A STRUCTURATIONAL VIEW OF INTERFIRM RELATIONSHIPS: AGENTS, SOCIAL STRUCTURES, AND TECHNOLOGY IN PRACTICE

By

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Abstract

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Despite the theoretical and strategic importance of Interfirm Relationship (IR) and technology in today's highly competitive marketplace, relational consequences of technology use in interfirm interactions remain unclear and inconclusive. Drawing on Giddens' (1984) Theory of Structuration, this dissertation proposes a structurational view of IRs and constructs a conceptual framework that emphasizes the role of IR agents in technology use and interfirm interactions. This dissertation views technology through a practice lens and examines the role of IR agents by studying IR agents' Sense-making and Technology Enactment. This research adopted a key-informant survey design in the context of industrial service providers. The results show that IR agents' Sense-making is positively related to Relationship Quality and plays a critical role in mediating effects of everyday IR interactions on Relationship Quality. Similarly IR agents' Technology Enactment of Relationship Management not only positively contributes to Relationship Quality but also mediates the relationship of IT Embeddedness and Relationship Quality. Additionally cognitive Sense-making seems to mitigate the effect of Technology Enactment on Relationship Quality. In general, research results are consistent with extant research but highlight the efficacy of human agency in technology use and IR formation and management.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

Dedication

This dissertation is gratefully dedicated to my parents Mingde Zhou and Daxiang Tong, to my sister Dr. Barbara Tong, and in memory of my Grandmas.

They are the inspiration of everything that I do.

CHAPTER ONE

INTRODUCTION

Interfirm relationships (IRs) have been a focus of research in marketing for more than two decades (Hunt 1983; McNeil 1980). A close and enduring relationship is an important strategic asset (Dwyer, Schurr, and Oh 1987; Johnson 1999; Varadarajan and Cunningham 1995) and a valuable source of competitive advantage particularly in business markets (Dyer and Singh 1998; Ulaga and Eggert 2006). Relationship-based marketing is often associated with lower transaction cost, customer loyalty and cooperation (Palmatier, Dant, Grewal, and Evans 2006), and ultimately more profit in the long run (Morgan and Hunt 1994). As such developing and sustaining favorable long-term relationships is strategically imperative in today's highly competitive and market-driven (Day 1994) business marketplace.

Prevalent in relationship management with business customers (B2B) is the remarkable advancement and ubiquitous application of *Information Technology (IT)* (e.g. Sriram and Stump 2004; Tippins and Sohi 2003). I refer to *IT* as any form of computer-based systems and packages that "create, capture, manipulate, communicate, exchange, present and use information" to support interactions with trading partners (Dewett and Jones 2001; Ryssel, Ritter, and Gemünden 2004, p.198). This definition of IT suggests that IT in this study encompasses computer hardware, software, their extensions, as well as IT-related personnel, and early electronic devices such as telephones are excluded. Recent popular IT innovations include *Customer Relationship Management (CRM), Supply Chain Management (SCM)*, and various Internet and web-based technologies (e.g. Chatterjee, Grewal, and Samabamurthy 2002; Hansen and Hill 1989). Application of these IT innovations has revolutionized and fundamentally changed how firms communicate, interact, and generally relate to each other

(Bordia 1997; Leek, Turnbull, and Naudé 2003; Subramani 2004; Jayachandran, Sharma, Kaufman, and Raman 2005), bringing enormous opportunities as well as challenges to IR management (Leek, Turnbull, and Naudé 2003; Schultze and Orlikowski 2004).

Despite the strategic importance and rising excitement, it remains unclear in the extant literature why and how IT use affects IRs and IR management. First, research on how IT impacts customer relationships is scant and limited (Sriram and Stump 2004). A preponderance of the extant IT research focuses on studying IT payoff in terms of value creation and financial performance (e.g. Kohli and Deveraj 2003) leaving relational consequences of IT largely under-explored. Moreover empirical studies in the extant literature have reported largely inconsistent and sometimes conflicting findings (Stump and Sriram 1997). While some studies suggest that IT facilitates collaborative relationships (e.g. Day and Bens 2005; Leek, Turnbull, and Naudé 2003; Myhr and Spekman 2005; Subramani 2004), most report disappointing or detrimental effects (e.g. Deeter-Schmelz and Kennedy 2004; Houldsworth and Alexander 2005; Payton and Zahay 2005; Ryssel, Ritter, and Gemünden 2004). In addition, marketing managers in the field also noted disillusionment regarding relational consequences of IT (e.g. Leek, Turnbull, and Naudé 2003).

