

Knowledge Sharing Processes in Business-to-Business Solution Co-Creation

by

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ABSTRACT

The marketing and development of solutions has become an increasingly important concept in both marketing practice and theory. Recent conceptual work has defined solutions as sets of products and services that allow customers to achieve customized outcomes. Although the definition of a solution is becoming clearer, the process through which solution value is generated is still opaque.

The purpose of this study was to add clarity to both marketing theory and practice by examining the solution value co-creation process in depth. Service-dominant logic, the relational view, service value co-creation, and theories of organizational learning and knowledge were the basis for this examination. Social capital was also examined to determine how these important relational concepts are involved in solution development.

The study was conducted in four separate phases using a multi-method approach of quantitative surveys, qualitative surveys, and depth interviews. A large, multinational educational firm provided the context for the study which included access to their solution sales force and customer base. Quantitative data was collected from 97 key informants across 182 different customer opportunities for both new and existing solution engagements. Qualitative data was also collected from 71 respondents to provide a mixed-method triangulation of how solution value is created. Overall, the study provided strong support to the idea that knowledge sharing between solution providers and their customers plays a pivotal role in the co-creation of solution value.

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	vi
LIST OF FIGURES.....	vii
CHAPTER	
1 INTRODUCTION.....	1
Problem Statement.....	3
Conceptual Foundation.....	4
The Study.....	7
Research Context.....	8
Potential Contributions.....	10
Limitations.....	12
Dissertation Organization.....	13
2 LITERATURE REVIEW.....	15
Customer Solutions.....	15
Value Creation.....	17
The Relational View and Service-Dominant Logic.....	19
Organizational Learning and Knowledge.....	25
Social Capital in Solution Learning and Knowledge Processes.....	31
Conclusion.....	37
3 CONCEPTUAL FRAMEWORK.....	41
Conceptual Model.....	41
Solution Account Team and Buying Center.....	43

CHAPTER	Page
Knowledge Sharing	45
Knowledge Processes	46
Structural Aspects of Solution Teams.....	52
Relational Aspects of Solution Teams	55
Solution Customization and Internal Knowledge Sharing	58
Conclusion	60
4 METHODOLOGY.....	62
Research Setting	62
Data Collection	64
Data Analysis Plan.....	75
Conclusion	83
5 RESULTS.....	84
Quantitative Sample Description	84
Measure Assessment	84
Quantitative Data Analysis.....	94
Hypotheses Testing	100
Qualitative Sample Description	102
Qualitative Data Analysis.....	102
Conclusion	113
6 IMPLICATIONS AND CONCLUSIONS	115
Theoretical Implications.....	115
Managerial Implications.....	122

	Page
Limitations and Directions for Future Research.....	128
Conclusion	129
REFERENCES	130
APPENDIX	
A RESPONDENT ONE-ON-ONE INTERVIEW GUIDE.....	144
B SURVEY OPPORTUNITY PRESENTATION LOGIC.....	150
C QUANTITATIVE SURVEY INSTRUMENT	152
D QUALITATIVE SURVEY INSTRUMENT	164
E INSTITUTIONAL REVIEW BOARD EXEMPTION.....	167

LIST OF TABLES

Table		Page
1.	Control Variables	76
2.	Independent Variables	78
3.	Moderating Variables	80
4.	Knowledge Sharing Scales	86
5.	Knowledge Sharing Summary Statistics (New)	87
6.	Knowledge Sharing Summary Statistics (Existing).....	87
7.	Moderating Variable Items	90
8.	Moderating Variables Summary Statistics (New).....	91
9.	Moderating Variables Summary Statistics (Existing).....	91
10.	Control Variable Items.....	93
11.	Control Variable Summary Statistics (New).....	93
12.	Control Variable Summary Statistics (Existing).....	94
13.	New Opportunities Logistic Regression Models	98
14.	Existing Opportunities Logistic Regression Model.....	100
15.	Summary Statistics for Knowledge Sharing Code Counts	107
16.	Percentage of Cases with Knowledge Sharing Code	108
17.	Summary Statistics for Structural and Relational Code Counts	110
18.	Percentage of Cases with Structural and Relational Codes	111

LIST OF FIGURES

Figure	Page
1. Conceptual Model	43

CHAPTER I

The ongoing relational processes between a customer and a service provider are an increasingly important component of what defines marketing (Tuli et al. 2007; Vargo and Lusch 2004a). This emerging perspective transcends the traditional goods-centered logic that value creation and consumption are activities separated in space and time between producers and consumers. Instead, this progressive framework proposes provider firms should actively engage in joint learning dialogs with the customer throughout the entire duration of a relationship (Ballantyne and Varey 2004; Jaworski and Kohli 2006; Selnes and Sallis 2003; Tuli et al. 2007).

For managers, this viewpoint advocates the marketing function should take the lead in facilitating the cross-functional relational processes that form learning dialogs (Vargo and Lusch 2004a). Instead of focusing almost exclusively on the development of specific ex ante value propositions, this new approach expands marketing's functional role to one that facilitates all value co-creation processes over the life of the customer (Grönroos 2000). Managers who adopt this approach will find themselves at "the center of the integration of business processes and disciplines" as value propositions are developed jointly with customers and the cross-functional resources of the provider (Vargo and Lusch 2004a).

Co-creation processes are relevant across all markets to some extent, but they are perhaps most critical in industrial markets. An excellent example of the

importance of co-creation process is the emerging area of business-to-business solutions. Solutions are customized sets of products and services developed through joint relational processes between provider and customer firms which accomplish specific customer goals (Bennett et al. 2001; Epp and Price 2011; Sawhney 2006; Sawhney 2003; Sawhney et al. 2004; Tuli et al. 2007; Wise and Baumgartner 1999). Solutions offer providers a competitive advantage compared to simple bundles of products and services given they are customized to meet a specific customer's needs (Sawhney et al. 2004; Sawhney et al. 2006). The academic research to date on solutions reflects the newness of the approach given it has been primarily conceptual and qualitative in nature (Bennett et al. 2001; Epp and Price 2011; Sawhney 2006; Sawhney et al. 2004; Tuli et al. 2007).

As the broader conceptual framework of solutions continues to be defined, a critical next step in the theory building process is to more fully understand and test the detailed mechanics that underlie the relational processes between suppliers and customers involved in solution building (Christensen et al. 2004). This dissertation will contribute to that effort by using theories of service value creation and organizational learning and knowledge to explore the processes involved in developing a business-to-business solution. Specifically, it will evaluate how differences in knowledge and relational processes affect the objective performance of a given solution. The setting for this exploration will be the social structure that operates through a business-to-business solution provider's primary marketing interface- the solution account team.

This first chapter will provide an overview of the research project including the conceptual problem to be addressed, the conceptual framework, and a description of the study including its potential contributions and limitations.

PROBLEM STATEMENT

Learning is not new a new construct in the marketing literature (Baker and Sinkula 1999; Day 1994; Hurley and Hult 1998; Madhavan and Grover 1998; Selnes and Sallis 2003; Slater and Narver 1995). The application of learning theories to co-creation processes is still in its nascency, however, and there are several key issues that have yet to be addressed. On the supply side, learning has typically been examined at the firm level without consideration for the actual joint learning processes that occur within social interactions between suppliers and customers in transactions like those involved in solution-based strategies. The studies in this area tended to view customers as static segments from which to learn rather than active participants in joint, individualized learning processes with provider firms. Understanding higher and more abstract levels of organizational learning is undoubtedly important. This perspective offers little insight into how the relationships among individual organizational actors impact specific market exchanges or firm level outcomes, however. Additionally, such macro perspectives on learning by definition can not speak to the individual differences that exist in specific exchange relationships.

When considering learning on the demand side, marketing research has typically been limited to the learning that occurs as a result of one-way marketing

communications (Hoch and Ha 1986; Hutchinson and Alba 1991; Li et al. 2003; Wernerfelt 1996) without any consideration of joint dialog. Much of this research stream examined the role a consumer's learning had in influencing their behavior. Even work in the consumer relationship marketing area looked at learning as an internal process that consumers undertook as they developed evoked sets of products to which they will be loyal (Sheth and Parvatlyar 1995).

Theoretical perspectives in the service literature have made recommendations for research that considers the learning processes by which value is co-created within specific marketing relationships (Jaworski and Kohli 2006). Likewise, scholars examining business-to-business solutions have called for research that addresses specific variables that influence solution success and the relational processes between solution providers and customers (Sawhney 2006; Tuli et al. 2007). This dissertation will answer both of these research calls by examining the knowledge and relational processes between solution providers and their customers that facilitate value co-creation and solution success in the business-to-business market.

CONCEPTUAL FOUNDATION

Value creation.

The service marketing literature provides a strong foundation for considering value creation in the business-to-business solution domain. One recent perspective in this literature advocates a new approach to examining value creation, termed *service-dominant logic* (Vargo and Lusch 2004a). Rather than

following the traditional logic that value is embedded in products by the producer, this viewpoint holds the value of products and services is determined by the customer through use (Grönroos 2000; Gummesson 2002; Lovelock and Gummesson 2004; Ravald and Gronroos 1996; Vargo and Lusch 2004a). Such value in use is co-created by the customer and provider as they both apply their resources to the task of meeting a particular customer need or desire (Sawhney 2006; Vargo and Lusch 2004a). These notions of value in use are consistent with similar service marketing descriptions of co-production where value is only arrived at through the joint interactions between provider and customer in a service setting (Bettencourt et al. 2002; Lovelock and Young 1979; Prahalad and Ramaswamy 2000). While the umbrella term, *service-dominant logic*, is a relatively recent construct, it is important to note many of the concepts behind this new logic have existed for some time. As a conceptual foundation, it is not the novelty of the service-dominant logic that is of greatest importance, but rather its ability to integrate similar theoretical threads into a more comprehensive fabric that addresses the source of value co-creation.

The concept of co-created value becomes much more interesting theoretically when consideration is given to what resources actually produce this value. In discussion of their new logic, Vargo and Lusch (2004a) define value as being the result of “the beneficial application of operant resources”. Operant resources are resources that produce effects which result in customer value (Constantin and Lusch 1994; Vargo and Lusch 2004a). Knowledge and skills are

seen as fundamental operant resources in the market exchange process (Flint and Mentzer 2004; Vargo and Lusch 2004a; Vargo and Lusch 2004b). The primacy of knowledge resources in the co-creation process is also reflected in conceptual work looking at solutions in particular (Sawhney 2006; Sawhney 2003).

Organizational learning and knowledge.

In order to better understand how knowledge sharing drives the value co-creation process, it is important to also examine the organizational knowledge and learning literature. The situated learning perspective is particularly well suited to better understanding this process. This perspective is rooted in the pragmatic logic that knowledge is only relevant within a specific context or situation (Sole and Edmondson 2002; Tyre and von Hippel 1997). When considering solutions, situated theories of learning would hold there is not an absolute, codified body of knowledge that emerges from the co-creation process, but rather knowledge is embedded in the interactions between the organizational actors who are directly involved in co-creation processes (Göranzon et al. 2006; Polanyi 1966; Suchman 1987).

As with new perspectives on service, organizational knowledge achieves value in use, rather than through simple exchange or trading of information (Hass and Hansen 2004). This use comes about not only from individual actors' intellectual understanding of the situation at hand, but also from the actors' ability to use information and social connections within a given context (Robey et al. 2000; Tyre and von Hippel 1997). While early research in this area looked

exclusively at codified knowledge, in complex processes such as solution development, such knowledge is insufficient and much of the learning may be tacit (Göranzon et al. 2006; Polanyi 1966). Indeed, excessive use of codified knowledge may be detrimental to the performance outcomes of such processes (Hass and Hansen 2004).

Together, these theories of value creation and organizational learning offer an excellent framework with which to explore solution development processes. By adopting the service-dominant logic rationale for value creation, it is possible to link the co-creation of solution value to knowledge and relational processes both between the solution provider and customer as well as within the solution provider's organization.

THE STUDY

Research objectives and questions.

The primary objective of this research study is to explore how knowledge and relational processes contribute to the value co-creation process for business-to-business solutions. Specifically, knowledge sharing and learning processes between a solution provider and customer will be evaluated within the social network of a solution provider and customer to determine how they impact the relative success of a given solution. Examination of these knowledge processes and the cross-firm social network will provide key insights into the overall value creation process. These insights will provide both theoretical and managerial prescriptions for how solution teams and knowledge processes can be configured

in order to achieve success in the solution market. Firms that develop core competencies in these relational knowledge processes are likely to have a long term competitive advantage over those who do not (Hunt and Arnett 2003; Hunt and Morgan 1995).

The following research questions were used to guide this study:

1. What knowledge and relational processes are involved in the creation of solution value?
2. How do the knowledge processes between a solution provider and customer affect the likelihood of success for specific solutions?
3. What aspects of the social network of a solution moderate the relationship between solution value processes and solution success?
4. What best practices can solution providers utilize in managing the relationship with their customers in order to increase the likelihood of successful solution implementations? Additionally, how can customers improve the success of solutions they undertake with providers?

RESEARCH CONTEXT

The context for this research was a large, global provider of digital learning software and services. This firm has a large sales force that sells a variety of digital products and services which collectively account for over \$150 million in product and services revenue. The context provided for a variety of different customer relationships which ranged from relatively simple to more complex solution-based services, all sold by the same set of account teams. The

customers of this firm are predominantly public and private elementary and secondary schools in the United States. Collectively, the entire market for this firm is represented by over one hundred thousand individual schools (Sable and Shen 2007). Decision making for purchases of the firm's software products is typically a complex process which involves a buying center composed of individuals from several different cross-functional groups inside the customer institution. The average total value of a given purchase (which includes software and services) is approximately \$50,000.

This study evaluated the social structure between the customer and provider firms by focusing on the provider's account team as the central unit of analysis. A firm's account team provides a critical linkage between resources at the provider and customer firms. Account teams provide the means to coordinate activities through communication and joint problem solving (Day 1994). By examining the role of the account team in facilitating the sharing of knowledge between the resources of both the provider and customer firms, it will be possible to determine how differences in the learning processes and social relationships affect value creation processes. The account team, and specifically the account executive, will therefore be the key informants for the majority of this study. The data from the account executives was supplemented with customer interviews, data from other functional roles at the provider firms, objective financial data, and data collected from individuals within the provider's customers.

The methodological approach to this study involved four separate phases. The first two phases were qualitative, exploratory, and aimed to gather contextual data and validate the key assumptions related to the social network that operated between the provider and customer firms. Interviews were conducted with several of the participating firm's customers. One-on-one depth interviews were also conducted with a randomly selected sample of six account executives at the provider firm. These interviews explored the social network between the provider and either a new or existing customer relationship.

The third phase of this study was a quantitative survey of an entire divisional sales force at the provider firm. This phase of the research selected a random set of either existing or potential customer opportunities from the sales tracking database. Each account executive then completed a web-based survey for each of these opportunities. The data collected from the account executives was combined with objective sales success data from the sales database in order to examine the outcomes of specific customer engagements.

The fourth phase of the study was qualitative, structured, and confirmatory. Following the results of the quantitative study, this phase surveyed the same sales team at the provider firm to collect open ended responses to questions about solution development and the role knowledge sharing and relationships had in developing superior solutions. This phase added additional context and depth to the study in order to further test the key research questions.

POTENTIAL CONTRIBUTIONS

This research will contribute to the marketing literature in four ways.

First, the study adopts and extends recent conceptual work within the business-to-business domain that defines solutions as relational processes between the solution provider and customer (Tuli et al. 2007). While these new definitions add weight to the theoretical importance of solutions, they do not transcend the context from which they emerged to delve into more fundamental processes like organizational learning or how solution value is created. This study will, therefore, further refine the definition of a solution by exploring the specific relational knowledge processes involved in the solution value creation process.

Second, this study will go beyond simply defining solutions to explore the relationship between the relational knowledge processes that comprise a solution and the success of that solution. This connection of processes to outcomes is a fundamental solution concept yet to be addressed in the marketing literature. Previous work narrowly focused on defining how a solution differed from unintegrated bundles of products and services where success was tautological in that a solution provided customized outcomes that are somehow better (Sawhney 2006). By examining the knowledge processes that provide integration and customization, it is possible to understand the sources of solution success for a given solution engagement.

Third, this study will answer the call for marketing to “lead the effort of building cross-functional business processes” as part of the service-dominant

logic of marketing (Vargo and Lusch 2004a). By adopting the service-dominant logic perspective, the study will identify the specific cross-functional processes that facilitate the co-creation of a solution. Once identified, it is possible to frame these in the broader definition of marketing as a “system integrator” of value co-creation processes (Achrol and Kotler 1999). This examination will be one of the first to empirically examine these issues in the context of solutions.

Finally, the study draws on established perspectives of organizational knowledge and learning to evaluate the relational processes that make up the solution co-creation process both within a solution provider and within exchange relationships with customers. By extending these traditionally intra-organizational perspectives to the exchange relationship in a solutions context, this study will offer new marketing insights into how these knowledge processes operate between solution providers and their customers.

LIMITATIONS

One of the primary limitations of this study is it was conducted within a single firm in a single industry. While this limits the generalizability of this study, it did provide a context where the research could be conducted in much greater depth than would have otherwise been possible in a multi-firm study. For example, the firm that cooperated in this study allowed the research team unfettered access to all of its databases of customer opportunities and sales person activities. The firm also allowed the research team to interview its employees and customers involved in the solution development process. Single firm research has

been established as an important technique for theory building especially in a areas that are new or evolving (Eisenhardt 1989; Frankwick et al. 1994). Given the newness of the solution domain, depth studies like this one can help to explore some of the processes that underlie new solution development and build the foundation for more generalizable research in the future.

A second limitation of this study is both of the primary surveys used account executives as the key informants. While the accuracy of key informant research has been criticized (Bernard et al. 1984), there is also evidence to show it can be a valuable research technique (John and Reve 1982). Social network research in particular has found a centrally positioned key informant tends to be a competent source of data (Krackhardt 1990). In this study, the job description of an account executive is to be a centrally located network actor, therefore they are well positioned to answer questions related to the overall relationship between solution provider and customer.

DISSERTATION ORGANIZATION

This chapter has provided an overview of the research study, its conceptual foundation, key research objectives and questions, an overview of the research context, and its potential contribution and limitations. Chapter Two reviews the relevant literature in order to develop a solid conceptual basis for the study. Chapter Three presents the conceptual model for the study and the hypotheses to be tested. Chapter Four covers the study methodology including the overall study design, data collection, and analysis techniques. Chapter Five

presents the results of this analysis and discusses the findings for the confirmatory phases of the study. Finally, Chapter Six presents a discussion of the findings and the implications for both marketing theory and practice.

CHAPTER II

LITERATURE REVIEW

This chapter reviews the relevant academic literature in order to develop the conceptual framework used in this study. The review begins by looking at solutions and value creation. Next, the relational view and service-dominant logic of marketing are examined. The third section covers organizational learning and knowledge sharing. The fourth section reviews social capital and its subcomponents, relational and structural embeddedness. The final section presents the key gaps in the literature.

CUSTOMER SOLUTIONS

Many industrial firms are looking to *solutions* in order to differentiate their market offerings and achieve competitive advantage (Bennett et al. 2001; Davies et al. 2006; Sawhney 2006; Sawhney et al. 2004; Sawhney et al. 2006; Tuli et al. 2007; Wise and Baumgartner 1999). The literature has defined *solutions* as “offerings that integrate goods and services to provide customized outcomes for specific customers” (Davies et al. 2006; Sawhney 2006). More recently, qualitative research has attempted to expand this definition from a goods and services focus to one that also includes relational processes (Tuli et al. 2007).

