquire resources for the project and the team members	←	Structural	0.357	0.149	3.651	***
Q5BOND: Project team frequently spent time together	←	Structural	0.513	0.199	5.257	***
Q4BOND: Project manger recognized and sought out the knowledge, skills, and abilities I bought to the project team	←	Structural	0.732	0.204	7.532	***
Q3BOND: Project leader encouraged communication with other team members throughout the project	←	Structural	0.984	0.193	9.965	***
Q2BOND: I was able to rely on those I worked with on this project	←	Structural	0.835	0.178	8.615	***
Q1BOND: I had access to the project leader when I needed him/her	←	Structural	0.700	0.147	7.201	***

[1] Standardized regression, [2]S.E. = Standard Error, [3]C.R. = Critial Ratio

Table F2

Final Measurement Model: Structural Social Capital

Measure		Construct	Estimate[1]	S.E.[2]	C.R.[3]	P
Q8BRIDG: Project leader was able to get external information quickly	←	Structural	0.729			
Q7BRIDG: If project leader did not have required information, he/she knew how to find the information or was able to refer the project members to others that would have the knowledge	←	Structural	0.770	0.210	9.583	***
Q4BOND: Project manger recognized and sought out the knowledge, skills, and abilities I bought to the project team	←	Structural	0.733	0.226	6.661	***
Q2BOND: I was able to rely on those I worked with on this project	←	Structural	0.738	0.198	6.696	***
Q1BOND: I had access to the project leader when I needed him/her	←	Structural	0.703	0.166	6.285	***

[1] Standardized regression, [2]S.E. = Standard Error, [3]C.R. = Critial Ratio

Table F3

Initial Measurement Model: Relational Social Capital

Measure		Construct	Estimate[1]	S.E.[2]	C.R.[3]	P
Q12RELAT: I had high degree of trust that the project leader had the capability to perform his/her role as the project leader	←	Relational	0.760			
Q11RELAT: I had high degree of trust that the project leader had the competence to perform his/her role as the project leader	←	Relational	1.115	0.152	11.745	***
Q10RELAT: I had high degree of trust in the project leader becahse he/she acted in the best interest of the project and the project team	←	Relational	0.564	0.124	7.059	***
Q9RELAT: Project leader encouraged the project team to "think outside the box" and take risks	←	Relational	0.665	0.150	8.300	***

[1] Standardized regression, [2]S.E. = Standard Error, [3]C.R. = Critial Ratio

Table F4

Final Measurement Model: Relational Social Capital

Measure		Construct	Estimate[1]	S.E.[2]	C.R.[3]	P
Q12RELAT: I had high degree of trust that the project leader had the capability to perform his/her role as the project leader	←	Relational	0.676			
Q11RELAT: I had high degree of trust that the project leader had the competence to perform his/her role as the project leader	←	Relational	1.000	0.207	8.722	***
Q10RELAT: I had high degree of trust in the project leader becahse he/she acted in the best interest of the project and the project team	←	Relational	0.678	0.182	6.540	***
Q9RELAT: Project leader encouraged the project team to "think outside the box" and take risks	←	Relational	0.740	0.261	6.007	***

[1] Standardized regression, [2]S.E. = Standard Error, [3]C.R. = Critial Ratio

Table F5

Initial Measurement Model: Knowledge Intergration

Measure		Construct	Estimate[1]	S.E.[2]	C.R.[3]	P
Q16KITEC: I had access to project information / data when I needed it	←	Knowledge Integration	0.808			
Q17KITEC: Common system / database was used to store information in common location that was available to the team	←	Knowledge Integration	0.327	0.132	3.377	***
Q18KIBEH: Project leader communicated knowledge and information related to project challenges, needs, and/or changes on regular basis	←	Knowledge Integration	0.225	0.132	2.291	0.022
Q19KIBEH: I could not have completed my tasks/responsibilities without knowledge and information from others	←	Knowledge Integration	0.728	0.135	8.412	***
Q20KIBEH: Project leader encouraged abd supported development of project team members skills through training / development opportunities	←	Knowledge Integration	0.750	0.124	8.752	***
Q21KIBEH: Project leader brought together the team to share new information / specialized knowledge that was relevant to the project	←	Knowledge Integration	0.913	0.115	11.627	***
Q22KIBEH: I was able to accomplish my project tasks because other team members knew their roles/responsibilities	←	Knowledge Integration	0.139	0.037	1.406	0.16
Q23KIBEH: Project leader allowed for decision making at the appropriate level	←	Knowledge Integration	0.431	0.091	4.536	***
Q24KIINNOV: Project team integrated new knowledge into the project tasks and decisions	←	Knowledge Integration	0.909	0.111	11.547	***
Q25KIINNOV: Project team developed new ideas that were incorporated into the project tasks and decisions	←	Knowledge Integration	0.875	0.107	10.891	***