A review of the IR literature suggests several potentially problematic research issues that deserve more research attention, namely conceptualization of IRs and the role of human agency in IT and IR interactions (Boudreau and Robey 2005). This dissertation proposes that the Structuration Theory of social interactions (Giddens 1984; Schultze and Orlikowski 2004) provides a compelling theoretical framework in addressing these research issues. Specifically I take a structurational perspective and construct IRs as social structures (i.e. relational structures) and view Relationship Quality as the propensity that relational structures promotes

favorable relational interactions by means of regulating IR agents' actions and behaviors in interfirm activities. I examine the role of technology and human agency in firm interactions and argue that the effects of technology on IRs depend upon IR agents' selective enactment of technological features, and IR agents also shape Relationship Quality through their cognitive Sense-making of emerging interaction patterns. In the next section, I briefly review the existing IR literature and discuss the conceptualization of IRs from a structurational perspective. I further discuss the role IT plays in aggravating these problems in IT-mediated interactions as opposed to traditional face-to-face interactions, which further motivates the structurational view of IRs (Giddens 1979, 1984).

Interfirm Relationships

Despite the wide celebration of relationship marketing (Dwyer, Schurr, and Oh 1987; Morgan and Hunt 1994) and relational exchange in marketing research (Macneil 1980; Lambe, Spekman, and Hunt 2002), little attention has been paid to the theoretical account of interfirm relationship itself. Much of the extant research has studied IRs within the context of interfirm exchange, defining relational exchange by contrasting it with transactional exchange (Macneil 1980). For example, in their seminal work of IRs, Dwyer, Schurr, and Oh (1987) define relational exchange in terms of the degree of departure from discreteness of exchange activities.

I argue that the extant IR research may be further enriched by addressing two potentially problematic research issues. First, existing IR definitions have largely been descriptive, and a theoretical basis is vague if not lacking. In the current IR literature, relationships are implicitly yet predominantly viewed as relational ties, social bonds, or

various forms of association that connect exchange partners. Commonly studied relational notions include relational strength (e.g. Kumar, Scheer, and Steenkamp 1995; Rindfleisch and Moorman 2001), relational bonds (e.g. De Wulf, Odekerken-Schroder, and Iacobucci 2001; Perry, Cavaye, and Coote 2002), social embeddedness (Granovetter 1985; Uzzi 1997), and governance structures (e.g. Heide 1994) among others. While these important notions in existing IR research are extremely valuable in facilitating our understanding of relationships in terms of firms' behaviors in exchange activities, the theoretical foundation of IR has yet to be fully established.

Secondly I argue that the role human agency plays in interfirm interactions and how it may shape Relationship Quality have not been fully explored in the existing IR research. It is intuitive that human actors constitute an indispensable component in any social interactions including business exchange activities, and thus consideration of human actions is crucial in advancing our understanding of IRs. Yet, much of the IR research has focused on effects of firm level factors such as power and dependence (e.g. Heidi and John 1988; Johnson, Sakano, Cote, and Onzo 1993; Morgan and Hunt 1994), communication (e.g. Anderson and Weitz 1992; Mohr, Fisher, and Nevin 1996), similarities (e.g. Crosby, Evans, and Cowles 1990), value creation (e.g. Boyd and Spekman 2004), and relationship investment and firm expertise (Palmatier et al. 2006) as prevalent relational antecedents to Relationship Quality. The narrow focus on firm level factors with little consideration of IR agents results in research myopia and therefore hindered a comprehensive understanding of IRs (Markus and Robey 1988).

I argue that this lack of consideration of human agency is particularly damaging in studying IT-mediated interactions because introducing technology in interactions brings into play a unique dynamic among human actions, technological features, and interfirm relations

(DeSanctis and Poole 1994; Orlikowski 1992, 2000). The proliferation of technology in interfirm interactions poses new challenges to IR research and calls for careful consideration of the theoretical frameworks in the existing IR research. Traditionally IRs are formed and maintained through interpersonal (e.g. face-to-face) contacts, and favorable relationships are results of direct interactions between suppliers and customers. IT-mediated interactions, however, complicate the process by introducing two tightly coupled components, technological features and users of such technology features (DeSanctis and Poole 1994; Orlikowski 1992), i.e. IR agents. Literature suggests that IR agents selectively enact technological features to carry out social and exchange activities between firms (Orlikowski 2000). Because people exercise considerable discretion in their choice, deployment, and actual use of technological features (Boudreau and Robey 2005; DeSanctis and Poole 1994; Schultze and Orlikowski 2004), human agency becomes an indispensable component and therefore plays a significant role in IT-mediated interactions and influencing Relationship Quality (Schultze and Orlikowski 2004). Thus, as technology penetrates and mediates firm interactions, no longer are the mere organizational and cultural structures at the macro level the sole influences to IRs and IR quality.

In light of this, I argue that use of IT in interfirm interactions brings new challenges to IR research in the sense that neglecting the role of human agents in interfirm interactions poses a severe threat to the rigor of IR research. Indeed recent organizational research brings to light the significant role of human agency in IR and IT management (e.g. Boudreau and Robey 2005; Schultze and Orlikowski 2004). However, empirical studies are scant and limited. As IT plays an increasingly important role in facilitating interfirm activities (Boyd and Spekman 2004; Devaraj and Kohli 2003), it is a pressing challenge for IR researchers to

explore and examine theoretical perspectives that facilitate investigations regarding how IRs, as a firm level phenomenon, may be affected by both macro level organizational structures and micro level human actions. While bridging macro and micro levels of forces can be challenging, the resulting theoretical framework can expand the theoretical domain of IR research and provide a comprehensive view of IR formation and management, especially for those involving intensive use of technology.