Solutions represent a shift in managerial practice and academic thinking. Traditional manufacturers such as John Deere, IBM, and GE have transformed themselves from makers of goods to providers of solutions (Sawhney et al. 2004). Likewise, traditional service providers like FedEx, Kaiser Permanente, and UPS

have moved beyond providing services designed from their service provider perspective to solutions that focus on a broader notion of a customer's desired outcomes (Brown 2008; Neu and Brown 2005; Sawhney 2006). While there is not a complete market estimate for the solution sector, IDC estimates the worldwide market for a single type of a solution approach, business process outsourcing, grew from \$382.5 billion in 2004 to \$641.2 billion in 2009 (IDC 2005). Business process outsourcing (BPO) represents an excellent example of solutions in practice, given it is focused on providing a comprehensive customer outcome by outsourcing an end-to-end function within a customer firm. Examples of BPO solutions include IT, HR, and procurement and supply chain management (IBM 2009).

Success for companies who implement a solutions approach is far from guaranteed, however (Tuli et al. 2007). Interviews with business leaders indicate about half of solution engagements may only be moderately successful with 25% being unprofitable (Stanley and Wojcik 2005). While many firms may decide to implement a solutions strategy, overcoming path dependencies in order to effectively implement the strategy may be difficult (Cohen and Levinthal 1989). Beyond path dependencies, the sources of advantage in a solutions strategy are challenging to identify, develop, and emulate given the complexities of coordination between the customer and solution provider within the overall solution process (Day 2004).

The literature to date on solutions has focused on describing and defining what a solution is especially when compared to bundles of products and services. The few authors that have considered the source of solution value typically only deal with the concept at a high level. Sawhney, for example, puts forward that *integration* and *customizations* are the determinants of the incremental value of a solution compared to the simple the additive value of a set of individual products and services (Sawhney 2006). In discussing the process of developing solutions, Sawhney focuses on managerial recommendations for organizations that develop solutions, but does not attempt to integrate these perspectives into any larger marketing or management frameworks (Sawhney 2006). Tuli et al expand on this perspective by advocating four relational processes (requirements definition, customization and integration of products and services, deployment, and post-deployment support) are the sources of value of a given solution (Tuli et al. 2007). Their work enhanced the extant definition of what makes up a solution by highlighting the role of the relationship between customer and solution provider in these four processes. Related literature on the customization of industrial products has focused on the control of customization decisions, but again has not explicitly examined the sources of value (Ghosh et al. 2006).

VALUE CREATION

Before exploring the sources of solution value, the definition of value must be considered more thoroughly. While value is a core marketing concept, the literature is equivocal when it comes to establishing a single definition of this

construct. The importance of value is not disputed, but its definition has been shown to have been inconsistently and imprecisely applied (Parasuraman 1997; Woodruff 1997). One widely cited definition of value that is Woodruff's:

Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations (Woodruff 1997).

While even this definition has been criticized as being overly general (Parasuraman, 1997), it defines value as "perceived preferences" which resulted from product "use". This definition attempts to capture both the logic of a traditional product focus by including product attributes, but also includes logic that works within a solution framework through inclusion of the achievement of customer end goals and purposes. While useful for potentially administering ex post measures of customer perceptions, this definition does not fully illuminate the murky territory of where value originates.

The preceding definition does offer some insight into the process of value creation, however. The key to this insight is value is derived from use. As mentioned previously, value in use perspectives are fundamentally different from the traditional manufacturing perspectives which assumed value was created by the supplier in isolation from customers (Gummesson 2002). Value in use becomes a central theme in the services marketing literature which focuses on co-production or co-creation of value (Bettencourt et al. 2002; Lovelock and Young

1979). The key to co-creation is both the customer and provider are jointly involved in the process of creating value. For solutions, this notion of co-created value aligns well with the customization required to develop a solution. Extended definitions of solutions like those presented by Tuli et al (2007) are also consistent with co-creation of value viewpoints given critical relational processes involve both the solution provider and customer working jointly to achieve solution outcomes.

THE RELATIONAL VIEW AND SERVICE-DOMINANT LOGIC

Relational perspectives are well established in the business literature when evaluating how relational assets may impact cooperating firms' ability to achieve competitive advantage through value creation. The most relevant example of this perspective is the relational view (Dyer and Singh 1998). The relational view explored relation specific assets and knowledge sharing routines between a pair or network of collaborating firms that could result in sustained competitive advantage for those firms (Dyer and Singh 1998; Dyer and Nobeoka 2000). These relational processes are thought to be the nexus of value creating activities between firms that lead to market advantage and "relational rents" (Dyer and Singh 1998). Dyer and Singh's seminal work suggests competitive advantage in alliances can be achieved through four components- relational assets, knowledge exchange, the combination of complementary resources, and more effective governance mechanisms (Dyer and Singh 1998). While this research looked at alliances rather than supplier-customer relationships, several aspects of how

alliances might achieve competitive advantage are worth applying to the solution context.

Given the importance of Dyer and Singh's relational view to considering solution value creation, each of these four areas is worth discussing briefly. Relational assets include human co-specialization which is achieved between alliance partners as they work together and accumulate specialized skills and knowledge. One of the benefits of this shared specialization is knowledge sharing becomes more efficient. Knowledge exchange goes beyond knowledge communication to include partner-specific absorptive capacity. In this context, absorptive capacity refers to the firm's ability to recognize knowledge from a partner based on previous experiences, assimilate and integrate that knowledge, and make use of it (Cohen and Levinthal 1990). Complementary resources specifically speak to the combination of resources from the alliance firms that generate greater rents than would be possible if the resources were separate from one another. Finally, effective governance mechanisms refer to the ability of the alliance partners to reduce transaction costs and maximize value through effective management structures.

Although the relational view is traditionally applied at the firm level, it seems equally suited to considering the co-creation of value between a solution provider and customer at a transaction level. Applying the framework analogously to these transactions would imply value is arrived at through the relational assets that emerge out of the interrelationships between provider and

customer. These assets facilitate the development of solution knowledge which can be applied to achieve value in use. The value in use is created by firm resources that are self-reinforcing in a system that allows and facilitates effective interaction between resources. Co-specialization makes use of the assets of both firms in developing solution-specific knowledge. The ability of the firms to develop such knowledge in many ways is a solution specific absorptive capacity (Cohen and Levinthal 1990). Within the solution context, absorptive capacity is a solution specific ability by the involved firms to recognize relevant knowledge in the system of firms and transform it into new knowledge that generates value within the solution provider and customer transaction. Finally, governance while perhaps not explicitly applied to solution and provider firms might be better reflected by the collective action of these firms as they work to the same solution end goals.

The relational view extends the resource based view which states firms that have rare, valuable, inimitable, and non-substitutable resources (so-called RVIN resources) are able to achieve competitive advantage (Barney 2001; Barney 1996). This advantage is often characterized as a lasting asymmetry in knowledge resources (Conner and Prahalad 1996). While the resource based view has most often considered resources within the firm, even in these cases, the source of value to the firm is derived exogenously from the market (Srivastava et al. 2001). The relational view is therefore a special case of the resource based

view which specifically considers relational assets among firms and the knowledge generated from those assets.

The relational view offers several important observations with which to more fully consider the sources of solution value. As a firm level theory, however, it falls short when considering value creation within individual provider and customer solution engagements. While offering powerful observations on the relative effectiveness of firms, it does not specifically delve into the differences that might exist among particular solution transactions within a given firm. To the marketer responsible for specific customer engagements, such high level perspectives offer little in the way of tools with which to deal with the many individual relationships that make up the collective interactions a solution provider engages in. In order to address this shortcoming, the service-dominant logic of marketing can be used to good affect as a next step in understanding and optimizing solution value creation given the strong foundation of the relational view.

The service-dominant logic of marketing is similar in many aspects to the relational view when considering sources of value. Like the relational view, service-dominant logic posits relational processes are critical to the co-creation of value in market exchanges (Vargo and Lusch 2004a). These relational processes are inseparable from the offering in that “value for customers is created throughout the relationship by the customer, partly in interaction between the customer and the supplier or service provider” (Grönroos 2000). Without the

relationship between provider and customer, value creation is not possible. In Vargo and Lusch's terms, the enterprise can only make value propositions given the customer is integral to value generation through co-creation processes (Vargo and Lusch 2004a).

The co-creation processes that are central to value production in the service-dominant logic have direct parallels to those in the relational and resource based view. Within the resource based view, for example, "dynamic capabilities function to acquire and shed resources, integrate them together, and recombine them to generate new value-creating strategies" (Eisenhardt and Martin 2003). Further, dynamic capabilities specifically involve learning and adapting the capabilities of the firm as it interacts with the market to achieve competitive advantage (Teece et al. 1997). Again, while these processes are at the firm level, they embody the themes of co-creation and relational processes which enable knowledge and skills to create value in use in the customer and provider exchanges which service-dominant logic exposes (Vargo and Lusch 2004a).

The relational view also examines interactions among entities that facilitate the transfer, recombination, or creation of specialized knowledge (Dyer and Nobeoka 2000). Specifically, the relational view argues interrelationships among firms in a network with a common purpose may be more effective than individual firms in generating knowledge which leads to competitive advantage (Dyer and Singh 1998; Dyer and Nobeoka 2000). This knowledge is network specific and therefore has the greatest value within that specific network context

(Dyer and Nobeoka 2000). The corollary from the service-dominant logic perspective is the differential use of knowledge applied in concert with other members of the value chain enable a service provider to generate superior value and thereby achieve competitive advantage (Vargo and Lusch 2004a).

Like the relational view, the service-dominant logic recognizes the centrality of knowledge and knowledge processes to the creation of value. Vargo and Lusch (2004a) state “the use of knowledge and mental competencies, are at the heart of competitive advantage and performance”. Indeed, they advocate knowledge is the fundamental source of competitive advantage (Vargo and Lusch 2004a). This perspective is grounded in previous literature which looked at market sensing and customer relating as being key strategic capabilities for firms to achieve competitive advantage (Day 1994). While the perspective of co-creation necessarily requires involvement of a customer in value creation, strategic capabilities such as these are key antecedents for firms to master prior to engaging in the co-creation of specific solutions (Day 2004).

While sharing similar concepts with both the relational view and the resource based view, service-dominant logic offers a transaction specific perspective on value creation within solution engagements. It highlights the importance of knowledge and learning activities to the co-creation of solution value. By combining this perspective with firm based frameworks, it is possible to see many direct and indirect capabilities and resources both at the solution provider and customer firm work together to produce solution value (Day 2004).

Clearly, these perspectives also elucidate the difficulties firms may have in achieving competitive advantage through just focusing on generic co-creation processes. In order to achieve advantage through solution value creation as service-dominant logic advocates, firms must selectively focus on those capabilities that are best suited to this task. Given the importance of knowledge and learning in all three of these strategic frameworks, it follows solution providers should focus their efforts on these processes.

ORGANIZATIONAL LEARNING AND KNOWLEDGE

In order to better understand knowledge and learning processes involved in the co-creation of a solution, it is important to evaluate both learning and knowledge processes as applied in market exchanges. Learning and knowledge are both well established constructs in the marketing literature. Organization learning has been examined in market orientation (Baker and Sinkula 1999; Slater and Narver 1995), new product innovation (Li and Calantone 1998; Madhavan and Grover 1998; Moorman and Miner 1997), inter-firm partnering (Johnson et al. 2004), the relationship between learning and improvisation (Miner et al. 2001), and market information processing (Moorman 1995; Sinkula 1994). These theoretical streams considered how learning and knowledge creation occurred within the firm or in the firm's interactions with the market. Some have argued the concepts of organizational learning, knowledge, and memory have yet to reach the level of being theoretically interesting (Spender 1996), but the vast majority of scholars in this area have found these constructs to be critical in

explaining organizational outcomes (Fiol and Lyles 1985; Kogut and Zander 1992; Senge 1990; Slater and Narver 1995).

Given the limited number of studies in the solution domain overall, studies in new product development offer perhaps the best analog for evaluating learning and knowledge in this context. Solution development and new product development share similar processes in both use collected customer requirements to subsequently craft a value proposition (Sawhney 2006). Within the learning literature looking at product development, Madhavan and Grover (1998) examined how knowledge was created and shared among the members of a new product team within the firm. Li and Calatone (1998) looked at the processes within a firm that enabled the firm to develop market knowledge competency and how these processes were related to new product advantage. These studies demonstrated learning and knowledge processes were critical to the success of new products.

Looking at the marketing literature with a deeper depth of field provides more relevant studies which can be applied to the solutions context. Hurley and Hult (1998) found organizational learning was positively associated with successful cultures of innovation in market oriented firms. They described how learning and development accounted for significantly more variance in group innovativeness compared to the other factors they studied (participative decision making, support and collaboration, and power sharing). Prahalad and Hamel (1990) detailed how organizational learning was also a key source of competitive

advantage. Slater & Narver (1995), in a widely cited conceptual paper on market orientation and the learning organization, make a case for organizational learning and higher level learning being associated with new product success and customer satisfaction which in turn lead to sales growth and profitability. While they did not specifically address co-creation of knowledge between firms, they did address learning as a “buffer” between the firm and the market. The buffer provides the interface between the firm and the market which are “loosely coupled”. This concept of learning being outside the firm and intertwined with the market begins to approach the knowledge processes in the co-creation of solution value. However, the conceptual argument they advanced only defined learning from the perspective of the firm learning about or from the market and not a learning system that spanned the firm and the market.

When discussing the organizational cognitive process within a system of firms, it is important to point out the distinctions between it and the individual process. While individuals certainly make up a large part of any organization, the sum of these individual’s learning processes is not synonymous with organizational learning (Fiol and Lyles 1985). At the highest level of abstraction, firms are systems which aspire to achieve such organizational goals as increasing stockholder value. Organizational systems are defined by these organizational level goals rather than individual ones (Weick and Roberts 1993). Within these systems, individuals and their associated cognitive processes do play a critical role. However, organization learning, knowledge, and memory exist beyond the

simple roll up of each individual's cognitive states. Heberg explained the issue thusly:

Organizations do not have brains, but they do have cognitive systems and memories. As individuals develop their personalities, personal habits, and beliefs over time, organizations develop world views and ideologies. Members come and go, and leadership changes, but organizations' memories preserve certain behaviors, mental maps, norms, and values over time. (Heberg 1981)

Weick and Roberts (1993) in their study of the collective mind in flight crews, had a similar view of organizations which represented the collective mind as a pattern of interrelated actions in a social system. Further, they argued the individual actors in this system conduct themselves in a way heedful and mindful of the consequences of their actions in subordination to the goals of the system. So, the actions of individual organizational actors form the synaptic processes of the organizational "mind" which exist within the broader social system of the firm.

When considering the network involved in the creation and delivery of a solution, the definition of organizational cognitive processes is extended from the insular confines of a single firm to encompass all of the actors involved in the joint creation of the solution consistent with service co-creation discussed earlier (Bitner et al. 1997). This conceptualization includes the individual entity (solution provider firm), but also examines the collective entity (solution provider

and customer firm) which has the goal of making the solution successful. The collective entity is comprised of the individual actors from both firms who also represent the social system of the collective. The collective entity can be thought of in the same way as an individual organization in many respects. This entity acts as a platform for creating shared solution knowledge. This concept is well represented by the Japanese concept of *ba* (Nonaka and Konno 1998). *Ba* is a shared space for advancing individual and collective knowledge (Nonaka and Konno 1998). Knowledge is embedded in *ba* which is composed of emerging relationships (Nonaka and Konno 1998).

Turning to solutions, while each organization is legally distinct, in an ideal situation, as in a joint contract, they share the common goal of making the solution successful. Learning occurs between each of the entities and knowledge of the solution is formed as the result of this learning. The knowledge that results from the learning is embedded in the social interactions between the firms which transcend any individual knowledge. The individual actors and their social relationships at both firms drive the organizational learning and knowledge processes for the collective entity.

Looking further into the concept of organizational learning, there are generally two different types of processes that can be used to further categorize such learning- adaptive and generative learning processes (Bell et al. 2002). Adaptive learning occurs when repetition and routine result in association building between a given behavior and that behavior's outcomes (Fiol and Lyles

1985). Adaptive learning, which is closely related to single-loop, lower level, and behavioral learning, occurs within static environments where rules are relatively well established. It is restricted to detecting and correcting errors within this defined rule set. Such learning is often associated with repetitive, well defined tasks. Adaptive learning may, therefore, play a role in individual processes as they are defined, but it does not have a fundamental role in the creation of a solution which is, by its nature, loosely or completely undefined initially.

Generative learning, also termed higher level or double-loop learning, on the other hand, is key to the creation of new solutions. Generative learning occurs when an organization “develops a new way of looking at the world based on an understanding of the systems and relationships that link key issues and events” (Slater and Narver 1995). This causes the organization to move beyond simple cause and effect relationships (adaptive learning) to focus on the interrelationships and process of change as is required in crafting true solutions (Senge 1990). Generative learning is therefore a key aspect of how a firm responds to dynamism in the innovation process via adaptive capabilities (Eisenhardt and Martin 2003). Given a solution is based on relational processes which occur over time, generative learning is most critical to the solution value process given the inherent dynamism of these processes.

Within the model of organization learning just discussed, organizational knowledge can be thought of as the theoretical statements whose meaning depends on their use and the framework in which they are deployed (Spender

1996). Generative learning based on exchange of information forms the knowledge that is the solution specific theoretical statements. Organizational memory, then, is simply stored knowledge (Moorman and Miner 1997) which can exist within individuals, culture, transformations, structure, ecology, and external archives (Walsh and Ungson 1991).

In the case of solution knowledge, as mentioned earlier, it is likely much of this knowledge is tacit in it is not explicitly documented, but is instead shared through socialization processes both within and between the solution provider and customer (Göranzon et al. 2006; Leonard and Sensiper 1998; Levitt and March 1988; Polanyi 1966). The very nature of solutions as emerging from learning processes necessitates tacit knowledge processes. Where a specific customer bid may contain explicit requirements, a solution is framed throughout the solution customization process and is therefore more akin to problem seeking than explicit problem solving (Czikszentmihalyi and Sawyer 1995).

Collectively, organizational learning and knowledge offer a solid theoretical basis to analyze solutions by examining the dynamic relational process that occurs along the same timeline as the solution development process leading to value creation.

SOCIAL CAPITAL IN SOLUTION LEARNING AND KNOWLEDGE PROCESSES

Organizational learning and knowledge processes are critical to the co-creation of solution value. Organizational learning is fundamentally a social

process and as such the broader set of social influences underlying organizational learning and knowledge should be examined in detail in order to better understand the overall mechanics of this effect. A highly relevant theoretical perspective with which to consider these processes is social capital (Burt 2000; Granovetter 1985; Moran 2005). Social capital is a relatively broad theoretical construct that encompasses such concepts as “informal organization, trust, culture, social support, social exchange, social resources, embeddedness, relational contracts, social networks, and inter-firm networks” (Adler and Kwon 2002). In a nutshell, social capital considers how the collective action of individual actors is influenced by the social interactions among these actors independent of defined structures (Wasko and Faraj 2005). Social capital explicitly recognizes the reality of complex firm behavior by embracing the interdependency of the actions of individual organizational actors within the social structure within which they operate (Houston et al. 2004).

Social capital is similar to physical and human capital in its functions to facilitate actions within a firm (Tsai and Ghoshal 1998). While the normative perspective of solution value co-creation through knowledge and learning processes only considers these specific processes, social capital offers a broader theoretical framework with which to understand how such processes may vary across different social relationships and solution specific social systems. Organizational research has shown the social network individual actors are embedded within and the relationships they share within that network impact

individual behavior and organizational performance at both the intra-firm and inter-firm level (Brass et al. 2004). Such social relationships have been found to be important in shaping organizational identities, beliefs, and social ties even as the structure of a firm changes (Houston et al. 2001). They have also been found to be key to inter-firm alliance processes (Gulati 1999; Hutt et al. 2000). Indeed, some scholars have taken a broad view of these relationships and proclaimed “a firm should be understood as a social community specializing in the speed and efficiency in the creation and transfer of knowledge” (Kogut and Zander 1996).