[1] Standardized regression, [2]S.E. = Standard Error, [3]C.R. = Critial Ratio

Table F6

Final Measurement Model: Knowledge Integration

Measure		Construct	Estimate[1]	S.E.[2]	C.R.[3]	P
Q16KITEC: I had access to project information / data when I needed it	←	Knowledge Integration	0.829			
Q19KIBEH: I could not have completed my tasks/responsibilities without knowledge and information from others	←	Knowledge Integration	0.655	0.128	7.821	***
Q20KIBEH: Project leader encouraged abd supported development of project team members skills through training / development opportunities	←	Knowledge Integration	0.822	0.113	10.259	***
Q21KIBEH: Project leader brought together the team to share new information / specialized knowledge that was relevant to the project	←	Knowledge Integration	0.877	0.104	12.035	***
Q24KIINNOV: Project team integrated new knowledge into the project tasks and decisions	←	Knowledge Integration	0.888	0.099	12.287	***
Q25KIINNOV: Project team developed new ideas that were incorporated into the project tasks and decisions	←	Knowledge Integration	0.921	0.095	12.501	***

[1] Standardized regression, [2]S.E. = Standard Error, [3]C.R. = Critial Ratio

Table F7

Structural Model Output

Measure		Construct	Estimate[1]	S.E.[2]	C.R.[3]	P
Knowledge Integration	←	Structural	0.570	0.137	3.248	0.001
Knowledge Integration	←	Relational	-0.403	0.120	-2.649	0.008
Q16KITEC	←	Knowledge Integration	0.831	0.070	12.383	***
Q19KIBEH	←	Knowledge Integration	0.630	0.084	9.536	***
Q20KIBEH	←	Knowledge Integration	0.805	0.088	11.041	***
Q21KIBEH	←	Knowledge Integration	0.865			
Q24KIINNOV	←	Knowledge Integration	0.890	0.073	14.405	***
Q25KIINNOV	←	Knowledge Integration	0.927	0.068	15.188	***
Q8BRIDG	←	Structural	0.733	0.047	10.494	***
Q7BRIDG	←	Structural	0.783			
Q4BOND	←	Structural	0.776	0.095	8.163	***
Q2BOND	←	Structural	0.700	0.084	7.296	***
Q1BOND	←	Structural	0.666	0.087	5.554	***
Q12RELAT	←	Relational	0.711	0.049	11.565	***
Q11RELAT	←	Relational	1.000			
Q10RELAT	←	Relational	0.638	0.070	8.796	***
Q9RELAT	←	Relational	0.740	0.076	11.376	***
Q26PSSCOPE	←	Knowledge Integration	0.385	0.075	7.065	***
Q27PSTIME	←	Knowledge Integration	0.486	0.086	8.961	***
Q28PSBUD	←	Knowledge Integration	0.684			***

[1] Standardized regression, [2]S.E. = Standard Error, [3]C.R. = Critial Ratio

Appendix G: Variance Inflation Factor (VIF)

	Collinearity Statistics	
	Tolerance	VIF
Q17KITEC	.668	1.496
Q18KIBEH	.223	4.479
Q19KIBEH	.169	**5.919**
Q20KIBEH	.175	**5.729**
Q21KIBEH	.079	**12.589**
Q22KIBEH	`	1.524
Q23KIBEH	.155	**6.445**
Q24KIINNOV	.031	**32.553**
Q25KIINNOV	.071	**13.990**

a. Dependent Variable: Q16KITEC

	Collinearity Statistics	
	Tolerance	VIF
Q18KIBEH	.205	4.884
Q19KIBEH	.169	**5.901**
Q20KIBEH	.165	**6.061**
Q21KIBEH	.090	**11.066**
Q22KIBEH	.613	1.631
Q23KIBEH	.151	**6.616**
Q24KIINNOV	.028	**35.208**
Q25KIINNOV	.078	**12.879**
Q16KITEC	.235	4.255