Research Objectives

The objective of this dissertation is to examine the relational consequences of technology use from a structurational perspective (Giddens 1979, 1984), highlighting the mediation effects of human agency (e.g. Boudreau and Robey 2005). I argue that IRs can be cast as *social structures* and hence may be examined with a structurational perspective (Giddens 1984). By conceptualizing IRs as social structures, I place IRs and IT in a structurational framework (DeSanctis and Poole 1994; Orlikowski 1992, 2000; Poole and DeSanctis 2004) to examine how technology use and IR agents' Sense-making jointly influence Relationship Quality. My general contention is that because technology use involves both technological features and undertakings of its users, i.e. IR agents, it is marketing agents' enactment of technology and their cognitive Sense-making efforts that mediate the impact of IT Infusion and everyday interactions on Relationship Quality. Furthermore, I suggest that the functionalities of technology materialize through IR agents' enactment of technology, and everyday IR interactions shape IRs through IR agents' cognitive Sense-making as interactions unfold.

Theory of Structuration

The Theory of Structuration (Giddens 1984) explains how social structures are created and shaped by the recursive interactions between institutional structures and individual actions. The center notions of the structuration theory are social structures, a system of *rules* (e.g. procedures to act) and *resources* (e.g. knowledge needed to act), and human agency, individual actors who carry out social interactions (Giddens 1984). *Structuration* is the process where existing rules and resources are put into practice and create new rules and resources. According to the theory, structures provide meanings for and regulate individuals' behaviors, and thereby both enable and constrain social interactions (Giddens 1984). This function can be performed by means of three types of structures (Giddens 1979; Orlikowski 1992, 2000; Scott 1995): structure of *signification* that gives meaning to actions; structure of *legitimization* that prescribes normative behaviors; and structure of *domination* that controls against violation of norms. I apply these forms of structures to develop a theoretically grounded conceptualization of relationships as social structures.

Highlighting the significant role human agency plays in shaping social structures, the theory asserts that social structures are results of, and therefore affected by, both existing rules and resources (resulting from previous interactions) and ongoing interactions (Giddens 1984). It offers a theoretical explanation as to how organizational structures may be affected by macro level social structures as well as micro level individual actions. In particular, the theory explicitly states that individuals are *knowledgeable* (e.g. learning from daily activities) and *reflexive* (having the ability to observe, gather, and understand their own actions and those of others) (Giddens 1984). Drawing on the theory, I develop two notions, *IT Enactment* and *Sense-making*, to examine the role of human agency in interfirm interactions. The notion *IT*

Enactment embodies the effect of human agency at IT deployment stage because it reflects the facts that IR agents exercise discretion in their selective use of technology; and *Sense-making* captures the cognitive efforts of human agency in the process of interfirm interactions. Taken together, a conceptual framework is developed to explain how IRs as social structures are shaped by the joint effects of existing social structures, human agency, and technology in practice. This framework offers a theoretical account for how mechanisms of structuration processes may lead to favorable Relationship Quality.

Contributions

This dissertation makes theoretical contributions to IR and IT research. First, I develop and substantiate a structurational view of IRs on basis of the Structuration Theory (Giddens 1984). I believe much is to be gained from studying IRs from a structurational perspective. Viewing and studying IRs in terms of structurational notions offers a novel yet theoretically compelling perspective to advancing current IR research. In particular, the appeal of structuration theory to IR research lies in its ability to bridge macro level social structures, i.e. IRs, and micro level individual actions. This integrated perspective offers a novel yet theoretically compelling framework to examine technology use and IRs and thus expands the theoretical domain of the IR research and enriches current IR literature.

Secondly, this dissertation draws on the structuration theory and proposes a conceptual model that emphasizes the role of IR agents in interfirm interactions. I examine technology use through a practice lens and situate technology in the context in which it operates and thereby incorporates the managerial discretion being exercised in technology deployment and appropriation (Orlikowski 2000). I study the role of human agency in technology use with a

practice lens because research suggests that a practice perspective is both theoretically advantageous and managerially relevant (Orlikowski 2000; Schultze and Orlikowski 2004). In addition the role human agency plays in shaping IRs is elucidated by studying IR agents' cognitive Sense-making during interfirm interactions after technology has initially been deployed and put to use in practice.

Research findings illuminate how human agency is tightly coupled with and interact with technology to shape IRs throughout the entire course of technology use in interfirm interactions. Findings from this dissertation can direct managerial attention to both marketing and IR agents in addition to a narrow focus of technology features. This dissertation also contributes to IT research by alleviating the unease and skepticism in adopting and effectively managing IT innovations, and provides guidance for effective management of IRs in business markets. Managerially findings from this dissertation help managers design and leverage IT innovations to better govern relational consequences and control potential downsides of technology in IRs.