Turning to value creation, social capital has been shown to be a key determinant of value creation within firms (Nahapiet and Ghoshal 1997; Tsai and Ghoshal 1998). Specifically, social exchange encouraged productive resource exchange and combination which promoted product innovations (Tsai and Ghoshal 1998). Social capital has also been used to evaluate firm performance via the examination of social relationships within and between firms including the evaluation of organizational learning processes and workgroup outcomes (Szulanski 1996; Szulanski and Jensen 2004). Personal interactions have also been found to be an important driver of business-to-business value creation even when not specifically couched in the broader framework of social capital (Ulaga and Eggert 2006).

Recent work in relationship marketing has also looked to concepts in social capital such as relationship quality and social network structure to examine their impact on customer value (Palmatier 2008). This work expanded the

previously limited perspectives that used social exchange theory to also consider social network concepts in looking at drivers of customer value. In Palmatier's (2008) study, two of the three key main effects, relationship quality and contact density, can be subsumed into the social capital framework (specifically, relational and structural embeddedness). Collectively, these perspectives on social capital are clearly relevant to the relational and knowledge process involved in solution value co-creation given the similarities to inter-firm processes. And while social capital is a broad concept, by including both relational and structural aspects, it may offer a more realistic perspective on market exchanges than theoretical perspectives that only consider one of these components (Palmatier et al. 2007).

While the framework of social capital has often been applied to intra-firm performance, the concept is equally suited to evaluating the social structure that exists between actors in a solution sales team and those at a customer firm. In many ways such an application is similar to previous research that evaluated concepts in inter-firm alliances (Hutt et al. 2000). Often firms confuse documented organizational structures with the true social system which is not defined by explicitly held roles and reporting structures, so examining a social system like a solution team that spans multiple firms would be a valid application of the concept (Giddens 1984). Social capital, therefore, offers a useful perspective for better understanding the relationship between knowledge sharing and solution value co-creation.

Social capital is often divided into multiple dimensions or facets.

Granovetter's widely followed conceptualization had two dimensions- structural and relational embeddedness (Granovetter 1992). The first relevant subcomponent of social capital is structural embeddedness (Burt 2000; Moran 2005; Wasko and Faraj 2005). Structural embeddedness represents the topology of a social network by mapping the number of connections (also termed ties) between actors in the network on a continuum that ranges from open (partially meshed or hub and spoke) to closed (fully meshed) network topologies (Coleman 1988). An open network would consist of just a few direct connections between the actors in that network. A closed network consists of a fully meshed set of connections between each actor in the network (Burt 2000). The relative closure in a network is measured by that network's proportional density where the number of actual connections between actors in a network is compared to the total number of connections possible.

Closed networks represented by a large proportion of direct ties offer advantages to network actors in that collective action is easier to achieve (Wasko and Faraj 2005). Closed networks are also thought to be better suited to execution or innovation-related tasks (Moran 2005). The advantages of closed networks in tasks like innovation are thought to be in their ability to transmit tacit and less codified information as is required in specific phases of the solution co-creation process (Burt 2000). Additionally, theorists suggest closed networks reduce the risk of incomplete information exchange due to the redundancy of connections

and sanctions of actors who share incomplete information by others in the social network (Coleman 1988).

In the case of a new solution, achieving collective action is important given the iterative nature of the solution development process (Tuli et al. 2007). Increasing collective action and reducing risk (especially in the early formative stages) are critical to enabling better solution performance. Collective action ensures the scope and definition of the solution best meet the specific customer needs based on multiple functional perspectives across the solution team. The understanding of these needs goes beyond the traditional purchasing-sales relationship to form the basis for a solution integrated and customized specifically across the customer's relevant operational processes. Such integration can only be achieved by developing new, tacit knowledge of how the solution will integrate with all relevant customer functions.

Structural embeddedness as a component of social capital, while important, is generally insufficient to understand how individual actors use their connections within a given context (Granovetter 1992). Relational embeddedness is the complement required to complete this understanding by considering not just the connection between individual actors, but also how and to what extent this connection can be utilized. So, while a connection may be present, the relational aspects of this connection may determine how and to what extent such a connection is used (Moran 2005). Connections characterized by close relationships are more likely to be optimal in the solution development process

given they are likely to increase transfer of knowledge resources (Granovetter 1985; Hansen 1999). In the case of new solution development which is characterized by emergent knowledge processes and tacit knowledge, closer relationships are considered optimal (Moran 2005).

While relational closeness is a key aspect of relational embeddedness, relational trust is also important when considering how structural connections can be utilized (Granovetter 1992; Moran 2005). Relational trust can be thought of as “the perceived ability and willingness of the other party to behave in ways that consider the interest of both parties in the relationship” (Selnes and Sallis 2003). Trust has also been noted to be a component of any transaction in which the performance of two parties is separated by time (Granovetter 1992). Trust generally contributes to better relationship performance by reducing the costs associated with more formal control mechanisms that might otherwise exist as a hedge against malfeasance (Selnes and Sallis 2003).

CONCLUSION

The extant literature on solutions and solution development is still in its infancy. The early solutions literature primarily focused on how to define solutions in the accepted frameworks of products and services (Bennett et al. 2001; Sawhney 2006; Sawhney 2003; Tuli et al. 2007). More recent research has moved from descriptive definitions of solutions to more sophisticated perspectives that now include the relational processes that form the backbone of what makes up a solution (Epp and Price 2011; Tuli et al. 2007). The work in this

area has set the stage for more in-depth analysis of not only what defines a solution, but how they are developed, and, perhaps most importantly, how a solutions approach can optimize value creation for solution providers and their customers. The lack of research examining solution value processes in detail is the fundamental gap this study hopes to fill.

From a managerial standpoint, a solutions strategy is clearly important for firms seeking competitive advantage in industrial markets (Sawhney 2006). A key theoretical question regarding solutions is how to build on the limited research in this area. As with any theory building exercise, once the phenomenon being considered have been categorized and classified, the next phase of research would be to further explore what causes such phenomenon and under what circumstances it occurs (Christensen and Carlile 2006). A critical next step in the theory building process for solutions, then, is further explicating the underlying solution processes and how such processes lead to managerial relevant outcomes such as greater solution value and success.

Using solution relational processes as a jumping off point (Tuli et al. 2007), this study endeavors to use established theoretical frameworks to decompose how solution processes lead to value creation. The relational view's focus on relational assets, knowledge exchange, complimentary resource combination, and governance is an excellent complement to the service-dominant logic of marketing with its focus on value co-creation through operant resources such as knowledge (Dyer and Singh 1998; Vargo and Lusch 2004a). Marketing

researchers evaluating the emerging service-dominant logic have called for more research that examines both the integration of firm cross-functional processes and the impact of a service-dominant logic approach on firm outcomes (Vargo and Lusch 2004a).

Taking the broad theoretical approaches of the relational view and service-dominant logic which emphasize the importance of knowledge resources, organizational learning and knowledge theories offer a useful process-level rationale for how knowledge resources can be developed in the solution value co-creation process (Slater and Narver 1995). While the organizational learning and knowledge literature has examined inter-firm processes, it has not specifically looked into inter-firm, exchange specific processes which are central in the solutions context. This study will examine these processes in detail which will be a first in this area.

Finally, the literature on social capital offers a relational lens through which to view the knowledge processes that drive solution development (Granovetter 1985; Moran 2005). Beyond just considering knowledge processes, social capital can also shine light on the complex social relationships involved in solution level interactions and processes.

This chapter has reviewed the literature on solutions, value co-creation, the relational view and the service-dominant logic of marketing, organizational learning and knowledge, and social capital. While each of these areas covers a vast conceptual domain, when examined in the context of solutions, they offer a

useful, interrelated conceptual framework from which to develop the conceptual model for this study. Specifically, this study will use knowledge and learning processes to better understand the co-creation of solution knowledge which leads to solution success. The service-dominant logic of marketing and the relational view add substance to this perspective by placing these processes in relevant meta-theoretical frameworks. Social capital will be utilized to provide substance to the learning and knowledge processes in situ within the social network that develops during the solution process.

While much progress has been made in conceptually understanding solutions, this study will play a critical role in adding to that conceptualization by applying existing organization theories to the solution space in order to better expose the essential processes that lead to co-created solution value. This approach will be one of the first empirical studies in this area and will therefore contribute new perspectives fundamental to furthering the understanding of solution marketing. This study will also answer the call for more marketing research which ties marketing actions to financial outcomes. Chapter Three presents the conceptual model for this study in detail.

CHAPTER III

CONCEPTUAL FRAMEWORK

Chapter Two presented a review of the relevant literature in order to provide additional insight into the knowledge, learning, and relational processes involved in the co-creation of a solution. Additionally, the role of social capital was explicated in the context of these co-creation processes. This literature review set the stage for the creation of the conceptual model that forms the basis for this study. This model establishes a framework for understanding how knowledge processes affect the relative success of a solution. It also examines the key relational and solution configuration variables that may moderate the relationship between knowledge processes and solution outcomes. Chapter Three will provide an overview of this model and develop relevant hypotheses for testing.

CONCEPTUAL MODEL

The conceptual model for this study is represented in Figure 1. This model seeks to explore the relationships between knowledge sharing in both existing and new solution performance. Account team and customer buying center knowledge sharing are hypothesized to have a direct and positive effect on both existing and new solution success. Success is an objective indicator of the value of a solution. Value is an overall assessment and evaluation of the potential solution's ability to achieve the customer's goals (Woodruff 1997). When the customer determines the value of a proposed solution is greater than other options

(including inaction), they chose to purchase that solution as is consistent with early work evaluating choice (Kotler 1967). This choice is based on their evaluation of the total value of the solution (Menon et al. 2005). Account team knowledge sharing is hypothesized to have a positive and direct effect on new solution success. Two structural embeddedness measures are hypothesized to positively moderate the relationship between account team and customer knowledge sharing and new and existing solution success, respectively. A higher number of direct ties is expected to positively affect new solution success, while a higher proportion of indirect ties is expected to positively moderate the relationship between account team and customer knowledge sharing and existing solution success. Relational embeddedness, as measured by relational closeness and trust, is hypothesized to positively affect the relationship between both account team and customer knowledge sharing and new solution success and internal account team knowledge sharing and new solution success. Finally, increasing levels of customization are thought to positively affect the relationship between account team knowledge sharing and new solution success and account team and customer knowledge sharing and new solution success.

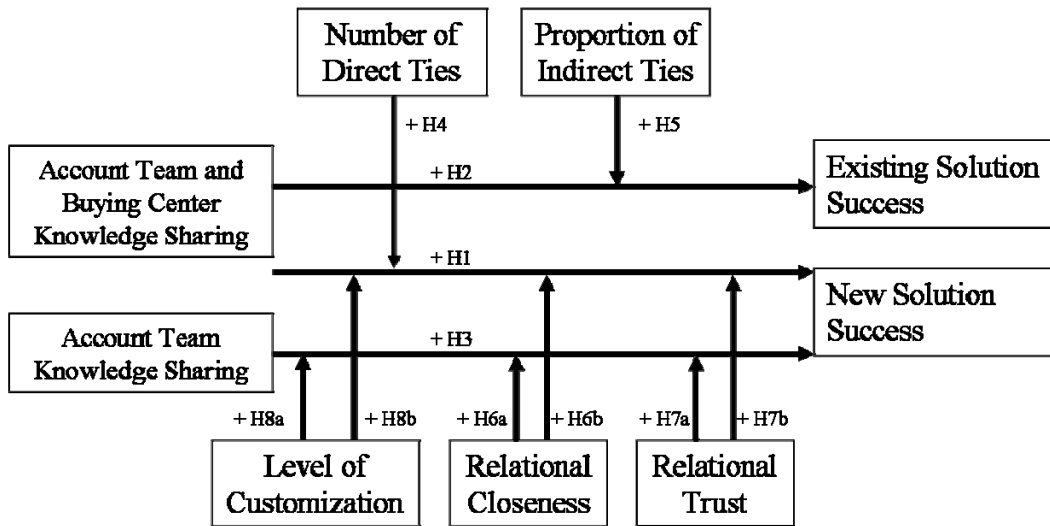


Figure 1. Conceptual Model

SOLUTION ACCOUNT TEAM AND BUYING CENTER

Although intra and inter-firm social structures are multifaceted, the central structure within the solution provider is the solution *account team*. The literature has defined a team as “a collection of individuals who are interdependent in their tasks, share responsibility for outcomes, who see themselves or are seen by others as an intact social entity embedded in one or more larger social systems (for example business units or the corporation)” (Cohen and Bailey 1997; Sundstrom et al. 1990). Therefore, in the context of the co-creation process, a solution *account team* represents the individuals from the solution provider that are responsible for the outcomes related to both new customer acquisition and the retention of current customers. This social network boundary specification

captures the individual actors from the solution provider firm who facilitate the value co-creation process between the provider and customer. This team is defined as a social entity which is not necessarily represented by a formal reporting structure or organizational chart. In this study, therefore, a solution *account team* constitutes a central focus of the analysis. While sales processes in some contexts might be more transactional, in the solution domain, these processes are intimately tied to the actual development of the customer solution and extend beyond the sale to include the implementation of the solution so in this regard the solution account team is responsible not only for securing sales, but also coordinating implementation tasks (Tuli et al. 2007).

While many studies of marketing phenomena only consider sales people, it is important to note that a solution account team includes personnel from many different functions. Qualitative interviews conducted prior to this study at several technology based solution firms and the focal firm indicated a solution account team includes not only sales personnel, but also technical and engineering resources, training personnel, product specialists, legal resources, and process experts among other functional roles.

Turning again to the relational process based interactions that are involved in solution development, it is equally important to define the customer components in this process. Consistent with research in the business-to-business literature, the customer analog to the solution account team is the solution *buying center* (Johnston and Lewin 1996). While referred to as a *center* in the business-

to-business literature, for all practical purposes, this social network specification is the customer equivalent of the solution account team. Given the term *buying center* may be somewhat dated in the service marketing lexicon, this group may also be thought of as the *customer purchasing network*. As with the solution account team, the solution *buying center* (or *purchasing network*) is made up of individuals at the customer firm that have the solution outcomes as one of their primary responsibilities. Like their fellow resources at the provider firm, the individuals within the solution buying center may span multiple functional groups such as purchasing, operations, engineering, or others. Together, the members of the solution *account team* and *buying center* make up the larger, cross-firm team responsible for the overall co-creation of the solution. This collective team is defined as the *solution team*. The only individual distinction is whether the actors in the larger solution team work at the provider or customer firm.

KNOWLEDGE SHARING

Knowledge sharing in this context is defined as searching for or transferring knowledge among the members of the solution account team and/or the members of the customer buying center (Cummings 2004). Knowledge sharing will be examined by considering both sharing within the account team and sharing that crosses the boundary of the account team to include members of the buying center. Knowledge sharing by the members of the account team will be termed *account team knowledge sharing* (Cummings 2004; Hansen 1999). Knowledge sharing between the *account team* and individuals in the customer

firm *buying center* will be termed *account team and customer buying center knowledge sharing* (Cummings 2004; Hansen 1999). While knowledge sharing has been used to evaluate intra-firm performance through analysis of such topics as the transfer of best practices (Szulanski 1996), it has not been used to understand the value co-creation process between a provider and customer firm. Recent conceptual research in the solution area has highlighted the link that knowledge sharing can have in both sharing information about a provider firm (products, interfaces, and processes) in addition to information about the customer firm (requirements, operations, and processes) (Tuli et al. 2007). Likewise, meta-analysis of factors that drive strong relationships indicate communication, including information sharing, are critical (Palmatier et al. 2007). Therefore, internal and external knowledge sharing processes will be used to evaluate the relationship of these processes to objective solution success.

KNOWLEDGE PROCESSES

Given this conceptualization of a solution sales team and solution buying center, attention can turn to the knowledge processes that occur between and within such teams. Literature in the management field has shown knowledge transfer within and outside of organizations can be an important determinant of organizational productivity and effectiveness (Argote et al. 2000; Cummings 2004). Specifically, higher levels of knowledge sharing, defined as “the provision or receipt of task information, know-how, and feedback regarding a product or procedure” (Cummings 2004; Hansen 1999) have been shown to be associated

with more effective work group performance (Cummings 2004). Extending this thinking to the solutions arena, the successful co-creation of customer value is primarily the result of knowledge sharing among the individual members of the solution account team and the customer buying center in line with the service and solutions literature (Grönroos 2000; Grönroos 2006; Gummesson 2002; Jaworski and Kohli 2006; Sawhney 2003; Sawhney 2006).

While the results of knowledge transfer, sharing, and learning have often been examined using firm level outcomes such as productivity and profitability either individually or relative to other firms in a market (Argote and Ingram 2000; Cummings 2004; Henderson and Cockburn 1994; Lippman and Rumelt 1982), this study will look to understand this process at the level of the solution account team and the associated solution buying center. Specifically, the impact of knowledge sharing will be evaluated by examining two objective outcomes- *new solution success* and *existing solution success*. These measures of success directly reflect the perceived value of the solution by the customer. Given the customer's evaluation of the proposed solution and all alternatives, the choice to purchase a solution (solution success in this study) demonstrates the value of the solution. Likewise, the customer's decision indicates success for the provider given the provider's effort to develop the solution is motivated by winning the customer's business. Both these measures will be defined by the customer relationship management system's status of the specific solution which will be either won or lost. In this study, these two measures are tied to specific solution account teams

based on the account executive's assigned accounts and/or identified opportunities. These two measures are also the primary performance measures used to evaluate sales account teams. Together, these measures capture objective customer perspectives on value creation resulting from knowledge sharing processes given they measure actual customer choice in a market based on relationship value components (Homburg et al. 2005).

New solution cross-firm knowledge sharing.

From a solution provider standpoint, a better understanding of the relational interactions that make up the solution development process will help firms to optimize this process. The first scenario to consider in the solution context is the situation of a solution provider who is trying to develop an entirely new solution with a specific customer. The solution components in a new buy situation are particularly dynamic and emergent given the solution provider and customer are crafting the solution for the first time with no previous relationship or benchmark of what the solution will eventually become. Given knowledge sharing among multiple functional positions at both firms will optimize the co-creation of value in this scenario, a smart provider would develop processes and procedures to facilitate the creation of new knowledge considering the assets of both firms. Given functionally equivalent roles at the provider and customer firms are more likely to engage in generative knowledge creation through sharing existing tacit knowledge, it follows that more sharing across the solution account team and buying center would be optimal. Rather than taking in established

customer requirements through a single sales person and then developing the details of the solution implementation inside the account team, this approach would call for more cross-firm knowledge sharing. In this way, value is created through the knowledge sharing processes between the solution provider and customer. Given the preceding discussion, the following hypothesis is proposed:

H₁: Greater levels of account team and buying center knowledge sharing will increase the probability of new solution success.

Existing solution cross-firm knowledge sharing.

Most solution research to date has taken the limited view of only considering new solution development processes. Within business-to-business research, however, the retention of existing customers is often seen to be as important, if not more important than new customer acquisition (Gounaris 2005). In the case of an existing business-to-business solution where the relational assets at both the solution provider and customer are not easily replicated in the broader market (concentrated market assets), a strategy that emphasizes retention of existing customers is likely the optimal choice for the solution provider (Voss and Voss 2008). While new solution success is clearly related to the solution development sales process, an important aspect of the overall lifecycle of a solution is the ongoing relationship between a customer and a provider (Sawhney 2006; Tuli et al. 2007; Vargo and Lusch 2004a). Solutions are typically longer term relationships which can span multiple years that involve constant adaptation given the dynamic nature of solution customer end goals. Such adaptation can

include “patching” by the solution provider in order to continuously maximize the value of the solution (Eisenhardt and Brown 1999). While these processes necessarily involve co-creation, in the existing solution scenario, they might also be said to encompass co-evolution (Eisenhardt and Martin 2003). Given this, while the first major financial outcome measure for a solution might be the contract win, the next will be the renewal of that contract. Consistent with the idea that cross-firm relational processes are important in solution development, it also should hold that such processes would be important in the ongoing processes that lead up to a decision for a customer to renew an existing solution contract.