a. Dependent Variable: Q17KITEC

	Collinearity Statistics	
	Tolerance	VIF
Q19KIBEH	.276	3.628
Q20KIBEH	.218	4.594
Q21KIBEH	.114	**8.781**
Q22KIBEH	.610	1.640
Q23KIBEH	.184	**5.422**
Q24KIINNOV	.044	**22.600**
Q25KIINNOV	.081	**12.373**
Q16KITEC	.253	3.953
Q17KITEC	.660	1.516

a. Dependent Variable: Q18KIBEH

	Collinearity Statistics	
	Tolerance	VIF
Q20KIBEH	.169	5.930
Q21KIBEH	.144	**6.929**
Q22KIBEH	.606	1.650
Q23KIBEH	.148	**6.777**
Q24KIINNOV	.028	**35.595**
Q25KIINNOV	.072	**13.866**
Q16KITEC	.233	4.294
Q17KITEC	.664	1.505
Q18KIBEH	.335	2.982

a. Dependent Variable: Q19KIBEH

	Collinearity Statistics	
	Tolerance	VIF
Q21KIBEH	.079	**12.705**
Q22KIBEH	.604	1.655
Q23KIBEH	.178	**5.622**
Q24KIINNOV	.047	**21.056**
Q25KIINNOV	.111	**9.036**
Q16KITEC	.246	4.069
Q17KITEC	.661	1.514
Q18KIBEH	.271	3.696
Q19KIBEH	.172	**5.805**

a. Dependent Variable: Q20KIBEH

	Collinearity Statistics	
	Tolerance	VIF
Q22KIBEH	.620	1.613
Q23KIBEH	.146	**6.866**
Q24KIINNOV	.029	**34.822**
Q25KIINNOV	.080	**12.516**
Q16KITEC	.234	4.265
Q17KITEC	.759	1.318
Q18KIBEH	.297	3.370
Q19KIBEH	.309	3.235
Q20KIBEH	.165	**6.060**

a. Dependent Variable: Q21KIBEH

	Collinearity Statistics	
	Tolerance	VIF
Q23KIBEH	.146	**6.861**
Q24KIINNOV	.030	**33.565**
Q25KIINNOV	.072	**13.835**
Q16KITEC	.252	3.974
Q17KITEC	.669	1.495
Q18KIBEH	.206	4.845
Q19KIBEH	.169	**5.928**
Q20KIBEH	.165	**6.076**
Q21KIBEH	.081	**12.414**

a. Dependent Variable: Q22KIBEH

	Collinearity Statistics	
	Tolerance	VIF
Q24KIINNOV	.104	**9.592**
Q25KIINNOV	.136	**7.367**
Q16KITEC	.247	4.051
Q17KITEC	.684	1.462
Q18KIBEH	.259	3.861
Q19KIBEH	.170	**5.870**
Q20KIBEH	.201	**4.976**
Q21KIBEH	.079	**12.739**
Q22KIBEH	.605	1.654

a. Dependent Variable: Q23KIBEH

	Collinearity Statistics	
	Tolerance	VIF
Q25KIINNOV	.172	**5.828**
Q16KITEC	.253	3.946
Q17KITEC	.666	1.500
Q18KIBEH	.322	3.103
Q19KIBEH	.168	**5.947**
Q20KIBEH	.278	3.594
Q21KIBEH	.080	**12.459**
Q22KIBEH	.641	1.560
Q23KIBEH	.541	1.850

a. Dependent Variable: Q24KIINNOV

	Collinearity Statistics	
	Tolerance	VIF
Q16KITEC	.232	4.315
Q17KITEC	.716	1.396
Q18KIBEH	.231	4.323
Q19KIBEH	.170	**5.894**
Q20KIBEH	.255	3.924
Q21KIBEH	.088	**11.393**
Q22KIBEH	.611	1.636
Q23KIBEH	.277	3.615
Q24KIINNOV	.067	**14.828**

a. Dependent Variable: Q25KIINNOV

	Collinearity Statistics	
	Tolerance	VIF
Q27PSTIME	.394	2.536
Q28PSSCOPE	.394	2.536

a. Dependent Variable: Q26PSBUD

	Collinearity Statistics	
	Tolerance	VIF
Q26PSBUD	.285	3.514
Q27PSTIME	.285	3.514

a. Dependent Variable: Q28PSSCOPE

	Collinearity Statistics	
	Tolerance	VIF
Q28PSSCOPE	.426	2.345
Q26PSBUD	.426	2.345

a. Dependent Variable: Q27PSTIME