Conceptual Model and Key Constructs

I propose the notion *IT Infusion* to refer to the extent to which technology is extensively implemented, integrated, and seamlessly ingrained in interfirm activities. I examine three aspects of IT Infusion, *IT Intensity,* the extent to which IT is used in interfirm interactions benchmarking against their corresponding industry average; *IT Embeddedness*, the degree to which IT is integrated and ingrained in all aspects of interfirm activities, and *IT Artifact,* the level of technological superiority of IT related hardware, software, and personnel skills. It should be noted that in comparing IT Intensity and IT Embeddedness, the former

gauges the amount and magnitude of IT use, while the latter concerns the breadth and scope of IT use.

Through a practice lens, I conceptualize the notion *IT Enactment* as the extent to which human agents purposefully enact technology to perform intended functions in relational activities. Research suggests that IT users exercise considerable discretion in their deployment of IT (Boudreau and Robey 2005), and as a result IT Enactment reflects the strategic choice effect of human agency at the deployment stage of technology. Because people may choose to use the same technology for different purposes, technological features may be enacted in distinct ways (Barley 1986; Robey and Sahay 1996). Given the research question in this study, I examine IT Enactment in terms of *Coordination* and *Relationship Management*. *IT Enactment of Coordination* refers to the extent IT is used to organize simple tasks by facilitating easy exchange of information, such as synchronizing calendars and scheduling meetings. In contrast *IT Enactment of Relationship Management* refers to the extent IT is used to perform substantial relational functions such as connecting with customers, learning customers' needs, and overall manage customer relationships. I expect that the three dimensions of IT Infusion influence IT Enactment of Coordination and Relationship Management, which in turn influences the ultimate dependent variable, Relationship Quality. In other words, I expect IT Infusion to influence Relationship Quality through and only through the process of IR agents' enactment of technology.

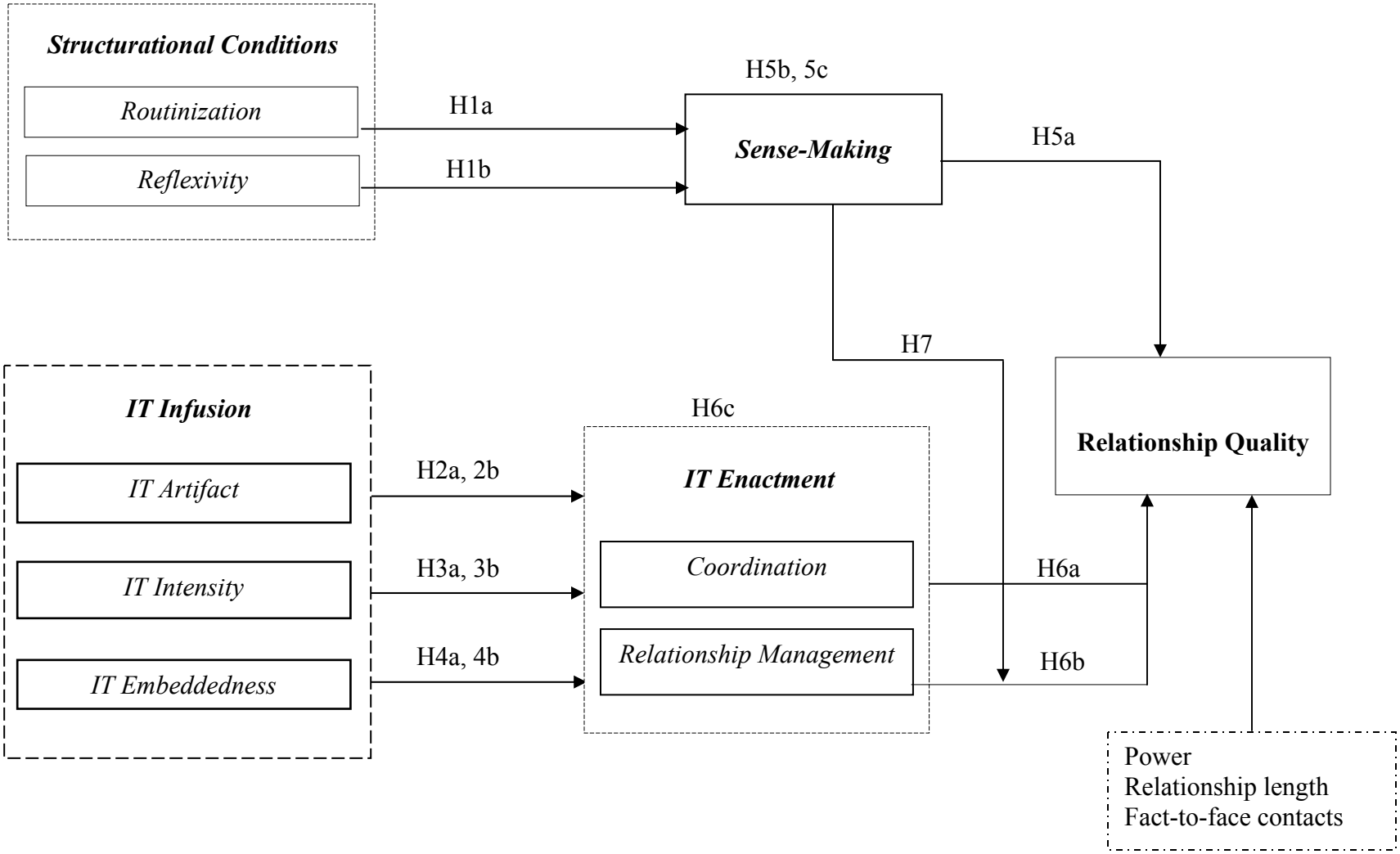
Furthermore, I argue that it is human agents' ability to make sense of actions of its own and others and translate them into actionable knowledge that prescribe normatively appropriate actions in future interactions that plays an important role in shaping IRs. When knowledgeable and reflexive IR agents (Giddens 1984) engage in interfirm activities, they