Therefore, the following hypothesis is proposed:

H₂ : Greater levels of account team and buying center knowledge sharing will increase the probability of existing solution success.

New solution internal knowledge sharing.

The final component of knowledge sharing to consider is the sharing that goes on within the solution account team. Previous research has indicated intra-group knowledge sharing can have a positive effect on team performance (Cummings 2004). In the case of solution development, given the iterative and cross-functional nature of the solution process, it is also likely that knowledge sharing within the solution account team is important to the success of the solution. Research in product development found knowledge sharing across functional lines can increase the effectiveness of projects within a firm (Hansen 2002; Hansen 1999; Szulanski 1996). In the case of a solution account team, the

team itself is cross-functional, so given this social network specification, cross-functional sharing actually occurs within the team. While being from different functional groups, the members of the team are highly interdependent, are primarily responsible for the outcomes of the solution engagement, and are seen both by the customer and provider as a discrete social entity. Sharing within the solution account team is again optimal given the emergent nature of solutions and the need to integrate across functional processes. Such sharing can also tap into cross-solution knowledge individual account team members may have accumulated with other customer engagements. Knowledge sharing is not simply knowledge transfer, but includes feedback processes related to requirements, products, and procedures. As indicated earlier, the solution co-creation process between the provider and customer is dynamic and generative in that operant resources are applied over time in order to achieve value in use. In the specific case of a new solution, it is likely the knowledge generated is less defined and more emergent than an existing solution which is more likely to require “patching” to an established base of knowledge. Such knowledge is tacit and embedded in the expertise of individuals at the solution firm and may take on characteristics of the J-form organization (Lam 2000). Such an organizational form would allow “dynamic interaction between the different layers of the organization and the freedom of its members to switch among the different contexts” (Lam 2000). In the context of a new solution, then, the knowledge sharing is embedded in different functional groups and their interactions. These

tacit knowledge sharing processes within the solution account team must also be active in order facilitate co-creation with the customer resources. Therefore, the following hypothesis is put forward:

H₃ : Greater levels of account team knowledge sharing will increase the probability of new solution success.

STRUCTURAL ASPECTS OF SOLUTION TEAMS

In order to understand the specific circumstances under which knowledge sharing will impact solution performance, several moderating variables will be evaluated. These will include social and structural embeddedness (Granovetter 1985; Moran 2005; Uzzi 1997) and the level of product or service customization.

In order to apply structural embeddedness to the solution team, the individual focus of the social network must first be determined. Given this study has defined the solution account team as the solution provider's social center, the focal individual within the solution team will be the account executive. In the case of a solution team (both the account team and buying center), the account executive is typically the central actor in the solution process. Qualitative interviews with account executives from the firm in this study indicated this involvement not only included the traditional sales process, but also post-sales implementation. From the provider perspective, the account executive orchestrates the interactions between the solution provider and customer resources including the coordination of responses to customer queries and meetings with the customer. In this way, the account executive acts as a central authority for

applying resources to the task of achieving sales success and facilitating solution team interactions. For the purposes of this study, therefore, the account executive will be the central network actor as is consistent with ego-centric research designs (Marsden 1990).

With the account executive as the focus of the social network, the next structural aspects to consider are the number and types of ties associated with the account executive. While related to the concepts of open and closed networks, ego-centric measures define *direct ties* as those between a central actor (ego) and their contacts and *indirect ties* as those among that central actor's contacts (Moran 2005; Podolny and Baron 1997). In the case of an individual sales opportunity or customer account, these ties can be measured in the context of that particular sales opportunity by specifying the network boundary (or team boundary) as those actors on the solutions sales team or in the solution buying center. Collectively, all these individuals would be part of the cross-firm solution team.

Direct ties.

Each component process of the solution is related to and dependent on its predecessor. In terms of the individual actors on the solution team, it is important knowledge from one functional role is communicated to other roles in order to insure the interrelated processes and components are integrated and ultimately achieving the end business goals of the solution. Research on social networks has consistently shown the network of ties between actors influences the flow of information between them (Granovetter 1985; Granovetter 1992; Gulati 1995).

Therefore, given the central role of the account executive in facilitating shared learning through establishing direct links between the provider and customer resources and the importance of direct links to redundant knowledge flow, the following hypothesis is put forward:

H₄ : Higher numbers of direct ties in the account executive's solution team network will strengthen the relationship between account team and buying center knowledge sharing and new solution success.

Indirect ties.

Most of the work in the solutions area to date has focused on the initial solution engagement. For example, Tuli, Kohli, and Bharadwaj (2007), specifically advocated that solutions evolve along a time line that involves customer requirements definition, customization of products and services, their deployment, and post deployment support. While this timeline seems appropriate in the context of a single solution engagement, it does not offer any insight into the ongoing relationship that might be involved when a particular solution contract expires. The solution process, while initially made up of emergent knowledge sharing and feedback loops, eventually evolves into a more understood process which involves support of the deployed solution (Tuli et al. 2007). As the solution relationship matures and customers shift from their initial focus on the solution implementation to whether or not to renew a solution relationship, it follows that the optimal means for knowledge sharing will also change. In the initial solution development processes, closed networks with more

direct ties offer advantages through motivating collective action and mutual obligation (Coleman 1988). In the later phase of considering whether to renew a contract for a solution, open networks with more indirect ties may be optimal, however (Burt 2000). A higher proportion of indirect ties has value in that it provides advantages in terms of accessing unique or novel information without the high costs associated with direct ties (Hass and Hansen 2004). Such novel information can include the smaller co-evolution adjustments that might be required as the needs around the solution change (Eisenhardt and Martin 2003). In the specific situation of a customer renewing an existing solution contract, the following hypothesis is therefore proposed:

H₅: Higher proportions of indirect ties in the account executive's solution team network will strengthen the relationship between account team and buying center knowledge sharing and existing solution success.

RELATIONAL ASPECTS OF SOLUTION TEAMS

Where structural embeddedness considers simple connections between social actors, relational embeddedness considers the quality and strength of those connections as a second component of the broader concept of social capital. So, while structural embeddedness indicates whether a connection exists between actors, relational embeddedness indicates how that connection can be utilized. Recent research has shown the relational aspects of a social system are separate and distinct from the social network structure when evaluating workgroup performance (Moran 2005). Relational embeddedness can be represented with

two distinct components- relational closeness and relational trust (Granovetter 1992; Moran 2005). These components are discrete, but can be viewed as contributing to the overall quality of the relationship. Where closeness looks at personal familiarity within a relationship (Uzzi 1997; Uzzi and Lancaster 2004), trust is the propensity of the parties to act in ways that benefit both parties in the relationship (Selnes and Sallis 2003).

Close ties are characterized by strong interpersonal relationships embedded in social attachments and affiliations (Hansen 1999; Uzzi 1997; Uzzi and Lancaster 2004). Hansen (1999) found in his study of the internal flow of information in a firm that stronger ties (higher relational embeddedness) were superior to weak ties in the transfer of complex knowledge between parties in a network. These connections were also characterized by higher levels of trust which lead to reciprocal arrangements where advice and assistance flow in both directions (Hansen 1999).

Close social relationships among members of the solution team can be expected to strengthen the performance of the solution given the associated requirements for tacit knowledge sharing (Granovetter 1985; Hansen 1999; Uzzi 1997). Contacts that have a close relationship are more likely to make better use of their structural connection to develop and refine complex ideas such as those that occur in the solution development process (Moran 2005). The following hypotheses are put forward to consider the role of closeness in solution performance:

H_{6a} : Higher levels of relational closeness will strengthen the relationship between account team knowledge sharing and new solution success.

H_{6b} : Higher levels of relational closeness will strengthen the relationship between account team and buying center knowledge sharing and new solution success.

Beyond just personal familiarity, trust and a reciprocal commitment to providing assistance can also be a critical tool in resolving differences that invariably occur between the solution provider and members of the customer's organization given the complexities of the development process. Trust also facilitates collaborative sharing of information given the parties are not concerned with how such information sharing might be used against them (Jap 1999; Morgan and Hunt 1994). In an ideal scenario, both parties will openly share information about the solution in order to optimize the solution development process rather than limit information that might be considered "risky". Such open information sharing allows both parties to have a long term relationship that is not overly burdened with efforts (and associated economic costs) to minimize potential risks, which in turn facilitates joint learning (Selnes and Sallis 2003). The following hypotheses are therefore proposed when considering trust within the solution development process:

H_{7a} : Higher levels of relational trust will strengthen the relationship between account team knowledge sharing and new solution success.

H_{7b}: Higher levels of relational trust will strengthen the relationship between account team and buying center knowledge sharing and new solution success.

SOLUTION CUSTOMIZATION AND INTERNAL KNOWLEDGE SHARING

By definition, solutions have some level of customization specific to an individual customer's needs at their core. This customization is required given both the complex nature of individual solutions within the business market and the observation that it is difficult to create a single solution that works equally well for a larger segment of customers (Sawhney 2003). Customization also provides a clear demarcation between solutions and bundles of products and services as mentioned earlier (Sawhney 2006). Additionally, customers often look to use such customization as a basis for differentiation and therefore seek out differences that will provide them with relative advantage.

While customization is important to a solution, there is relatively little discussion in the literature as to what level of customization is required to reach solution status. Logically, a new solution could represent a range from a completely customized, newly created set of products and services to a standard set of products and services minimally customized in order to better meet a specific customer's needs. Indeed, studies that have measured the relative level of customization have defined the construct along a continuum from products solely based on customer needs (high customization) to products solely based on

supplier inputs (low customization) (Salvador and Forza 2004). Within this range, the amount of new solution knowledge co-created will likely vary with the relative level of customization. Customization is therefore likely to increase the need for internal sales team knowledge sharing. The more customization, the more important internal knowledge sharing processes are to the development of solution provider processes. Likewise, greater levels of customization are also likely to strengthen the relationship between external knowledge sharing and new solution success. Just as is the case within an account team, higher levels of customization increase the need for cross-firm knowledge processes. While internal knowledge sharing might relate more to the coordination of solution provider processes, external sharing is more likely to relate to the overall solution processes and the critical interfaces between solution provider and customer. As discussed, such knowledge is more likely to be tacit given the emergent nature of not only the overall solution, but also its individual product and service components.

There is very likely to be a tradeoff between knowledge sharing processes and the level of customization. Previous research has demonstrated access to knowledge may in fact hurt overall performance if such knowledge is time consuming to gather and does not have sufficient value in use (Hass and Hansen 2004). This negative relationship between the utilization of more knowledge and performance stems from the particular condition within which the knowledge is to be utilized. For a given solution, if the customization required is relatively low, it

is unlikely the search costs of seeking and integrating that knowledge will be worthwhile given a base level of competency on the solution team. Given this discussion, the following hypotheses are proposed:

H_{8a} : As the level of solution customization increases, internal sales team knowledge sharing will be more strongly associated with new solution success.

H_{8b} : As the level of solution customization increases, external account team and buying center knowledge sharing will be more strongly associated with new solution success.

CONCLUSION

Chapter Three developed the conceptual model and hypotheses to be used in this study. The conceptual model discussed the overall model, the individual constructs within the model, and the application of the model to the research context. The development of the conceptual model discussed the knowledge processes involved in solution value creation, the affect of these processes on solution success, and how structural and relational embeddedness and solution customization moderate the effect of knowledge sharing on solution success. Overall, knowledge sharing is expected to have a positive effect on solution success, but this relationship is critically differentiated between new and existing solutions. Likewise, both structural and relational embeddedness are projected to be important moderating variables of the relationship between knowledge sharing and solution success, but only in specific solution contexts. Finally, the level of

solution customization is expected to be an important and previously overlooked variable in the conceptual model. Chapter Four will present the study methodology including the overall study design, data collection, and analysis techniques.

CHAPTER IV

METHODOLOGY

Chapter Three outlined the conceptual model and detailed the key hypotheses to be tested in this study. This chapter will describe the research context, data collection procedure, and analysis plan.

RESEARCH SETTING

As stated earlier, the research setting for this study is a large, global provider of digital learning software and services. While the firm is international, the setting was limited to the sales teams based in the United States. The firm utilizes a predominantly direct sales model with sales teams organized across the country by geographic region. According to the top sales executive for this division, the average sales cycle can range from six months to two years and involves many interactions with the customer. Most sales require customized implementation and installation services delivered by an internal consulting and engineering group. For pre-sales support, each account executive has access to a variety of resources including product software content experts, implementation and training consultants, sales engineers, product managers, and various other roles inside the firm. Sales leadership described their customers' switching costs as low. Lower switching costs result in customers being able to move between providers as they wish without much vendor lock-in.

There are several advantages to examining the key research questions in a single-firm context. One important benefit relates to controlling extraneous variance that can often be present in cross-firm studies. Several critical variables are relatively fixed in a single-firm study such as this. These include the product mix, national marketing activities, pricing, brand strength, compensation plans, and relative market share. Secondly, given the key research questions relate to the knowledge processes between a customer and solution provider, a single-firm study can provide for a much more detailed examination of these processes and thus provide a high degree of internal validity. In this study, such additional detail will be generated through the use of qualitative research methods within the firm to assist in developing a deeper understanding of the firm specific constructs. The use of qualitative methods in a single context has been recommended by several prominent social scientists (Eisenhardt 1989; Shadish et al. 2002).

Another advantage of the single firm setting is in the ability to get access to detailed, objective financial data related to the specific solution. By using this solution provider's sales database, objective data can be used to inform and refine the measurement of key constructs. Such detailed data is not typically available in multi-firm studies due to the costs and time associated with developing a trusted relationship which allows access to what is typically confidential information. Finally, to the extent this firm represents similar firms, it provides a purposeful sample of a typical instance and is more likely to be generalizable across other such instances (Shadish et al. 2002).

DATA COLLECTION

Data collection for this study was conducted in four phases. The first two phases were exploratory and the final two phases were confirmatory. Given the newness of the solution domain in the marketing literature, the exploratory phases informed the study by investigating the solution domain without imposing theoretical constraints on the data collected. These phases also offered the opportunity to develop the conceptual model in more detail and test how the proposed constructs would manifest in this specific context. The last two phases tested the conceptual model using a multi-method approach of both qualitative and quantitative data collection. Each phase of the study will be reviewed in the sections below.

The first phase consisted of a series of one-on-one interviews with the customers of the focal firm. These interviews were intended to generally assist in describing the market context of the firm and specifically to identify the relevant customer roles the firm's sales teams interacted with. These interviews were set up by a randomly selected set of account executives. Collectively, these interviews were conducted with twenty customer informants who comprised a variety of different roles including teachers, technical managers, and administrators. The interviews followed an exploratory, grounded theory approach where the respondents were asked to describe their perspectives on software-based learning solutions and their experience with the focal firm's

solutions (Strauss 1990). Theoretical memos and field notes were composed throughout the interview process to provide insight into later phases of the study.

Phase two: account executive interviews.

Following the initial customer interviews, six one-on-one, depth interviews were conducted with a random selection of account executives at the firm. The selection of the account executives was pulled from two categories sales leadership had defined- account executives that tended to have smaller or larger sales. Within the firm, these two categories were referred to as “base hitters” and “elephant hunters”. Additionally, a sampling quota of one account executive per sales manager was set. All six interviewees were located in different states across the United States. Given the small sample, this purposeful sampling within each category was intended to solicit the range of different types of firm-customer relationships and attempt to minimize any multilevel effects associated with account executives who worked for the same sales manager or within the same market.

Each interview followed a structured guide developed and reviewed with experienced researchers. The guide began with a description of the task and offered respondents the opportunity to ask clarifying questions. The rest of the guide followed a similar format as was planned for the quantitative study where the respondent selected an existing customer relationship, generated a list of the people and roles they interacted with, and discussed the types of knowledge and information shared between their firm and the customer. While following a

structured guide, the questioning was still exploratory; the respondents were asked open ended questions related to the solution development process and knowledge sharing. Probes were used to elicit more thoughtful and in depth responses. This exercise was repeated with the account executive by next selecting a new customer relationship. Finally, the respondent was asked to discuss the social network ties between the actors they listed earlier for both existing and new customer relationships. Specifically, the respondent discussed both direct and indirect ties and the relationships among those actors in terms of “closeness”. The complete interviewer’s guide is contained in Appendix A. The interviews were conducted by phone and lasted approximately 60 minutes each. All the interviews were recorded and transcribed which resulted in 146 pages of text for analysis.

Phase three: quantitative study.

Phase three of the study called for a survey of all 111 account executives within the digital business unit of the target firm. These account executives cover the entire spectrum of customers for this business unit and were organized into two groups that cover elementary and secondary school customers. The account executives were based across the United States.

Before the final survey was distributed to the total set of respondents, all the questions in the survey were subjected to a critical systematic review by business-to-business researchers to insure they were reliable and valid (Fowler 2009). After the critical systematic review and appropriate revisions, the entire

survey was tested using a cognitive interview protocol (Groves et al. 2009). This protocol used “think aloud” tasks to walk volunteer respondents through the entire survey to ensure item validity. The volunteers for the think aloud tasks were from sales management or sales support roles to avoid having to remove such volunteers from the final study sample.

After the final revisions were made to the survey instrument, it was pre-tested with 20 randomly selected account executives to validate all of the questions were clear and easily understood. Follow-up interviews were conducted with these respondents to walk through their responses to ensure the validity of their responses. No changes were made to the survey items as the result of the pre-test, although the survey instructions were slightly modified based on these interviews.

The final survey was completed by 105 of the 111 (94.59% response rate) respondents identified as account executives at the firm. Each respondent was presented with identical survey items for two distinct customer relationships. The customer opportunities were randomly selected from the firm’s internal sales database based on several qualifying criteria. First, the customer must have been involved in a relationship with the firm started no earlier than one year from the date of the survey. A relationship with the customer is defined as any interaction related to an exchange expected to transpire over time (Dwyer et al. 1987). Given the sales database is used exclusively to manage ongoing customer relationships, the entry of a customer as an opportunity in the database is equivalent to the

customer being identified for ongoing exchanges and is, thus, a relationship. It should be noted for this firm, entry into the sales database is not required for one-time (transactional) orders. This date range encompassed the stated range of the customer sales cycle while also being recent enough to increase the likelihood the respondent can accurately recall the interactions with the customer. Secondly, the opportunity for each customer was greater than \$5,000 in total contract value. By establishing a minimum threshold, the opportunity is more likely to be a custom solution rather than a more simple transaction. The transactional products the firm sells generally have contract prices that are less than \$5,000. Thirdly, from the qualified opportunities, two were selected for each account executive- one for an existing customer relationship and one for a new customer relationship. The order of new and existing opportunities was reversed for half of the survey respondents to avoid any presentation order effects. These opportunities were selected at random from the total data set that contains both won and lost opportunities. The overall distribution of wins and losses in the database was examined to ensure a random selection would result in enough cases to evaluate differences between wins and losses. Over the period being considered, there were 4,423 opportunities of which 71% were won and 29% lost.

Additionally, the distribution of wins and losses among individual account executives was examined to ensure the random sample of wins and losses would not be skewed by relative account executive performance. This analysis was completed by dividing all the account executives into quartiles based on the

percentage of sales quota they had achieved in both 2009 and 2010 and evaluating the distribution of wins and losses by these quartile categories. Each quartile closely matched the overall distribution which indicated the random selection method would be acceptable for this study.

The selected opportunities were dynamically presented to each respondent via the web-based survey tool which pulled relevant opportunity data from the firm's sales database. Each respondent was asked to first validate their involvement with the selected opportunity before being presented with the survey items. Respondents were encouraged to use notes, the CRM tool, and other materials with relevant data about the opportunity being considered to inform their decisions as is accepted methodological practice for more complex survey instruments in order to decrease memory retrieval failure about the opportunity (Groves et al. 2009). Additionally, when specific opportunities were presented to respondents, cues related to the details of the opportunity and the specific positions of individuals involved in the opportunity were provided. These cues included the account executive's description of the opportunity, the primary product category, and the total opportunity value. These fields were retrieved from the sales database as entered by the account executive during the course of working on the opportunity. These opportunity related fields were found in the qualitative interviews to be the descriptors used by the account executives to describe an opportunity beyond just the customer name which might be associated with several unique opportunities.

The specific positions included in the survey were identified in the qualitative research as being common across opportunities. During the qualitative interviews, these cues were found to increase the ability of respondents to recall specific individuals. The web-based survey was administered without time limits and gave respondents the ability to save and return to the survey at a later time. Providing cues and more time to complete a survey are recognized as the best tactics for increasing a respondent's ability to accurately retrieve data from long term memory (Groves et al. 2009).

All questions related to network measures were dynamically generated so the number of questions matched the specific number of actors the respondent entered. All network actors were also color coded into blue text for customer contacts and red text for provider contacts to avoid any issues that might have existed due to similar names occurring at both the customer and provider. By piping the entered network actors and opportunity information into the text of subsequent questions, the questions were more salient and there was less opportunity for respondents to lose track of what network actors or opportunities they were being asked about.

As an additional precaution against the respondent not recalling the presented opportunities, the survey first validated that the respondent was able to recall the details of their interactions with the selected customer. If they answered that they were not able to recall the presented opportunity, the survey dynamically presented the respondent with a field to populate an alternative opportunity that

they did recall. This opportunity included all relevant criteria for the opportunity that matched the presented opportunity including size, whether it is a new or existing opportunity, and whether the opportunity was won or lost. The respondent entered customer opportunity was then piped into an alternate branch of the survey using the identical items and presentation that would have been used in the pre-selected opportunity as represented in Appendix B. In either case, all items included the specific customer name for each opportunity throughout the survey in order to make the items salient to the respondent as they completed or returned to the survey. Screen shots that represent all questions used in the survey are presented in Appendix C.

f Turning to the results from the survey, 87% of the new opportunities presented were recognized by the respondents. 88% of the existing opportunities were recognized. For the opportunities that the respondents were prompted to enter, two of the new opportunities and two of the existing opportunities could not be validated against the sales database, so these responses were removed from the final data set.

5.2% of the respondents for the new opportunities did not have a qualifying record in the sales database. For these respondents, the survey automatically prompted the respondent to enter a qualifying opportunity using all the same criteria. The win or loss designation was indicated to the respondent based on randomly selecting the designation from the pool of overall

opportunities. If the respondent did not recall such an opportunity, they were passed out of the survey and the null response was recorded.

After all the responses were collected, the final set of responses for both the new and existing opportunities were cross-checked against the firm's human resources database to ensure that all the respondents were valid account executives. Eight respondents who were indicated to be account executives in the sales database were found to be "renewal specialists" or "technical specialists" using the CRM system for their own purposes. Given these roles did not meet the criteria of being key informants, they were removed from the data set. Finally, given the relatively small sample size, the data were analyzed to determine whether there were any outliers within the won and loss categories in terms of knowledge sharing. Using a box plot of these categories, one case was dropped from the new and existing sample. These two cases were potentially spurious given all responses were at the low end of the external knowledge sharing scale, but the result was a win despite data in the CRM indicating at least some knowledge sharing should have occurred. The final sample, therefore, was composed of 91 new and 91 existing opportunities from 97 different respondents.

Phase four: qualitative survey.

The final phase of the study was a short qualitative survey sent to the then current list of account executives approximately six months after the quantitative survey was sent. Mixing both qualitative and quantitative research strategies is a well established technique to increase convergent validity in order to "triangulate"

on the research questions at hand (Jick 1979). In this particular study, the qualitative survey was utilized to further explore the hypothesized relationships between knowledge and relational processes and solution outcomes.

The survey asked respondents to recall a specific problem for which they developed a unique, creative, and effective solution. As mentioned earlier, the focus on customer outcomes and goals is a key component definition of solutions (Davies et al. 2006; Sawhney 2006). The objective of the qualitative instrument was to use free response questions that paralleled the quantitative measures used in the earlier survey. Rather than focusing on a complete customer solution, however, this survey focused on one specific problem the account executive recalled as being the single most important problem they solved for a customer they had worked with. This specific problem was positioned to still meet the definition of a solution given earlier, but unlike an entire customer opportunity that might address several different problems; the focus of this survey was on a discrete problem-solution pair.

The introduction to the survey provided a detailed description of what was meant by *customer problem* and established these problems should be tactical rather than strategic in nature. The intent of having respondents focus on tactical problems was to make the problem as specific as possible in order to increase the likelihood they would recall the specific processes used in developing the solution to that problem. Tactical problems were defined in the survey as those detailed enough that a set of very specific actions that could be executed to solve this

problem, could usually be solved in six months or less and were more detailed and execution focused than problems that are at the higher, strategic level.

Methodologically, the focus on tactical solutions was meant to avoid problems of “generic memory” that might exist across a typically long sales cycle involved with a broader strategic solution (Groves et al. 2009). As a specific tactical problem was top of mind for the respondent, the hope was recall of the knowledge processes and actors involved in these processes would be maximized. The questions presented were all open ended and generic to avoid any response bias associated with the text of the question. Both the introduction and the questions in their exact format are included in Appendix D.

Prior to administering the survey, the entire instrument was tested with both sales leadership at the firm and academic experts to ensure it was clear and relevant to the research questions being considered. Based on these tests, several small changes were made before the final survey was delivered to 101 account executives. The survey was administered via a web based system where the respondent received a unique link via e-mail in order to track the overall response rate. As with the previous survey, respondents were given the opportunity to complete the survey as their time allowed and could save partial responses and return later.

The survey was completed by 71 of the 93 (76.34% response rate) account executives identified by the firm to participate in this phase of the study. The invitation click through rate was 88.17%. The lower overall response rate

compared to the quantitative survey was partially attributable to the timing of the survey being during the spring break time period for many states. Given this and the innocuous nature of the survey questions, there is no reason to believe that there is a significant non-response bias in these data.

The next section details the data analysis approach taken with both the quantitative and qualitative data collected.

DATA ANALYSIS PLAN

The data from the first two phases were collected primarily to inform the development of the conceptual model and the design of the larger quantitative and qualitative studies in phases four and five. These first two phases were exploratory and focused on refining the methods of the later phases. As such, the data analysis for the complete research study focuses exclusively on the larger quantitative and follow-up qualitative data sets. The data analysis plan is presented for the quantitative and qualitative data, respectively.

Quantitative analysis.

Table 1 represents key control variables included in the quantitative study or extracted from databases at the firm. These variables were selected from studies that examined group performance within organizations given they are likely to also impact group performance (Cummings 2004). In addition to standard demographic variables, firm variables like tenure at the firm and tenure in the industry were included as sales leadership believed they were important for account executive performance.

Table 1

Control Variables

Construct	Measure	Cronbach Alpha (source)	Source (adapted from)
Age	1 item	n/a	n/a
Gender	1 item	n/1	n/a
Environmental Uncertainty	1 item	.92	Brown and Utterback (1985)
Availability of Project Resources	3 item	.80	Ancona and Caldwell (1992)
Account Executive Tenure at Firm	Firm Sales Database	n/a	Objective Measure
Account Executive Tenure in Industry	1 item	n/a	Objective Measure

The two dependent variables, *existing solution success* and *new solution success* were based on objective outcome data from the firm's sales database. Using measures from different sources, specifically from objective sources, is an important technique to reduce common method bias (Podsakoff et al. 2003). Specifically, the presented opportunities had a dichotomous outcome status of "closed-won" or "closed-lost". All active or closed opportunities in the database are evaluated by the entire sales management team on a quarterly basis to insure their accuracy. The won and lost categories represent a single, objective measure of the success of the solution. From the firm's perspective, these classifications indicate whether the ultimate objective of the relationship, winning the sale, was successful or not. This measure also indicates success for that particular

relationship engagement from the customer's perspective given the customer made the choice to purchase a new solution or renew an existing one with the provider.

An alternative measure of solution performance was also included in the survey which asked the respondent to rate the opportunity being considered on quality and performance relative to other solutions at the solution provider and against competitors of the solution provider. The respondents ratings for quality and performance were both collected via single item scales. These items were based on work by Ancona and Caldwell in a similar context examining team performance (1992).

Table 2 lists the two independent variables, *account team and buying center knowledge sharing* and *sales team knowledge sharing*, that were be used in the primary survey. These measures were based on Cummings' (2004) research which evaluated performance outcomes based on knowledge sharing within a work group and outside that work group. These scales measure intra-group (within the solution account team) and inter-group knowledge sharing (between the solution account team and the buying center team). Cummings' research was also conducted within a single firm and the context of his study shared many similarities with the solution domain given the groups he evaluated were cross-functional and working on relatively complex projects. The original items were adjusted based on interviews at the target firm in order to make the knowledge

sharing examples consistent with the specific context of the study. The specific adjustments were tested to insure validity per the procedure mentioned earlier.

Table 2

Independent Variables

Construct	Measure	Cronbach Alpha (source)	Source (adapted from)
Account Team and Buying Center Knowledge Sharing	5 item	.97	Cummings (2004)
Sales Team Knowledge Sharing	5 item	.84	Cummings (2004)

There were five variables hypothesized to moderate the relationship between the independent and dependent variables. These variables are the *number of direct ties*, the *proportion of indirect ties*, *relational closeness*, *relational trust*, and *solution customization*. These variables are listed in Table 3.

The first two variables, the proportion of direct and indirect ties, are measures of the structure of the social network that exists for a given solution which are calculated by comparing the sum of all ties to the sum of direct and indirect ties. As mentioned earlier, these variables were measured using an ego-centric research design. The selected account executive respondents completed a name generation task as is commonly employed in established ego-centric research (Burt 1984; Marsden 2005). Specifically, the respondents were asked to list the names of alters considered significant or important in the course of

working on a given solution. One of the key challenges of such a design is maximizing the respondent's recall of the members of their social network.

While research has generally established individual respondents may not recall all alters in a specific social network, there are techniques that can be utilized to increase the probability of collecting accurate network data from name generation tasks. For this component of the study, non-specific probes were used to elicit a complete list of alters from each respondent. This technique has been put forth by social network researchers as a way to reduce respondent forgetting (Brewer 2000). Specifically, generic roles collected in the qualitative interviews were used as prompts for specific alter name elicitation. These roles were compiled through these interviews by asking account executives to recall both names and roles associated with a solution. All these roles were then compiled across respondents to arrive at a list of roles which occurred across all the solution opportunities. The list of roles was then validated with sales leadership to ensure the roles were the most likely across all opportunities.

Relational closeness and relational trust are both well established constructs in the literature. The specific measures used in this study were taken from Moran (2005). Finally, the moderating variable intended to measure the level of solution customization was a new measure based on concepts in Gwinner, et al (2005). This new measure was developed using best practices as advocated by Churchill (1979) to maximize reliability and validity.

Table 3

Moderating Variables

Construct	Measure	Cronbach Alpha (source)	Source (adapted from)
Network Structure (proportion of direct and indirect ties)	Name Generation Task	n/a	Marsden (1990) Moran (2005)
Relational Closeness	1 item	n/a	Moran (2005)
Relational Trust	3 items	.68	Moran (2005)
Solution Customization	7 item	TBD	New Measure Based on Gwinner, et al (2005)

Data analysis of the hypothesized relationship was conducted using a nonlinear binary response model. Given the dependent variables are binary (either the solution is successful or it is not), logit (and probit) models offer a proven and reliable method for multiple hypotheses testing (Cohen et al. 2003; Long 1997; Tabachnick and Fidell 2007; Wooldridge 2003). The models were estimated using a maximum likelihood method (Wooldridge 2003). Hypothesis tests for moderation were conducted using the procedure described in Baron and Kenny (1986).

Qualitative analysis.

Analysis of the qualitative phase four data followed the general concepts outlined by leading qualitative researchers in the social sciences (Bernard and Ryan 2010; Corbin and Strauss 2008; Strauss 1990). Unlike the earlier interviews

which took an open and exploratory approach, the analysis of the collected survey data was structured and confirmatory (Bernard and Ryan 2010).

There were five questions used in the survey. These questions were intended to prompt the respondents to provide data for the entire solution process from the initial determination of the solution's scope to the aspects of the social network and relationship that may have been relevant to that process. The questions are listed below:

1. Describe the most important generic customer problem you solved for the customer you are thinking about.
2. What was your solution to that problem?
3. How did you determine/develop the best solution to the customer's problem (what was the process)?
4. How did you discuss the potential solution with the customer?
5. What aspects of your relationship with the customer helped make the solution successful?

The wording of these questions was developed based on the earlier exploratory interviews where respondents discussed their knowledge sharing processes. While these questions were structured, they were written to try to elicit any knowledge sharing processes, the social network involved in those processes, and the relational aspects of the process without biasing the respondent by specifically inquiring about knowledge sharing. Generic categories of possible

areas to include in the response were also added based on feedback from testing the survey instruments.

The first question set the context for the solution by asking the respondent to identify the problem the solution was intended to solve from the customer's perspective. The second question asked the respondent to describe the components of the solution. The third question then prompted the respondents to describe the general process involved in developing a successful solution without referring to knowledge sharing as a potential part of the process. Likewise, the fourth question did not specifically ask the respondent to recall the social network involved in the solution process, but instead asked generically about any discussions the respondent had with the customer related to the successful solution. Finally, the fifth question asked the respondent to discuss any factors that positively impacted the success of the solution including any relational aspects. It should be noted two additional questions related to gaps in the solution provider's current solution capabilities were also included in the survey, but were not included in the analysis given they were not theoretically relevant to the research questions at hand. The complete instrument is attached in Appendix D.

Analysis of the collected text involved coding the text to a priori themes based on the conceptual model as is consistent with the metacoding approach (Bernard and Ryan 2010). Specifically, these themes were account team and buying center knowledge sharing, account team knowledge sharing, direct ties, indirect ties, relational trust, and relational closeness. Each of these themes

represented either the independent or moderating variables in the conceptual model. Solution success and solution customization were not included as themes given the questions were asked in the context of a successful solution customized for a specific customer, so these variables and their values (successful and relatively high customization) were fixed in the responses. All of the text within each question was coded to one of these themes and annotated with theoretical memos where appropriate. Text was coded to each theme based on complete phrases to develop a count of themes by theme in each case and within each of the proposed questions.

CONCLUSION

Chapter Four has outlined the research setting, data collection method, and data analysis approach for testing the conceptual model put forth in Chapter Three. The proposed methodology included a multi-phase and multi-method approach in order to ensure the validity and reliability of the complete study. The approach was aligned with the key research questions presented in Chapter One. All the required measures for hypothesis testing were also presented along with the theoretical rationale for their use in these tests. Chapter Five will present the results of the analysis of the collected data.

CHAPTER V

RESULTS

Chapter Four described the research context, data collection procedure, and analysis plan. This chapter will present the results of the data analysis for both the quantitative and qualitative surveys conducted. The quantitative data will be examined first followed by the qualitative.

QUANTITATIVE SAMPLE DESCRIPTION

The final sample consisted of 91 responses for both new and existing opportunities from 97 different respondents. For the new opportunities, 62.6% of the sample was female and 36.3% was male. The mean age for this group was 45.39. The average tenure with the firm was 7.94 years with 16.30 being the average number of years in the industry. Turning to the existing opportunities, 63.7% of the respondents were female and 36.3% were male. The mean age was 45.22 years, the average tenure with the firm was 8.36, and the average time in the industry was 16.68 years.

The average size of the new opportunities was \$50,803 with a standard deviation of \$85,850. The existing opportunities averaged \$73,857 with a standard deviation of \$181,315. All opportunity data was cross-checked across the firm's order and CRM system to insure the validity of the opportunity. As mentioned earlier, all of these opportunities included a mix of products and services.

MEASURE ASSESSMENT

All multi-item scales were assessed for reliability using tests of Cronbach's Alpha and item to total statistics in the SPSS scale reliability procedure. All scales utilized five point measures. Scales were assessed individually in the new and existing data set as well as in a combined file. All of the scales in the conceptual model exhibited acceptable reliability measures with Alpha values greater than .90, so no items were deleted. One control scale, availability of project resources, exhibited less reliability with values of .73 in the new data set and .83 in the existing one.

Knowledge sharing.

Knowledge sharing was measured using two scales- *account team and buying center knowledge sharing* and *sales team knowledge sharing*. Taking the perspective of the solution provider firm, these can also be thought of as external and internal knowledge sharing, respectively. Each scale was composed of five items and based on those used by Cummings (2004) with changes made to make them relevant in the context of the study firm. The items were measured by a scale of 1 to 5 where 1 was "never" and 5 was "a lot". The individual items are listed in Table 4. The summary statistics for each scale are detailed in Table 5 for new opportunities and Table 6 for existing opportunities.

Table 4

Knowledge Sharing Scales

Scale

Account Team and Buying Center Knowledge Sharing

On average, how often did your [provider firm] team share each type of knowledge with the customer team during your work on the opportunity?

- General Overviews (e.g.- goals of solution, timelines, member responsibilities, etc.)
- Specific Requirements (e.g.- curriculum, standards, technical , training, support, etc.)
- Purchasing Process (e.g.- funding, order process, pricing, contracts, etc.)
- Progress Reports (status updates, resource problems, implementation updates, etc.)
- Project Results (preliminary results, ongoing results, support experience, unexpected outcomes, etc.)

Sales Team Knowledge Sharing

On average, how often did you share each type of knowledge within the [provider firm] team?

- General Overviews (e.g.- goals of solution, timelines, member responsibilities, etc.)
 - Specific Requirements (e.g.- curriculum, standards, technical , training, support, etc.)
 - Purchasing Process (e.g.- funding, order process, pricing, contracts, etc.)
 - Progress Reports (status updates, resource problems, implementation updates, etc.)
 - Project Results (preliminary results, ongoing results, support experience, unexpected outcomes, etc.)
-

Table 5

Knowledge Sharing New Opportunities (n=91)

Construct	Measure	<i>M</i>	<i>SD</i>	Cronbach Alpha
Account Team and Buying Center Knowledge Sharing	5 item	17.76	4.29	.90
Sales Team Knowledge Sharing	5 item	16.55	5.32	.94

Table 6

Knowledge Sharing Existing Opportunities (n=91)

Construct	Measure	<i>M</i>	<i>SD</i>	Cronbach Alpha
Account Team and Buying Center Knowledge Sharing	5 item	18.75	4.61	.93
Sales Team Knowledge Sharing	5 item	18.04	4.93	.96

Moderating variables.

Five moderating variables were used in the conceptual model. The number of direct ties was calculated by counting the total number of network actors the respondents entered for the opportunity being considered. The proportion of network ties was calculated by dividing the number of pairs of contacts with a close relationship by the total number of pairs as outlined in Moran (2005). Respondents indicated a particular pair had a close relationship by selecting “Yes” if “the pair of contacts had more than an arm's length (distant) relationship”. The individual pairs were automatically generated by the survey

system for all possible pairwise combinations which were presented individually to the respondent in order to select “Yes” or “No”. Summary statistics for direct ties and the proportion of indirect ties for the new and existing data sets are contained in Table 8 and 9 respectively.

Relational closeness was measured by taking the mean of a one item scale for all direct network contacts the respondent entered into the network roster. The scale for each contact ranged from 1 to 5 where 1 was “Distant/arm’s length” and 5 was “Very close”. The term “distant” was added to the lower anchor given pre-testing indicated respondents did not recognize the term “arm’s length”. The text of the item is contained in Table 7. Summary statistics for each scale for new and existing opportunities are presented in Table 8 and 9.