likely gather random and peripheral information from interactions and are thus faced with the challenge of making sense of it and reapply resulting knowledge to guide future behaviors. This cognitive process of organizing, interpreting, and utilizing such information is defined as IR agents' *Sense-making*. As such Sense-making is where meanings of peripheral information materialize (Weick, Sutcliffe, and Obstfeld 2005).

According to the theory (Giddens 1984), practices and actions are standardized and eventually institutionalized to function as structures only if stable patterns can be extracted from highly routinized procedures and activities. The extent to which interfirm activities recur with noticeable patterns is referred to as *Routinization* of interfirm activities and practices. Taken together, the structuration process necessitates both Routinization of interfirm activities and practices and reflexive IR agents. Subsequently rules and resources (being results of previous interactions) are applied to routine activities and in conjunction with agents' improvised learning from ongoing interactions create revised structures that both enable and constrain IR agents' future actions (Giddens 1984).

As such I expect that Reflexivity and Routinization influences agents' ability to understand and make sense of interactions, which in turn influences Relationship Quality. In addition as structuration theory suggests that human actions and technological structures jointly shape emergent structures, i.e. IRs, I further expect that agents' cognitive *Sense-making* moderates the effect of IR agent IT Enactment on Relationship Quality, i.e. the effect of IT Enactment on Relationship Quality. Figure 1 provides a graphic depiction of the proposed conceptual model.

Figure 1. Conceptual Model of Technology Enactment on Relationship Quality



This dissertation proposes a conceptual model highlighting two distinct yet coupled forces that shape IRs as social structures, IT Enactment and agents' Sense-making. I propose that IT Infusion influences Relationship Quality through technology enactment, and that IR agents' Reflexivity and the Routinization of interfirm interactions affect Relationship Quality through human agents' Sense-making. Both IT Enactment and Sense-making are results of social structures and human agents' cognition and reflect an integrated view of agents and structural features. The general hypothesis of this dissertation states that it is through the joint effect of IT Enactment and agents' cognitive ability to make sense of evolving structures and actions that IT Infusion changes rules and resources in relational interactions and thereby improve interfirm Relationship Quality.

Research Design and Data Analysis

The research context for this study is industrial service providers. Because service providers are characterized by close contacts between trading partners (Meuter, Bitner, Ostrom, and Brown 2005), it provides an adequate context for studying intensive interfirm interactions. Because my primary interest lies in relational consequences of technology and cognition of human agents, the unit of analysis is individual relationships between service providers and their respective customers. I conduct empirical testing using a key informant survey design.

I followed Huber and Power (1985) guidelines for key-informant based survey research and undertook rigorous research and data collection procedures to ensure high quality data. In particular I conducted a qualitative study with field studies and in-depth interviews, which was then complemented by an extensive literature review. This procedure

ensures theoretical significance and managerial relevance of the research question and the proposed conceptual framework. The instrument development process was characterized by an extensive literature review, field in-depth interviews, item generation and validation, expert panel reviews, and an iterative process of pretesting and revisions. Key informants were carefully identified and rigorously qualified to further ensure high quality data. Data analysis consisted measure validation using confirmatory factor analysis (CFA) and structural equation model (SEM) estimation of path coefficients for hypothesis testing. Mediation effects of IT Enactment of Relationship Management and Sense-making were tested by conducting significance tests for respective indirect effects. Specific details of the research design and procedures are described in Chapter Four.

Organization of the Dissertation

The rest of this dissertation is organized as the follows. In Chapter Two, I provide an overview of the structurational theory (Giddens 1984) and synthesize it with the existing literature and conceptualize IRs in structurational terms. This structurational conceptualization of IRs sets the stage for the structurational view of *Relationship Quality* as well as the development of a structurational framework of IRs highlighting human agency, relational structures, and technology in practice. With a structurational framework, I develop the constructs of *Reflexivity* and *Routinization*. I then review how technology influences IRs in the extant literature and propose my conceptualization of IT Infusion in terms of *IT Intensity*, *IT Embeddedness*, and *IT Artifact*. Further I emphasize the human agency aspect (DeSanctis and Poole 1994; Orlikowski 2000) of the conceptual model and develop the key

constructs, *IT Enactment* in terms of *Coordination* and *Relationship Management* and IR agents' cognitive *Sense-making*.

Building on the theoretical framework from Chapter Two, I propose a conceptual model of Sense-making, IT Enactment, and Relationship Quality in Chapter Three. I introduce Relationship Quality as the dependent variable, present the conceptual model and flow of relationships, and develop and present specific hypotheses in Chapter Three. Chapter Four describes the research design and data collection procedures, and Chapter Five reports data analysis procedures and hypothesis testing results. This dissertation concludes with a discussion of research results and research implications in Chapter Six.

CHAPTER TWO

CONCEPTUAL AND THEORETICAL BACKGROUND

In this Chapter, I draw on the Theory of Structuration (Giddens 1979, 1984) to build the theoretical foundation as for how interfirm relationships may be cast as social structures and develop the conceptual background to examine IRs from a structurational perspective. Specifically I apply the theory of structuration to examine the three structures (signification, legitimization, and domination) (Giddens 1979; Scott 1995) and IR agents' instantiation of IRs to conceptualize IRs as social structures. I develop conceptual definitions for the key constructs in the model, namely Routinization, Reflexivity, IT Infusion, IT Enactment of Coordination, IT Enactment of Relationship Management, and IR agents' Sense-making. In the next sections, I review the structuration theory and its application in business research to set the stage for the conceptual development of the key constructs in this study. I then briefly review the existing IR literature in synthesis with the structuration theory and IT literature to derive conceptual definitions for the key constructs. I conclude Chapter Two with an overview of the conceptual framework and general flow of the relationships.

Theory of Structuration

With its roots in institutional theory (Scott 1995), the Theory of Structuration emphasizes the role of human actors and explains the production and reproduction of social structures as a result of recursive interactions between existing structures and recurrent human actions (Giddens 1984). It is important to note that the notion of social structure in the structuration theory differs from organizational structures and hierarchies. Social structures in the structuration theory refer to a system of "rules and resources, recursively implicated in the

reproduction of social systems (Giddens 1984, p.337)." The structural *rules* refer to appropriate procedures of social actions, such as organizational protocols of carrying out exchange activities. *Resources* refer to firms' command of tangible and intangibles means in interactions, such as interactional knowledge necessary to perform boundary spanning tasks.

Structuration is the process in which existing structures interact with recurrent human actions to restructure existing rules and resources and reproduce a revised set of structural rules and resources (Giddens 1984). According to the theory (Giddens 1984) routinized actions and reflexive IR agents are two necessary conditions that enable the process of structuration. In other words, social structures are results of recurring and standardized actions and structures from previous social interactions. Practices and actions are constantly affirmed, revised, and amended in the process of social interactions through an ongoing process of structuration (Giddens 1984). Subsequently new rules and resources are created as a result of previous actions and are applied to regulate future actions.

As such, social structures function to both enable and constrain IR agents' actions and interfirm interactions (Giddens 1984). This function occurs via three structures, structure of *signification*, structure of *legitimization*, and structure of *domination* (Giddens 1979). Structure of *signification* influences human actions by providing meanings of actions to individuals; structure of *legitimization* affirms the appropriateness of actions and by so doing prescribes normative behaviors; and structure of *domination* regulates behaviors by controlling against potential violations of existing rules and resources (Giddens 1979; Orlikowski 2000). In addition, the theory asserts that structures are instantiated by human actions and do not take material existence unless being regularly applied to function in social interactions (Giddens 1984).

Structuration Theory in Business

Structuration theory has been applied in studying a wide range of business phenomena ranging from information system research to organizational studies (see Poole and DeSanctis 2004 for a review). Particularly relevant to this research, structuration theory (Giddens 1984) has been widely referenced in studies of organizational change and work processes (e.g. Bachmann 2003; Barley 1986; Boudreau and Robey 2005; Feldman 2000, 2004; Yates 1997). Commonly cited include collaborative decision making (e.g. Evans and Brooks 2005), ethical decisions (Dillard and Yuthas 2002; Yuthas and Dillard 1999), and organizational routines (Feldman 2000; Howard-Grenville 2005). Particularly prevailing in organizational research is the examination of technology as one of the critical structural forces driving organizational work processes (e.g. DeSanctis and Poole 1994; Orlikowski 1992, 2000; Schultz and Orlikowski 2004). For instance, Evans and Brooks (2005) conduct a case study on how groupware systems shape organizational work processes in a pharmaceutical firm and report that technologies such as groupware systems remove obstacles of physical proximity in traditional interactions and hence facilitate collaborative practices.