Relational trust was measured as the mean of the sum of a 3 item scale presented for all direct contacts in the same manner as was described for relational trust. Again, this scale and procedure was based on Moran (2005). The scale for each of the items presented for each individual contact ranged from 1 to 5 where 1 was “Strongly disagree” and 5 was “Strongly agree”. The text of each of the items is contained in Table 7. The summary statistics for this scale are presented in Table 8 for new opportunities and Table 9 for existing ones.

Solution customization was a new scale developed for this study based conceptually on Gwinner, et al (2005). This scale had 7 items which were summed with responses that ranged from 1 to 5 where 1 was “Strongly disagree” and 5 was “Strongly agree”. The text of each item is detailed in Table 7 and the

summary statistics are contained in Tables 8 and 9 for new and existing opportunities.

Table 7

Moderating Variable Items

Scale

Relational Closeness

During the course of working on this opportunity, indicate how close (professionally) you felt to [input network actor] by selecting from the choices below.

Relational Trust

Indicate whether you agree or disagree with the following statements regarding [input network actor] and your working relationship on this opportunity

- [input network actor] shares my overall goals and values.
- [input network actor] is generally honest and truthful in the information provided.
- [input network actor] is very competent in the areas in which we interact.

Solution Customization

While working on the [customer name] opportunity...

- The requirements we discussed with the customer were specific to their particular situation.
 - The proposed deployment and support plan was adapted to the customer's needs.
 - The customer's needs dictated a specific implementation of products and services.
 - The requirements we discussed were developed based on the customer's unique needs.
 - We proposed an integrated solution for this customer based on a unique combination of products and services.
 - The proposed combination of products and services was specifically configured for this customer.
 - The proposed deployment of products and services was customized for this customer.
-

Table 8

Moderating Variables Summary Statistics (New) (n=91)

Construct	Measure	<i>M</i>	<i>SD</i>	Cronbach Alpha
Number of Direct Ties	network roster	4.79	2.71	n/a
Proportion of Indirect Ties	network roster	.46	.29	n/a
Relational Closeness	mean of 1 item	3.68	.90	n/a
Relational Trust	mean of 3 item	12.32	2.50	.90
Solution Customization	7 item	27.11	5.79	.90

Table 9

Moderating Variables Summary Statistics (Existing) (n=91)

Construct	Measure	<i>M</i>	<i>SD</i>	Cronbach Alpha
Number of Direct Ties	network roster	5.21	2.22	n/a
Proportion of Indirect Ties	network roster	.49	.28	n/a
Relational Closeness	mean of 1 item	4.00	.74	n/a
Relational Trust	mean of 3 item	12.73	2.61	.91
Solution Customization	7 item	28.32	6.08	.93

Control variables.

Four control variables were also utilized in this part of the study.

Environmental uncertainty was measured with a 1 item scale that ranged from 1 to 5 where 1 was “Stable” and 5 was “Rapidly changing”. This scale was adopted from Brown and Utterback (1985). The text of this item is in Table 10 and summary statistics are in Tables 11 and 12.

Availability of project resources was measured with a 3 item scale where each scale ranged from 1 to 5 where 1 was “Not very available” and 5 was “Very much available”. The text of each item in this scale is presented in Table 10. The summary statistics for the sum of all three items are contained in Tables 11 and 12.

The tenure of each account executive at the provider firm was collected from the firm’s internal database. Each account executive’s experience in years within the provider firm’s industry was collected via a 1 item numeric input field. The summary statistics for both of these measures are presented in Tables 11 and 12. The age and gender of each respondent was also collected by single item questions as was described in the summary of the overall sample earlier.

Table 10

Control Variable Items

Scale

Environmental uncertainty

On average, to what extent did this opportunity need skills or information that were stable or rapidly changing?

Availability of project resources

On average, to what extent did this opportunity have available resources (both from [provider firm] and the customer)...

- financial
- personnel
- equipment

Account Executive Tenure in Industry

How many years have your worked in the education industry?

Table 11

Control Variable Summary Statistics (New) (n=91)

Construct	Measure	<i>M</i>	<i>SD</i>	Cronbach Alpha
Environmental Uncertainty	1 item	3.04	1.20	n/a
Availability of Project Resources	3 item	9.82	2.74	.73
Account Executive Tenure at Firm	firm database	7.94	5.95	n/a
Account Executive Tenure in Industry	1 item	16.30	7.95	n/a
Age	1 item	45.39	8.68	n/a

Table 12

Control Variable Summary Statistics (New) (n=91)

Construct	Measure	<i>M</i>	<i>SD</i>	Cronbach Alpha
Environmental Uncertainty	1 item	2.93	1.32	n/a
Availability of Project Resources	3 item	10.51	2.79	.83
Account Executive Tenure at Firm	firm database	8.36	6.27	n/a
Account Executive Tenure in Industry	1 item	16.68	8.18	n/a
Age	1 item	45.22	8.85	n/a

QUANTITATIVE DATA ANALYSIS

The final sample size for both the new and existing customer opportunities was 91 based on the responses from a single division in the firm. This final number was less than the 200 estimated to be achievable prior to beginning the study. An a priori power analysis using effect sizes from similar knowledge sharing studies (Cummings 2004) indicated the desired sample size would have had sufficient power to detect the hypothesized effects. Unfortunately, one additional division of the firm decided not to participate in the study which reduced the overall sample available.

Post hoc logistic regression power analyses were conducted for the main effects of account team and buying center knowledge sharing on solution success which resulted in power values of .64 in the new opportunity data set and .44 in the existing (Hsieh et al. 1998). Both of these power values indicate the

probability of committing a type II error is higher than the recognized minimally acceptable value of .80 (Cohen et al. 2003). This lack of power is most concerning when considering the higher relative power required to detect moderating effects when compared to simple main effects. Tests of moderation hypotheses with sample sizes of less than 100 have been shown in Monte Carlo simulations to lack the power to detect moderation effects in regression analyses (Aguinis 2004). The difficulty in detecting moderation effects is especially problematic in field studies such as this given the relative lack of power compared to experimental studies that can insure larger numbers of extreme cases by grouping them into experimental conditions (McClelland and Judd 1993). Median splits and other grouping strategies are generally not recommended to overcome the inherent limitation of continuous variables in field studies due to the associated increase in measurement error and potential reduction in power (McClelland and Judd 1993). The reduction in power alone can be up to 50% when implementing a median split (McClelland and Judd 1993).

Visual and descriptive analysis of the distribution of the independent variables, account team and buying center knowledge sharing and account team knowledge sharing, indicated a small negative skewness (-.51 for account team and buying center knowledge sharing and -.64 for account team knowledge sharing in the new opportunity data set and -.80 for account team and buying center knowledge sharing in the existing opportunity data set) with a spike in the frequency of responses at the four out of five item response value. This higher

frequency of values is unlikely to impact the robustness of the logistic regression model for main effects, but could complicate the issue of low power when evaluating moderation effects.

Analysis of the data was conducted using the logistic regression routine with the maximum likelihood estimation procedure in SPSS and Stata. Two models are presented in Table 13 which detail the results of the logistic regression of solution success on the independent variables, their moderators, and product terms for the new opportunity data set. These two models are presented to provide a comparison between the two types of knowledge sharing (between the account team and customer and within the account team) thought to be involved in the solution development process. The two models represent all the hypothesized variables and interactions associated with account team and buying center knowledge sharing and account team knowledge sharing, respectively. The chi-squared omnibus tests were significant for both the account team and buying center knowledge sharing ($\chi^2 = 24.64$, $df = 9$, $p = .003$) and account team knowledge sharing ($\chi^2 = 14.14$, $df = 9$, $p = .049$) models. The account team and buying center knowledge sharing model showed a reasonable metric for pseudo- R squared values, Cox and Snell $R^2 = .24$, Nagelkerke $R^2 = .34$. The account team knowledge sharing model showed a reduced ability to account for variance in the dependent variable, Cox and Snell $R^2 = .07$, Nagelkerke $R^2 = .11$. All of the individual parameter estimates in both models were not significant at $p < .05$ which makes any interpretation of the parameters in terms of size or direction

unwise given the number of terms in the regression equation. While multicollinearity may partially account for the lack of significance of individual parameter estimates, the overall lack of power in the study is the primary concern given sufficient power can negate some shared variance among predictors (Mason and Perreault 1991). The standard errors of the parameter estimates were not exceedingly large, however, so multicollinearity did not seem to be a major factor in the predictors (Tabachnick and Fidell 2007). Tests for linearity of the logit of the main effects also did not indicate any substantial issues (Tabachnick and Fidell 2007).

Table 13

New Opportunities Logistic Regression Models (n=91)

Variables	Account Team and Buying Center		Account Team	
	<i>B</i>	<i>Exp(B)</i>	<i>B</i>	<i>Exp(B)</i>
Constant	10.05	23079.80	2.81	16.65
Knowledge Sharing	-0.72	0.49	-0.50	0.61
Sol. Customization	-0.23	0.79	0.06	1.06
Relational Closeness	2.61	13.59	1.85	6.36
Relational Trust	-1.55	0.21	-0.86	0.42
No. of Direct Ties	1.54	4.64		
Knowledge Sharing X Sol. Cust.	0.01	1.01	0.00	1.00
Knowledge Sharing X Relational Close.	-0.13	0.88	-0.09	.91
Knowledge Sharing X Relational Trust	.09	1.10	0.07	1.08
Knowledge Sharing X No. of Direct Ties	-.06	.94		
-2 Log-likelihood		99.03		109.53
Cox and Snell R^2		0.24		0.14
Nagelkerke R^2		0.32		0.19
χ^2		24.64** ^a		14.14* ^b
Classification Percentage		69.20%		69.20%

Note. None of the individual parameter estimates were significant at the .05 level.

^a Degrees of freedom = 9. ^b Degrees of freedom = 7.

* $p < .05$. ** $p < .01$.

The overall model for existing opportunities was not statistically significant at the $p < .05$ when the proportion of direct ties and the interaction between account team and knowledge sharing and that variable were included in the model. Using a more liberal p value of .10, this model shows much less ability to account for the variance in the solution outcome as evidenced by the pseudo- R squared values of Cox and Snell $R^2 = .07$ and Nagelkerke $R^2 = .11$. Detailed statistics for this model are contained in Table 14. As will be discussed in the individual hypothesis testing section below, account team and buying center knowledge sharing did have a significant relationship with solution success when the proportion of indirect ties and interaction terms were not included.

Table 14

Existing Opportunities Logistic Regression Model (n=91)

Variables	Account Team and Buying Center	
	B	Exp(B)
Constant	-2.99	0.05
Knowledge Sharing	0.22	1.25
Proportion of Indirect Ties	4.96	143.22
Knowledge Sharing X Proportion of Indirect Ties	-0.22	0.81
-2 Log-likelihood	81.28	
Cox and Snell R^2	0.07	
Nagelkerke R^2	0.11	
χ^2	6.36 ^a	
Classification Percentage	81.30%	

Note. The omnibus test of the model had $p = .10$. None of the individual parameter estimates were significant at the .05 level.

^a Degrees of freedom = 3.

HYPOTHESES TESTING

Hypothesis testing was conducted for both the new and existing opportunity data sets using logistic regression in SPSS and Stata. Moderation analysis was conducted using the general model and definitions advanced by Baron and Kenny (1986). The results for the main effects hypotheses are presented first followed by the moderation hypotheses.

Knowledge sharing main effects.

H₁ examined whether greater levels of account team and buying center knowledge sharing strengthened the probability of new solution success. This hypothesis was supported at the $p = .03$ level. The odds ratio for the mean of the scale was 1.82. This result indicates for each additional move up the five-point account team and buying center knowledge sharing scale, the odds of the opportunity being a win increased by 1.82 times.

H₂ was also supported with $p = .04$ which supports the hypothesis that greater levels of account team and buying center knowledge sharing will increase the probability of existing solution success. The odds ratio for this hypothesis was 1.83 again indicating a relatively strong relationship between increases in account team and buying center knowledge sharing and existing solution success.

H₃ was not supported at the $p < .05$ level indicating the null hypothesis that greater levels of account team knowledge sharing would not increase the probability of new solution success could not be rejected. The parameter estimate was in the hypothesized direction, however, with an odds ratio value of 1.34 for the mean of the account team knowledge sharing scale.

Moderating effects.

H₄, H₅, H₆, H₇, and H₈ could not be supported at the $p < .05$ level.

Additional analyses using both k-means clustering and bootstrap resampling were conducted to attempt to overcome the low power of the overall study, but these methods did not produce any theoretically defensible findings of moderation.

Therefore, all of the moderating hypotheses related to solution customization and

structural and relational embeddedness could not be supported with the samples collected for the study.

Control variables.

Age, gender, tenure in the firm, tenure in the industry, and environmental uncertainty all did not have a significant relationship to the probability of new or existing solution success. The availability of project resources was the sole control variable that showed a significant relationship with solution success at the $p = .01$ and $p = .02$ level for the new and existing opportunities respectively.

QUALITATIVE SAMPLE DESCRIPTION

The final sample for the qualitative survey consisted of 71 responses (a response rate of 76.34%). 70.42% of the sample was female and 29.58% was male. The mean age for this group was 44.48. The average tenure with the firm was 7.61 years with 16.27 being the average number of years in the industry. Two responses were dropped due to the respondents being unable to recall a relevant solution due to their being new to the organization. There were 345 valid responses of text analyzed across the remaining 69 respondents. Each text response corresponded to an individual survey question. In total, these responses contained 12,867 words. The average number of words per response was 36.76. The minimum number of words was 1 and the maximum was 153. The standard deviation of the word count per response was 28.18.

QUALITATIVE DATA ANALYSIS

Analysis of the qualitative data began with coding of the 345 collected text responses. Each response was in direct response to the five questions posed in the online survey. Following the metacoding strategy mentioned earlier, the high level codes for these themes were sales team and customer knowledge sharing, sales team knowledge sharing, direct ties, indirect ties, relational trust, and relational closeness. All coding, memoing, and analysis was done in the qualitative analysis software MAXQDA10 (Sozialforschung 1989-2011).

Given the primacy of knowledge sharing in this research, several subcodes were also determined before the coding began. These subcodes deconstructed the two knowledge sharing variables- account team and buying center knowledge sharing and account team knowledge sharing- into three mutually exclusive codes. These subcodes were tacit knowledge sharing, explicit knowledge sharing, and general knowledge sharing. Including these subcodes in the analysis offered a powerful tool to deconstruct the respondents' descriptions of the solution process. Given much of the conceptual rationale for the moderating relationships between the structural and social embeddedness variables and knowledge sharing was based on solution knowledge being tacit rather than explicit, using subcodes that allowed text segments to be classified in this way would also provide data as to the relative proportion of each type of knowledge used in the solution process.

The definitions of tacit and explicit knowledge followed those given earlier in Chapter 2. Examples from the data of tacit knowledge sharing would be “we had roundtable discussions about the solution”, “it (the solution) involved

lots of discussion to find out the [customer] need”, and “I met with the [customer role] and [customer role] to discuss effective implementation of the solution”. Examples of explicit knowledge sharing would be “I sent them a ‘Solution Packet’ that I designed”, “we printed 96 Summary reports and tabulated each [customer role's] total time in (the product)”, and “FYI mailings about things that had been done elsewhere and been successful under similar circumstances”. For completeness, general knowledge sharing was also included as a subcode to provide a category where the knowledge shared was not easily classified into either tacit or explicit. An example of general knowledge sharing would be, “we developed the solution via discussions and meetings with subject matter experts to review our created courses”, “we developed a presentation and focused events around this topic and gave the kit out to the attendees”, and “there was/has been a combination of combined meetings both by phone and face to face with all subject matter expert, as well as correspondence between the customer's [customer role] and our experts in platform and implementation”.

The code for direct ties was intended to identify text segments where the respondent mentioned an interaction with an individual or group (network actor or actors) involved in the solution process. This coding paralleled the network roster task in the quantitative study. As with knowledge sharing, coding of the text segments focused on phrases that explicitly (e.g.- “I met with the director of [customer role]”) or implicitly (e.g.- “we provided constant updates”) mentioned direct contact between the respondent and network actors involved in the solution

process. Other examples of direct contacts included “I cannot stress enough that being in ‘front’ of the customer in some way on a weekly basis is essential” and “it took many meetings over about 9 months to truly understand the problem, build the trust, and truly become a consultant to the school district as opposed to a sales rep”. This last example also is an example of a text phrase that would be coded to the relational trust code as well.

For indirect ties, text phrases were coded when the respondent mentioned actors in the solution network working together without the respondent being involved. Examples of such a text segments are “they talked to our consultants to fully understand how our data showed student success”, “they (the other firm employees) managed the internal [customer role] relationships”, and “we engaged technical experts when appropriate to help fine tune the implementation or answer very specific questions along the way”.

Relational trust and relational closeness were both coded to text segments where trust or closeness were mentioned in the context of the actors on the solution team. For example, “we had gained great trust”, “we have a very trusting relationship”, and “I developed the trust” would be coded to relational trust. “I had him on our side”, “I earned the right to have a seat at the table as a respected resource who truly cared about the district”, and “good working relationship with the decision maker (was critical)” would likewise be coded to relational closeness.

Text segments were coded based on complete phrases that met the criteria of the category the code represented. A codebook was developed that contained

the criterion for a text segment to be assigned each of the codes. These criteria were adjusted and retroactively applied when a new text segment did not fit the existing coding criterion as is consistent with qualitative methodology best practices (Bernard and Ryan 2010). Other than the knowledge sharing subcodes that were mutually exclusive, individual text segments could be assigned multiple codes if each code's criterion was met within the same segment. Theoretical memos were also attached to the codes and text segments during the initial review of the data and during the subsequent coding to capture theoretical questions, observations, or other concepts relevant to the study (Bernard and Ryan 2010; Corbin and Strauss 2008). A second independent coder reviewed all of the coded text segments with the completed codebook and indicated 95.63% agreement with the codes. Given the high level of agreement, the initial coding was retained rather than reconciling with the second coder.

After the coding was complete, there were 640 coded text segments. The summary statistics for each theme were calculated and are presented in the tables below. Table 15 details the frequencies of the counts for knowledge sharing codes and Table 17 details the frequencies of the codes hypothesized to moderate knowledge sharing.

Table 15

Summary Statistics for Knowledge Sharing Code Counts by Respondent (n=69)

Code	<i>M</i>	<i>Mdn</i>	Max	Min	<i>SD</i>
Account Team and Buying Center Explicit Knowledge Sharing	0.54***	0.00	5.00	0.00	1.05
Account Team and Buying Center Tacit Knowledge Sharing	3.10	3.00	8.00	0.00	2.24
Account Team and Buying Center General Knowledge Sharing	0.42	0.00	6.00	0.00	1.01
Account Team Explicit Knowledge Sharing	0.01***	0.00	1.00	0.00	0.12
Account Team Tacit Knowledge Sharing	0.30	0.00	3.00	0.00	0.60
Account Team General Knowledge Sharing	0.04	0.00	1.00	0.00	0.21

Note. Paired sample *t*-test mean comparisons were conducted between explicit and tacit codes for both account team and buying center knowledge sharing and account team knowledge sharing.

*** $p < .001$

The summary results of the text coding of the knowledge sharing codes in Table 15 highlight several important aspects of knowledge sharing within the solution development process. First, the mean count of codes between explicit and tacit codes within each type of knowledge sharing was significantly different. Within account team and buying center knowledge sharing, the average number of explicit codes per respondent was 0.54 compared to 3.10 for tacit codes ($p < .001$). Turning to account team knowledge sharing, the average count per

respondent was 0.01 for explicit knowledge compared to 0.30 for tacit knowledge which was also significantly different ($p < .001$).