A seminal work by Orlikowski (1992) develops a theoretical model of technology from a structurational perspective to examine the interactions between technology and organizational structures and consequential changes. Orlikowski (1992) sets the stage for a subsequent series of theoretical and qualitative research, mostly case studies and conceptual discussion, on structurational views of technology during the past two decades (Poole and DeSanctis 2004). The key notion duality of technology is proposed as that since technology is developed in a social-political process as a product of human actions and therefore is socially constructed, technology assumes both technological features and structural properties

embedded in the structures (Orlikowski 1992). It is pointed out that the effects of technology must be studied in conjunction with both technology artifact and structural properties of human actions simultaneously.

DeSanctis and Poole (1994) contribute to this stream of research by constructing an Adaptive Structuration Theory (AST) of technology to study organizational changes as a result of IT appropriation. The theory postulates that social structures as Orlikowski (1992) points out are embedded in technological structures, and actuated use of technology is therefore a process of human agents' appropriating suitable technological features to achieve desirable objectives (DeSanctis and Poole 1994). DeSanctis and Poole (1994) advance the structurational model of technology by explicating the process by which human agents exercise discretion in technology use in practice. It is asserted that technological features materialize only when human agents put it to use.

This notion of technology appropriation evolves into a dynamic view of emergent structures and the notion technology enactment in Orlikowski (2000). Orlikowski (2000) argues that organizational structures are not "embedded" in technology structures, but rather since human agents' engagement in technological features are temporally and contextually provisional, actuated use of technology in practice embodies an alignment between the enacted technological features and social structures (Orlikowski 2000). In other words, technology embodies social structures, and situated enactment of technology constitutes the underlying driving force of organizational change. This series of model development leads to several theoretically plausible frameworks and set the foundation for this stream of research (Poole and DeSanctis 2004).

Extension to Interfirm Relationship Research

Grounded in human actions, the theory of structuration (Giddens 1984) offers a novel and compelling theoretical framework to IR research. It facilitates a theoretically grounded conceptualization of IRs in terms of structural rules and resources and thereby expands the theoretical basis of IR research. In addition, a structurational perspective illuminates the largely under-explored effect of human agency in social interactions and its role in shaping IRs. It is intuitive that at the interface of any social interactions are human agents and their actions. In the context of business exchange relationships, IR agents explore and exploit suitable technological features to perform intended functions and tasks. It is inevitable that both decision makers' appropriation of technology at the early stage of technology deployment and IR agents' improvisation of actions during the on-going interactions play significant roles in molding relationships. The structuration theory (Giddens 1984) addresses how these social interactions are formed, routinized, and constrained by highlighting the imperative role human agency plays in creating structural rules and resources and in turn regulating future actions.

Interfirm Relationships

Despite the wide celebration of relationship marketing (Dwyer, Schurr, and Oh 1987) and relational exchange (Macneil 1980), the very basic notion of relationship has yet to be explicitly defined. In the extant IT-IR literature, it is at the best implicitly assumed that IRs are relational bonds, relational ties, and various types of associations that connect exchange partners. Perry, Cavaye, and Coote (2002, p. 76) refer to social bonds as "investments of time and energy that produce positive interpersonal relationships between the partners."

Rindfleisch and Moorman (2001) define relational tie strength in terms of trust, commitment, and knowledge redundancy. Relational theorists examine IRs in parallel with the exchange continuum (Macneil 1980) contrasting between arm's-length relationships and socially embedded relationships (Granovetter 1985; Uzzi 1997). Socially embedded relationships are often associated with more personal contacts, collaboration, and governance mechanisms that reply on goodwill, mutual expectations, and norms rather than formal contracts (Granovetter 1985; Uzzi 1997). While existing conceptualizations of IRs are extremely valuable and merit careful research, the theoretical basis for IRs is somewhat vague.

Conceptualizing Interfirm Relationships as Social Structures

Taking a structurational perspective, I propose that IRs are first and foremost relational structures consisting of rules and resources. They regulate individual actions and prescribe normative moves by providing meaning to actions of their own and those of others (signification), validating appropriate behaviors (legitimization), and controlling violations against organizational goals and values (domination) (Giddens 1979; Orlikowski 2000). In interfirm interactions, structural rules may be mutually assumed routines and procedures both firms abide by in exchange activities. Similarly resources may pertain to any interactional knowledge relevant to this customer firms and respective interactions.

The structuration theory identifies three forms of structures with which relational structures enable and constrain human actions (Giddens 1979; Scott 1995). I argue that IRs can be cast as structures because IRs can perform pertinent functions of the three structures. Structure of signification provides understanding and meaning of actions, which enables actors to interpret interactions and derive appropriate meanings for actions in future

interactions. By providing meaning to interaction and exchange activities, relational structures, i.e. IRs, provide meanings to exchange activities and facilitate understanding with customer firms and thereby influence the way people work together (Schultze and Orlikowski 2004). Structure of legitimization prescribes and validates behaviors that are appropriate and in alignment with organizational and relational goals and values (Orlikowski 2000). For instance, reciprocity as a structural feature would validate acts such as returning a favor in exchange activities. Structuration of legitimization prescribes normative behaviors that are deemed to be consistent with firms' relational goals and values. Trust and Commitment, for instance, provide guidelines for IR agents in dealing with exchange partners as well as re-affirm agents' behaviors that are consistent with goals characterized by trusting and committed relationships. Finally structure of domination regulates actions by ensuring agents that their behaviors are not in violation of relational goals and values (Giddens 1979; Orlikowski 2000).