Simple counts of codes do not account for variance in the length of respondents' answers, however. In order to control for these differences, Table 16 details the percentage of cases that had a least once occurrence of each code and those with more than one occurrence. Through looking at occurrence versus non-occurrence, it is possible to minimize some of the bias of longer responses having multiple codes assigned to them.

Table 16

Percentage of Cases with Occurrences of Knowledge Sharing Code by Respondent (n=69)

Code	% with > 0 occurrences	% with > 1 occurrences
Account Team and Buying Center Explicit Knowledge Sharing	30.43***	11.59
Account Team and Buying Center Tacit Knowledge Sharing	84.06	72.46
Account Team and Buying Center General Knowledge Sharing	23.19	10.14
Account Team Explicit Knowledge Sharing	1.45***	0.00
Account Team Tacit Knowledge Sharing	24.64	4.35
Account Team General Knowledge Sharing	4.35	0.00

Note. Paired sample *t*-test comparisons for the counts of at least one occurrence of each code were conducted between explicit and tacit codes for both account team and buying center knowledge sharing and account team knowledge sharing which indicated significant differences in both cases.

*** $p < .001$

The results in Table 16 indicate similar differences as were seen in the comparisons between the mean counts of explicit versus tacit knowledge sharing. For account team and buying center knowledge sharing, 30.43% of the cases had at least one code assigned for explicit versus 84.06% for tacit. Similarly, for account team knowledge sharing 1.45% was explicit versus 23.19% which was tacit.

Another paired sample *t*-test was completed to compare the occurrences of at least one of each of these codes by respondent which indicated a significant difference ($p < .001$) where the mean count for explicit knowledge sharing was 0.30 and the mean count for tacit knowledge sharing was 0.84. A *t*-test also indicated a significant difference ($p < .001$) between explicit and tacit knowledge sharing in sales team knowledge where the average count was 0.01 for explicit and 0.25 for tacit. Again, these results were based on qualitative coding of text which is subject to individual interpretation. The differences, however, are important especially given the high level of inter-coder agreement and the ease with which tacit and explicit knowledge sharing were coded (the difference between knowledge sharing via social exchange or documentation). These findings provide validity to the assumption that solutions are primarily developed through tacit knowledge sharing and the social processes which accompany it.

It should also be noted there were differences between the number of times account team and buying center knowledge sharing was coded compared to account team knowledge sharing. The mean count for tacit account team and

buying center knowledge sharing was 0.54 versus 0.01 for tacit account team knowledge sharing. The percentage of cases with at least one occurrence of each code was similarly, 84.06% versus 24.64% respectively. Follow up discussions with individual respondents after the survey was administered indicate these results (and the similar lack of significance in account team knowledge sharing in the quantitative study) are partially the result of structural limitations at the study firm. Given these contextual limitations, these differences have little confirmatory power when the quantitative study indicated such internal knowledge sharing was not a significant predictor of an increasing likelihood of the solution being successful.

The summary data for the codes associated with the moderating variables in the conceptual model are presented in Table 17.

Table 17

Summary Statistics for Structural and Relational Code Counts by Respondent (n=69)

Code	<i>M</i>	<i>Mdn</i>	Max	Min	<i>SD</i>
Direct Ties	2.61***	2.00	7.00	0.00	1.73
Indirect Ties	0.71	0.00	7.00	0.00	1.13
Relationship Trust	0.62	0.00	4.00	0.00	0.88
Relationship Closeness	0.90	1.00	5.00	0.00	0.91

Note. A paired sample *t*-test mean comparison was conducted between the means of the counts of the direct and indirect ties count.

*** $p < .001$

Table 18 presents the percentage of cases that had at least one occurrence of each moderating code and those with more than one occurrence.

Table 18

Percentage of Cases with Occurrences of Structural and Relational Codes by Respondent (n=69)

Code	% with > 0 occurrences	% with > 1 occurrences
Direct Ties	91.30**	69.57
Indirect Ties	46.38	11.59
Relationship Trust	44.93	11.59
Relationship Closeness	63.77	20.29

Note. A paired sample *t*-test mean comparison was conducted between the means of the counts of the direct and indirect ties count.

** $p < .01$

Given the nature of qualitative data and the fact all of the respondents were asked to answer the survey questions in the context of a successful solution, it is not possible to determine whether these variables moderate the relationship between knowledge sharing and solution success. From a purely descriptive perspective, however, the data do provide some guidance to how these variables might be involved in the solution process.

Turning first to the count of the direct ties code, it is important to point out the mean of this count should not be used as a comparison to the quantitative study direct ties variable. The codebook called for any mention of either individuals or groups in a specific phrase to be coded to this variable and therefore does not indicate the actual number of direct contacts. Each of these

codes was further analyzed to determine whether they likely involved a single contact or multiples. While this coding was complicated by some text that had an indeterminable number of contacts (for example, “the customer” could be a single contact or multiples), the text segments that clearly indicated multiple contacts accounted for 56.82% of the total codes. Many of these segments indicated multiple different actors in different roles across multiple levels of the organization similar to the earlier exploratory interviews. So, while this data could never statistically confirm a moderating relationship, the general pattern would also not preclude such a relationship.

Indirect ties were mentioned at least once in 46.38% of the cases analyzed. These text segments included cases of employees at the customer firm, employees other than the respondent at the provider firm, and employees at both the customer and provider firm other than the respondent sharing knowledge and working to make the solution more successful. This is significantly less ($p = .007$) than the number of direct ties mentioned in the same cases.

Relationship trust had similar counts as indirect ties with at least one mention in 44.93% of the cases. Relationship closeness had higher incidents with at least one mention in 63.77% of the cases. As with the other variables thought to moderate knowledge sharing and solution success, these two social capital concepts display a frequency pattern that could support moderation in that among all of the cases that were by definition successful solutions, a limited subset had incidents of these specific codes.

It is important to point out while the thrust of the qualitative analysis was to provide a mixed methods approach to validating the occurrence of codes in the survey responses via frequencies, the responses also provided rich examples of the importance the conceptual variables in solution value creation. Knowledge sharing (particularly tacit knowledge) and relational and structural mechanisms were important aspects of what made solutions successful in the majority of the responses collected.

CONCLUSION

This chapter presented the quantitative sample description, measure assessment, quantitative data analysis, hypotheses testing, qualitative sample description, and qualitative data analysis. Overall, support was found for the main effects of solution provider and customer knowledge sharing on the probability of success of a solution. The quantitative study was vexed by low statistical power that made it unlikely moderating relationships could be found in the data, however. The qualitative study added to the overall research program by confirming the critical role tacit knowledge sharing has in successful solutions. Given this role, the rationale the conceptual model that put forth for the moderating relationships of relational and structural social capital and knowledge sharing can not be disconfirmed. The results confirmed the critical role of knowledge sharing in the solution development process and provide some directional evidence to support the important theoretical role of social capital and solution customization in this process. The next chapter will review the

implications of these findings for marketing theory and practice, discuss limitations, and provide some directions for future research in this area.

CHAPTER VI

IMPLICATIONS AND CONCLUSIONS

Chapter Five presented the results of the analyses undertaken to test the conceptual framework through a multi-method approach. This chapter takes those results and summarizes the implications for marketing theory, marketing practice, as well as detailing the limitations of the study. Finally, the chapter also provides suggestions for future research in this domain.

THEORETICAL IMPLICATIONS

This study set out to answer three substantive questions related to business-to-business solutions. First, what knowledge and relational processes are involved in the creation of solution value? Second, how do the knowledge processes between a solution provider and customer affect the likelihood of success for specific solutions? And, lastly, what aspects of the social network of a solution moderate the relationship between solution value processes and solution success? The contributions to marketing theory are discussed in the following sections which represent each of these research questions.

Solution knowledge and relational processes.

Overall, the results from this multi-phase research program have detailed many of the processes that contribute to solution value co-creation. Beginning with the exploratory interviews, both knowledge sharing and social relationships were identified as key components of the solution co-creation process. The confirmatory quantitative and qualitative surveys added to this understanding by

further decomposing these processes based on the specific types of knowledge and learning utilized. The qualitative phase of this study demonstrated the superordinate position of tacit knowledge and generative learning in the value creation processes. By identifying the critical role of tacit knowledge in the co-creation process, another dimension can be added to the services marketing concept of value in use. In this case, the use is in the actual development of the solution offering through generative learning and iterative knowledge sharing between customer and provider within the solution engagement.

The role of tacit knowledge sharing in solutions also confirms that relational factors like structural connections and social embeddedness play an important role in the solution process. Beyond the fact tacit knowledge is inherently embedded in social processes, both the exploratory interviews and the confirmatory surveys illustrated most solution engagements involve extensive interactions between personnel at the solution provider and customer. These findings add a critical next level of understanding to previous conceptual and exploratory work in the solutions and services literature (Neu and Brown 2005; Sawhney 2006; Sawhney 2003; Tuli et al. 2007; Vargo and Lusch 2004a).

This study also served to provide a conceptual and empirical linkage between theories in services marketing and management that are relevant to solution research. Specifically, by providing conceptual connections between the relational view (Dyer and Singh 1998) and service-dominant logic (Vargo and Lusch 2004a), it was possible to integrate services marketing notions of the co-

creation of solution value to the resource based view's concept of relational assets and competitive advantage. Both of these theoretical frameworks hold knowledge sharing and the relational processes that arise from the interactions between firms lead to value co-creation (in the services model) or competitive advantage (in the relational view) (Dyer and Singh 1998; Vargo and Lusch 2004a). The exploratory and confirmatory phases provided empirical examples of the interconnectedness of these two conceptual domains.

Specifically, the confirmatory surveys validated the presence of value creating processes that are central in both frameworks. Three of the four components of the relational view associated with competitive advantage were present in the solution process including relational assets, knowledge exchange, and the combination of complementary resources (Dyer and Singh 1998). Relational assets were demonstrated through the frequency of both trust and closeness in the qualitative survey. Additionally, respondent quotes like "I think in the end the [top customer executive] felt like we were an extension of their resources" provide rich illustrations of concepts like co-specialization and the combination of resources from the relational view (Dyer and Singh 1998).

These same observations can be applied to the service-dominant logic of marketing. Both knowledge sharing as a source of advantage and the importance of relational processes are foundational elements of this theoretical viewpoint (Vargo and Lusch 2004a). The extensive learning interactions between provider and customer also support the broader perspective from service-dominant logic

that "...doing things, not just for the customer, but in concert with the customer..." is one of the fundamental ways to develop custom solutions that meet customer needs (Vargo and Lusch 2004a).

Collectively, the results of this study when positioned within the broader theoretical frameworks of marketing, management, and organizational learning provided a much more detailed understanding of what processes are involved in solutions. This research's illumination of the processes involved in the solution co-creation also takes up the recent call by organizations like the Marketing Science Institute for more research focusing on innovation in businesses processes (Rizley 2011). Hopefully, this increased understanding of solution processes will also assist future marketing researchers as they continue to explore the solutions domain.

Knowledge sharing's impact on solution success.

This study also made an important contribution to the literature by demonstrating the relationship between knowledge sharing and objective measures of solution success. The quantitative results supported the hypothesis that knowledge sharing between the solution provider and customer increased the likelihood of that solution being successful. This finding was confirmed in both new and existing solution engagements.

When considering solution success, another contribution of the quantitative section of the study was its ability to test the hypotheses related to knowledge sharing by using objective customer outcomes from the study firm.

These objective outcome measures and the random selection design of the study added to the overall internal validity and general relevancy of the study for both theory and practice.

The qualitative results added additional support to the relationship between knowledge sharing and solution success by detailing the types of knowledge exchanged in successful solutions. Knowledge sharing was extensively mentioned in almost all of the responses to the survey question that specifically asked about the process that resulted in a successful solution.

The lack of support for the hypothesis that knowledge sharing within the solution provider would affect the probability of solution success presents an interesting and unresolved question for future research. As mentioned earlier, follow up interviews within the study firm indicated structural limitations may have prevented account executives from accessing internal resources. Specifically, account executives described their inability to contact or schedule time with some of the personnel who were assigned to be their primary support in detailed knowledge sharing discussions with customer personnel. This difference between external and internal knowledge sharing was also evident in the qualitative research where there were significant differences between the occurrences of account team and buying center knowledge sharing and account team knowledge sharing. These results differ from other studies that showed internal and external knowledge sharing both impacted work group performance (Cummings 2004).

Looking beyond the structural and relational processes, another issue that remains unresolved in this study is the role the relative amount of customization plays in knowledge sharing and the success of a solution. Although the hypothesis put forward in this regard could not be supported, there are two circumstances this non-finding must be couched within. The first is the previously mentioned low power of the quantitative study. In future research, this issue could potentially be overcome with a larger sample size. The second issue relates to the validity of the measure of solution customization. While the measure demonstrated good reliability as measured by Cronbach's Alpha, post-survey interviews indicated respondents may still have had difficulty in interpreting the individual items in the intended manner. The crux of this issue related to whether respondents considered the broader definition of a solution encompassing pre-sales, post-sale support, products, and services as has been advocated in this study and previous work in this area (Tuli et al. 2007). The post-survey interviews indicated at least some of the respondents answered these questions from the more narrow (and product-centric) view of customization by only considering the software products without also including services and implementation activities that were clearly customized.

The social network of solutions.

Although none of the moderating hypotheses could be supported in the quantitative phase of this study, there are still conclusions that can be drawn about the role of the relational and structural aspects of the solution social network in

influencing the success of that solution. First, both the quantitative and qualitative data indicated a solution team was comprised of multiple actors from both the provider and customer. The mean number of contacts involved in both new and existing solutions from the quantitative data was 2.65 from the customer and 3.35 from the provider. Likewise, 56.82% of the responses in the qualitative study also clearly indicated multiple contacts at the customer firm involved in the solution process. These results confirm the development of solutions does involve multiple actors from both the provider and customer. All of the data collected during the exploratory and confirmatory phases of this research also indicated the roles of those involved in the solution were diverse in terms of functional positions and relative position within the management structure of the firms and organizations being considered. Together, these findings indicate multiple actors with multiple different functional roles can comprise the broader cross-organizational solution team.

The majority of knowledge sharing coded in the qualitative survey was tacit in nature. While these results certainly must be considered within the context of the qualitative methodology where they were generated, they support the case that solutions are primarily developed with tacit knowledge through generative learning. This is important theoretically given that if there was not a difference in the amount of explicit versus tacit knowledge involved in the solution it would be difficult to say structural and relational embeddedness played a role in moderating the relationship between knowledge sharing and solution

success. Said a different way, if all solution knowledge sharing was explicit, relational and structural variables would be irrelevant given explicit knowledge sharing simply involves sharing documentation rather than tacit knowledge sharing which by definition evolves through socialization processes (Göranzon et al. 2006; Leonard and Sensiper 1998; Levitt and March 1988; Polanyi 1966). Given tacit knowledge is embedded in social interactions, these findings provide weight to the idea relational factors like trust and closeness can also play a role in strengthening the relationship between knowledge sharing and solution success. Given the lack of results in the quantitative study for the hypotheses proposing a moderating effect both for social and structural factors, this area also presents a rich opportunity for future research.

MANAGERIAL IMPLICATIONS

The results of this study have important implications for both solution providers and customers. While conceptual work in managerial journals have advocated the benefits of solution approaches (Bennett et al. 2001; Sawhney 2003; Sawhney et al. 2004; Sawhney et al. 2006), they offered little in the way of practical advice at the level of individual solution engagements. This study has developed a more in-depth perspective on the details of the solution process which can immediately be applied in management practice. Providing additional insight in this area is especially important given many solution engagements are not successful (Stanley and Wojcik 2005). Unsuccessful solutions not only negatively impact solution providers, but can also have equally unwanted

outcomes for the customers that have invested their time and resources in developing or evaluating the solution.

Given the importance of knowledge sharing in the solution process, solution providers and customers should work to see how they can optimize the exchange of such knowledge. This optimization should be applied to both the actual knowledge exchange and the relationship in which this exchange is embedded.

The first step in optimizing solution knowledge sharing is for both providers and customers to recognize sharing knowledge between relevant actors is a critical part of the overall process of defining a solution. This recommendation may seem self-evident, but many firms continue to follow the purely economic logic that partners should be treated not as partners, but as “opportunists” that are especially likely to take advantage of each other when the details of the transaction are evolving or unclear. This thinking is evidenced in customer managerial thinking when they choose to work with potential providers via processes like the very structured and controlled “request for proposals” which allow for little tacit knowledge sharing. It is similarly displayed by solution providers when they choose to limit the ability of internal resources to interact with customers and instead choose to have a “single point of contact” for all interactions and knowledge sharing. Both of these approaches may serve to limit the risk of unknown scope by limiting any interaction or sharing of knowledge outside the predefined scope of the potential relationship, but they also

act as significant barriers to the co-creation of true value through the emergent process of defining the solution. Even prominent academics have derided these types of marketing management practices which fail to encourage trust and truthfulness in marketing interactions (Sheth and Sisodia 2006).

These approaches are embedded in dated manufacturing based notions of value that assume the exchange process is solely concerned with evaluating an a priori value proposition. Solutions in some ways are the antithesis of these more traditional notions, in they evolve through interaction and are not defined in detail prior to this interaction. Customers interested in optimizing the solution process would therefore be well served by implementing processes that facilitate more open and free-form interactions with potential or existing solution providers. This optimization should seek to establish a working environment that encourages iterative and ongoing learning dialogs. A primary focus should include allowing providers to better understand the high level goals the customer seeks to achieve. Rather than establishing the purchasing department as a strict filter and formatter of interactions with potential solution providers, customers should allow their employees with the best knowledge of the problems at hand to interact directly with their functional equivalents at the provider firm. These interactions should encourage an open exchange of knowledge around the problems to be solved and the potential solutions available. Even when evaluating potential solution providers, fostering an environment of trust and openness will assist customer

firms in assessing whether provider firms would make good partners when moving on to develop the proposed solution.

For provider firms, they should similarly look to establish processes that facilitate interactions with their customers that put a premium on the exchange of tacit solution knowledge. They, too, must leave behind notions of the solution being predetermined and instead work to better understand the goals the customer seeks to achieve before recommending a solution. One reoccurring theme in the interviews conducted for this study was customers often did not have an accurate perspective on potential solutions for their problems until in-depth sharing of knowledge occurred. This is very much the definition of generative learning where an organization “develops a new way of looking at the world based on an understanding of the systems and relationships that link key issues and events” moving beyond simple cause and effect relationships (Senge 1990; Slater and Narver 1995). For more traditional providers, it may seem counterintuitive to suggest a customer might not know exactly what they want. Such providers might believe that marketing is simply about giving customers what they ask for. When put in the context of the results of this study, however, it is apparent customers may bypass discussing their generic needs and instead jump to what they believe to be the solution to those needs. Without engaging in generative knowledge sharing, this would be the equivalent to a patient prescribing a medical treatment without consulting with their physician. While such treatments may through chance or customer skill turn out to be effective, a much more informed

strategy would be to take advantage of the expertise of the physician (or solution provider) in jointly determining the treatment. So, even in the case where a customer has defined what they are seeking, solutions-focused providers should seek to better understand the underlying need they are trying to solve and insure the solution best meets those needs. Similarly, providers should not assume they understand a customer's needs (and potential solutions to those needs) until they have the opportunity to share more detailed knowledge among the members of the solution team.

Both customers and providers should also recognize tacit knowledge sharing is critical to solution success. While it may be appealing to rely on detailed requirements documents, such documents may not be effective for communicating or documenting complex or rapidly evolving requirements. Even high technology research and development firms are moving away from development processes that rely on excessive documentation to those that focus more on tacit knowledge sharing through interaction (Highsmith and Cockburn 2001). Such processes like *agile development* share many similarities with the solution development process including valuing “individuals and interactions over processes” and working solutions “over comprehensive documentation” (Highsmith and Cockburn 2001). Both customers and providers should look to facilitate similar environments that allow the exchange of tacit knowledge through iterative interaction in pursuit of the optimal customer solution.

Beyond just knowledge sharing, this study has also shown the types and number of people involved in the solution process also seem to affect its success. Both the quantitative and qualitative surveys demonstrated a variety of different roles are involved in successful solutions. Although the moderation hypothesis related to the number of direct ties impacting solution success could not be supported, won opportunities had significantly greater numbers of direct contacts ($p < .001$). Likewise, the majority of the responses in the qualitative survey mentioned multiple actors being involved from both the provider and customer. The managerial recommendation from these results would be to include those with the appropriate knowledge in the solution process even if their role does not typically involve dealing with providers or customers.

Finally, the quality of the relationship between the provider and customer personnel appear to influence the success of a given solution. As with the number of contacts in a new solution opportunity, there were also statistically significant differences in the mean values of relational closeness between wins and losses with wins having greater levels of closeness ($p = .007$). Trust and closeness were both discussed in detail in the qualitative responses. For managers, this implies they should work to foster these aspects of the relationships between members of the greater solution team. The advantages of close and trusting relationships should benefit each firm as they move from purely self-centered control mechanisms to those that put their collective success at the fore. This advantage should also assist in making their knowledge sharing processes as efficient as

possible through open and honest discussions of solution benefits, tradeoffs, and limitations.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

There are several limitations to this research that should be considered when evaluating it within the larger nomological net of marketing theory. First, this was a single firm study within a single industry. While some aspects of solution value creation at this firm may be generalizable, further research either with different firms or across firms can help to test whether these findings are more generally valid. Second, the lack of findings for the moderation hypotheses needs to be evaluated given the low power of this part of the study and the general difficulty of detecting moderating effects such as these in a field study (McClelland and Judd 1993). A study with a larger sample may be able to better test these hypotheses. Additionally, while difficult in practice given the nature of business-to-business relationships, an experimental design may add understanding to the stated research questions. Thirdly, both the quantitative study and qualitative study were administered at a single point in time. Although care was taken to design the studies in order to capture some of the aspects of these phenomena that occurred over the course of the solutions being developed, a longitudinal design might add significantly to understanding these iterative processes. Finally, both of the confirmatory surveys relied on a single key informant at the provider firm. While the exploratory interviews did include

customers, future research should seek to include multiple informants from the solution network to increase the validity of any social network measure.

CONCLUSION

This was the final chapter in this research study that investigated the role of knowledge sharing in solution co-creation. It presented the implications of the research findings for both marketing theory and practice. Finally, the limitations of the study and suggestions for future research were also detailed.

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APPENDIX A
RESPONDENT ONE-ON-ONE INTERVIEW GUIDE

Interview Guide

BEGIN INTERVIEW GUIDE:

Background:

We are conducting these interviews for a research project in partnership with Arizona State University which examines the relationships between YOUR FIRM and its customers. Specifically, we are interested in two sets of people.

The first is anyone from YOUR FIRM that shares your responsibility for some aspect of supporting a particular solution within a customer account. For example, this could be Education Consultants, Curriculum Specialists, Sales Operations, Sales Engineers, or Product Managers. Members of this team do not need to be formally on the account team, just involved in the account.

The second is anyone on the customer side that is responsible for some aspect for the relationship with YOUR FIRM and/or other vendor's solutions. For example, this could be a principal, a superintendent, a purchasing manager, a technology manager, a curriculum specialist, or a teacher.

All of your responses will be confidential in that no names will be included in the final report, so feel free to be candid in your responses,

Do you have any questions?

Initial Network Generation and External Knowledge Sharing Component:

Let's begin with discussing what types of knowledge is shared between YOUR FIRM and its customers.

Renewal Customer Relationship

First, think of an existing customer account YOUR FIRM was seeking to secure a renewal contract for.

Which customer are you thinking of?

Please list out the roles/names of people from YOUR FIRM that were involved in the account in some way:

Record Here:

Considering the same existing customer, please list out the roles/names of people from the customer that were involved in the account:

Record Here:

Considering the same customer account, at a high level, what types of knowledge and information was shared **between** the employees from YOUR FIRM and the customer? Please include information that may have been shared that you might not have been directly involved in.

Now, let's consider the types of knowledge that is shared **within** the team of YOUR FIRM employees. What types of knowledge and information was shared among the YOUR FIRM employees relative to this customer account? Please include information that may have been shared that you might not have been directly involved in.

New Customer Relationship

Now, let's change our focus to a new customer account you were looking to win.

What customer are you thinking of?

Please list out the roles/names of people from YOUR FIRM that were involved in this account:

Record Here:

Again, considering the same new customer account, please list out the roles/names of people from the customer that were involved in the account:

Record Here:

Considering the same new customer account, at a high level, what types of knowledge and information was shared **between** the employees from YOUR FIRM and the customer? Please include information that may have been shared that you might not have been directly involved in.

Now, let's again consider the types of knowledge that is shared **within** the team of YOUR FIRM employees. What types of knowledge and information was shared among the YOUR FIRM employees relative to this customer account? Please include information that may have been shared that you might not have been directly involved in.

Social Network Ties

Now, let's consider the relationships between the people you identified in the two accounts we just reviewed.

Current Customer Direct Ties (from Moran 2005)

Beginning with the current customer account, please characterize your relationship with each of the people who I will list out from my notes. Please characterize your relationship to each of these people in terms of how "close" your relationship is to them.

List of People from Above.

Current Customer Indirect Ties (from Moran 2005)

Now, let's consider the relationships among the people at both YOUR FIRM and the customer separate from your relationships. Which of the pairs of people at YOUR FIRM or the customer had more than an arm's length relationship?

List of People from Above.

Did *person 1* have more than an arm's length relationship with anyone else you listed as being part of this account (considering both people at YOUR FIRM and the customer)?

How would you characterize their relationship?

New Customer Direct Ties (from Moran 2005)

Let's turn to the existing customer account. As before, please characterize your relationship with each of the people who I will list out from my notes. Characterize your relationship to each of these people in terms of how "close" your relationship is with them.

List of people from above if required and repeat.

New Customer Indirect Ties (from Moran 2005)

Finally, let's consider the relationships among the people at both YOUR FIRM and the customer at the new customer account separate from your relationships. Which of the pairs of people at YOUR FIRM or the customer had more than an arm's length relationship?

List of people from above if required and repeat.

Did *person I* have more than an arm's length relationship with anyone else you listed as being part of this account (considering both people at YOUR FIRM and the customer)?

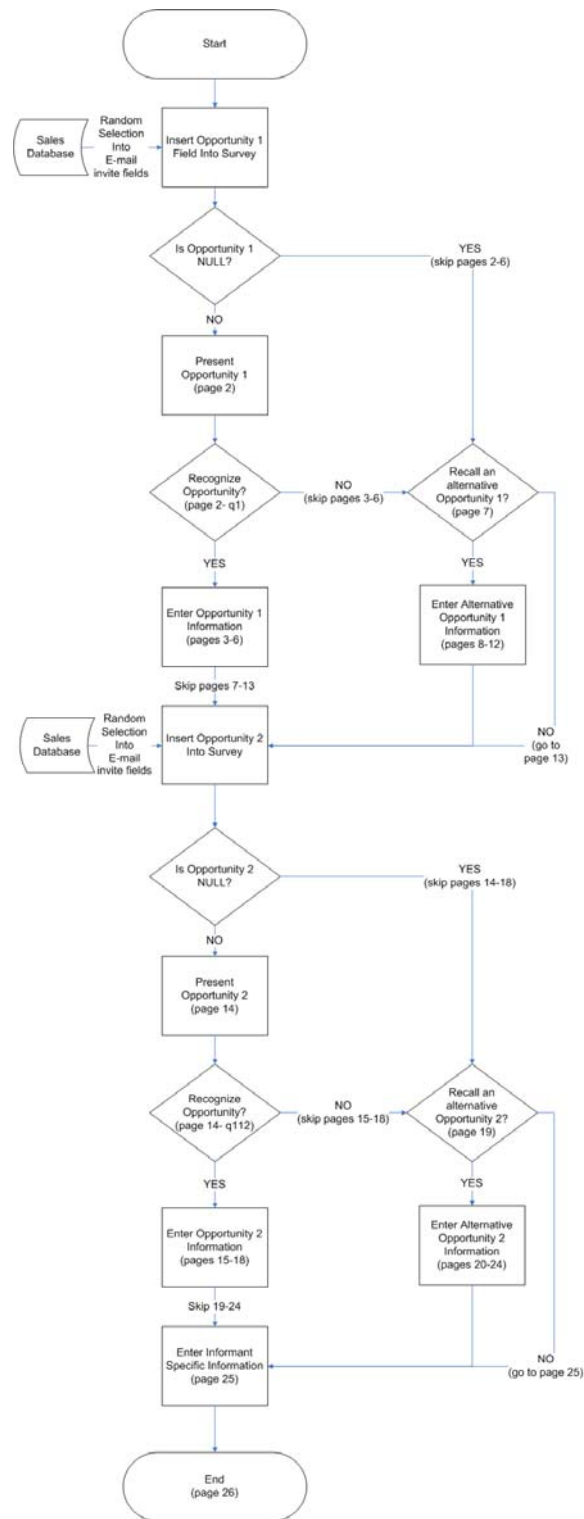
How would you characterize their relationship?

That concludes our interview- are there any final thoughts you would like to add?

Thanks again, we appreciate your assistance!

APPENDIX B

SURVEY OPPORTUNITY PRESENTATION LOGIC



APPENDIX C
QUANTITATIVE SURVEY INSTRUMENT

Hello ,

is conducting this study with a team of researchers from to better understand how to optimize its relationships with important customers. Specifically, this study will explore the types of relationships that exist between and customers that have worked on a proposed solution with

All responses to this survey will be **STRICTLY CONFIDENTIAL**. Your individual responses will be assigned a numeric code and all identifying information related to you or the customers considered will be removed before the results are presented by the University researchers back to . While we will ask you for contact names, this is only to guide your questioning.

ALL PERSONAL INFORMATION INCLUDING YOUR NAME, CUSTOMER NAMES, AND PEARSON CONTACT NAMES WILL BE REMOVED FROM THE FINAL STUDY.

The survey will take approximately 30 minutes. *Please, take your time and read each question in detail and provide us with your most accurate and candid feedback.*

The survey is divided into two major sections which each ask you the same set of questions about **two different customers** that we randomly selected from the database.

In case you do not finish your survey in one session, you can save your progress and return (use the link in the upper, right hand section of this window).

If you have any questions about the survey, please contact us at .

Thank you for your assistance.

1

Click to Next Page

4%

For the first opportunity, we would like you to recall the following customer opportunity:

This specific opportunity had the following entries in _____ for *product name / opportunity ID (if entered) / opportunity potential* :

This customer was chosen at random from the _____ database as a sales opportunity assigned to you with a value of at least \$5000 that was closed between January 1, 2009 and now.

We will ask you several questions about your interactions with this customer. When you think about this opportunity, consider the **total solution** for the customer which includes pre-sales activities, products, services, implementation, and support.

WE ARE INTERESTED IN ACCURACY, SO YOU CAN CONSULT ANY OTHER RECORDS TO WHICH YOU HAVE ACCESS (e.g.- your notes, _____ etc.).

1. Before we continue, can you accurately answer several questions about your interactions with ?

*(Please answer "No" if you can not recall this opportunity based on your memory or other data you may have access to.)**

- Yes
- No

2

Click to Go Back

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4. On average, how often did you share each type of knowledge **within the team** during your work on the opportunity? *

	(1) never	(2) rarely	(3) sometimes	(4) regularly	(5) a lot
General Overviews (e.g.- goals of solution, timelines, member responsibilities, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Specific Requirements (e.g.- curriculum, standards, technical , training, support, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchasing Process (e.g.- funding, order process, pricing, contracts, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Progress Reports (status updates, resource problems, implementation updates, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project Results (preliminary results, ongoing results, support experience, unexpected outcomes, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. On average, did the opportunity require **skills or information** that were stable or **skills or information** that were changing? *

	(1) very stable	(2)	(3)	(4)	(5) rapidly changing
skills/ information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. On average, to what extent did the opportunity have *available resources* (both from and the customer)?

*

	(1) not very available	(2)	(3) average	(4)	(5) very much available
financial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
personnel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. While working on the opportunity...*

	(1) strongly disagree	(2) disagree	(3) neither agree nor disagree	(4) agree	(5) strongly agree
The requirements we discussed with the customer were specific to their particular situation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The proposed deployment and support plan was adapted to the customer's needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The customer's needs dictated a specific implementation of products and services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The requirements we discussed were developed based on the customer's unique needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We proposed an integrated solution for this customer based on a unique combination of products and services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The proposed combination of products and services was	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The proposed deployment of products and services was customized for this customer.

8. How would you rate the *quality* of the proposed solution for the opportunity compared to other solutions at ?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to other solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. How would you rate the *overall performance* of the proposed solution for the opportunity compared to other solutions at ?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to other solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. How would you rate the *quality* of the proposed solution for the opportunity compared to competitors' solutions?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to competitor solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. How would you rate the *overall performance* of the proposed solution for the opportunity compared to competitors' solutions?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to competitor solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Did ultimately purchase the proposed products and services associated with this opportunity?*

- Yes
- No

3

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We will now collect information about the people you worked with on the opportunity.

13. CUSTOMER CONTACTS

Enter a unique name for each contact you worked with from the **CUSTOMER TEAM** on the opportunity in the text fields below.

Ideally, enter their first and last name, e.g.- "Jane Doe".

If you don't recall their name, enter their title, e.g.- "Teacher 1"

When you are recalling these contacts, think about the roles you might have been involved with including the following examples:

- **assistant superintendents or superintendents**
- **assistant principals or principals**
- **education directors, teachers, or curriculum specialists**
- **purchasing managers, administrators, or technology directors**

*

Customer Contact 1	<input type="text"/>
Customer Contact 2	<input type="text"/>
Customer Contact 3	<input type="text"/>
Customer Contact 4	<input type="text"/>

14. CONTACTS

Enter a unique name for each contact you worked with from the **TEAM** on the opportunity in the text fields below.

Ideally, enter their first and last name, e.g.- "Jane Doe".

If you don't recall their name, enter their title, e.g.- "Curriculum Specialist 1"

When you are recalling these contacts, think about the roles you might have been involved with including the following examples:

- curriculum specialists
- educational consultants
- district managers
- engineer or sales engineers
- product managers
- sales operations

Contact 1

Contact 2

Contact 3

Contact 4

4

Click to Go Back

Click to Next Page

18%

Next, we will ask you about the relationship between each of the contacts (if you entered more than one) you listed for the opportunity.

We will ask you the same question about **every pair of contacts** you listed.

contacts are in RED TEXT.

Customer **contacts** are in BLUE TEXT.

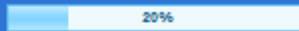
15. Select "Yes" if the pair of contacts had **more than an arm's length (distant) relationship**.*

	Yes	No
test two and test one	<input type="radio"/>	<input type="radio"/>

5

Click to Go Back

Click to Next Page



Next, we will ask you about your relationships with the group you worked with on the opportunity.

contacts are in RED TEXT.

Customer contacts are in BLUE TEXT.

43. During the course of working on this opportunity, indicate how close (professionally) you felt to **test one** by selecting from the choices below.
*

(1)					(5)
distant/arm's		(2)	(3)	(4)	very close
length					
<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

44. Indicate whether you agree or disagree with the following statements regarding **test one** and your working relationship on this opportunity.*

	(1) strongly disagree	(2) disagree	(3) neither agree nor disagree	(4) agree	(5) strongly agree
test one shares my overall goals and values.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
test one is generally honest and truthful in the information provided.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
test one is very competent in the areas in which we interact.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The proposed deployment of products and services was customized for this customer.

8. How would you rate the *quality* of the proposed solution for the opportunity compared to other solutions at ?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to other solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. How would you rate the *overall performance* of the proposed solution for the opportunity compared to other solutions at ?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to other solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. How would you rate the *quality* of the proposed solution for the opportunity compared to competitors' solutions?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to competitor solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. How would you rate the *overall performance* of the proposed solution for the opportunity compared to competitors' solutions?

*

	(1)	(2)	(3)	(4)	(5)
	much worse		the same		much better
Comparison to competitor solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

On this final page, please help us by providing some background information. Remember, all information will be kept confidential.

237. Select your gender*

- Male
- Female

238. Enter your age in years:*

239. How many years have you been with [redacted] ?*

240. How many years have you worked in the education industry?*

25

Click to Go Back

Finished? Submit your Survey

88%

APPENDIX D
QUALITATIVE SURVEY INSTRUMENT

Customer Solution Survey

Before we get started, let's discuss **exactly** what we mean by **solutions to customer problems**.

First, what do we mean by **customer problem**? We are trying to understand generic customer problems that might exist regardless of what products or services a customer uses. We are not trying to understand product or service features that a customer may want from Pearson (not in this survey, anyway). By focusing on problems, we can understand the ultimate goal we are trying to solve without immediately jumping to specific feature requests. A good solution is crafted to solve these problems.

For example, the iPod would never have been developed if Apple asked its customers what new features they would like to see in their then current products. The key to the iPod was understanding that customers wanted an easy, elegant way to enjoy all their music, all the time.

Secondly, there are many different types of problems or challenges that Pearson may be able to assist customers with. For the purpose of this survey, we are interested in problems that exist at the **tactical level**. The tactical level is detailed enough that there is a small set of very specific actions that could be executed to solve this problem. Tactical problems can usually be solved in six months or less. Tactical problems are more detailed and execution focused than problems that are at the higher, strategic level.

Here are some examples to assist you in thinking about the correct level for this survey:

Tactical Problems (what we want in this survey):

- My students need more ESL support
- I have to report program usage data to the state
- We want to support work at home students
- I need installation to be easier for my IT staff
- My teachers need help in implementing new technologies

Strategic Problems (quite valid issues, but too broad for this survey):

- The state budgets continue to decrease
- We need to increase student performance across the board
- Our school is under-performing
- We need to be more technology focused

Strategic problems are usually much longer in duration and relate to general directions rather than the specifics of how to get there. While higher level, strategic problems are without a doubt important, we want to focus on the more detailed solutions that you developed.

Combining many tactical solutions is often the way that strategic objectives are achieved. By focusing on the tactics, we can better understand the specifics of what problems you are helping customers solve.

With the explanation out of the way, let's move on to the survey!

Click to Go Back

Click to Next Page

60%

Customer Solution Survey

Please start by thinking of a customer that had one or more tactical problems for which you developed a creative and effective solution. Ideally, your solution would have started with the customer expressing their generic problem after which you worked with them to develop that effective solution.

Try to make your answers as short as possible while still capturing the essence of the question.

1. Describe the most important generic customer problem you solved for the customer you are thinking about (please describe it from their perspective).

*

2. What was your solution to that problem? (Include any products, services, or resources you used to solve that problem even if they were from outside

.)

*

3. How did you determine/develop the best solution to the customer's problem (what was the process)?

*

4. How did you discuss the potential solution with the customer (meetings/discussions with subject matter experts, etc.)?

*

5. What aspects of your relationship with the customer helped make the solution successful (connections to the right people, good working relationship, etc.)?

*

Click to Go Back

Click to Next Page

APPENDIX E
INSTITUTIONAL REVIEW BOARD EXEMPTION

To: Michael Hutt
BAC

MR **From:** Mark Roosa, Chair *MR*
Soc Beh IRB

Date: 03/14/2011

Committee Action: Exemption Granted

IRB Action Date: 03/14/2011

IRB Protocol #: 1103006174

Study Title: Organizational Learning and Knowledge Processes in New Solution Department

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(2).

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.