In light of such I argue that through the three forms of structures, IRs function as rules and resources that enable IR agents to interpret, comprehend, and execute relational activities as well as constrain agents' actions and behaviors in interactions to be in line with values and goals of the firm and the particular relationship. IR agents draw upon existing relational rules and resources to understand exchange situations and make judgments on appropriateness of possible actions. As such I propose that indicators of favorable relationships such as trust, commitment, reciprocity, and stability among others (e.g. Johnson, Sohi, and Grewal 2004; Morgan and Hunt 1994; Rindfleisch and Moorman 2001) can be viewed as relational structures, i.e. rules and resources, that guide and regulate IR agents' behaviors in interfirm interactions.

Indeed, one of the key questions IR managers ask when making a decision as to how to behave in a relationship is "what should my firm do in situations like this?" Particularly in relational hardships, it is relational structures that impose meaning to actions, prescribe appropriate moves, and regulate behaviors to be in alignment with organizational and relational goals and values. Consequently, from a structurational perspective, a relational exchange occurs when IR agents draw upon relational structures that have strong propensity to prescribe favorable actions (e.g. commitment, reciprocity) and exhibit rule-following behaviors even when such moves may undermine its own immediate payoff. In contrast, transactional exchange occurs when judgment of actions, as a result of relational structures, emphasizes self-interest seeking and encourages according actions in interfirm interactions.

Curiously recent marketing literature has hinted an analogous view of relationships. Heide and Wathne (2006) denote relationships in terms of "a role of a friend" as opposed to "a role of a businessperson." It is argued that favorable relationships result when judgment of behaviors follows logic of a friend whereas strict exchange relationships occur with judgment in line with utility maximizing outcomes. I argue that denoting relationships in terms of "roles" coincides with the structurational view of IRs because it implicitly assumes that a system of rules and resources are embedded in the "role of a friend", which guides judgment of actions. The notion of playing a role suggests behavior compliance with the assumed rules of "being a friend."

Additionally, according to Giddens (1984), social structures are extracted from, and at the same time sustained in, recurrent interfirm interactions and are instantiated by the recurrent human actions and interactions (Schultze and Orlikowski 2004). Structural rules and resources have "no reality except when as they are instantiated in activity" (Whittington 1992,

p.696). IRs can be cast as relational structures because IRs do not ascribe a material existence until it is applied in recurrent exchange activities and reciprocal interfirm interactions. Favorable relationships are characterized by trust, commitment, and reciprocity, which are social capitals (Adler and Kwon 2002; Coleman 1988) that only materialize in exchange activities. That is, until certain rules (e.g. reciprocity, commitment) are applied in actions to assess the appropriateness of possible actions, the concept relationship does not take any form of substance.

From a structurational view, positive relationships constitute rules and resources that likely provide favorable meanings to actions and prescribe facilitating and collaborative behaviors in exchange interactions. With such structures in place, suppliers and buyers in exchange activities mutually assume and follow certain rules, procedures, and routines, as well as sharing knowledge and understandings of interactions and implications to guide future conducts. Relational structures may cover a collection of issues ranging from how suppliers learn about customers' particular needs, when and how customers should be contacted, exchange procedures, how purchase orders and customers' inventory may be efficiently managed, how products and services are delivered, to how quickly suppliers respond to customers' comments among others. These rules and resources constantly evolve as interactions unfold (Giddens 1984). Thus, relationships are formed through a recursive structuration process (Feldman 2000), and the rules and resources at any given point in time are both consequences of previous structuration process and sources for future structures. Taken together, I argue that IRs can be cast as a form of social structures and should be examined with a structurational framework. In the next section, I propose a conceptual

framework to examine how technology use and IR agents' cognitive Sense-making influences relational structures.

The structuration theory (Giddens 1984) indicates two necessary conditions for the structuration process to occur, *Routinization* of activities and *Reflexivity* of human agents. It assumes that IR agents are knowledgeable and have the ability to observe, accumulate, and interpret implicit and peripheral information from the physical and social context (i.e. Reflexivity) where interactions unfold. In addition, the theory also asserts that the formation of social structures necessitates highly routinized activities and practices (i.e. Routinization) as episodic and irregular practices do not constitute social structures (Giddens 1984; Orlikowski 2000). In the next section, I develop and discuss Reflexivity and Routinization in the process of structuration.

Reflexivity

One of the key assumptions and a unique theoretical contribution of the structuration theory (Giddens 1984) lie in its explicit acknowledgement of knowledgeable and reflexive human actors in social interactions. Knowledgeable agents have the ability to learn from everyday activities (Giddens 1984). For instance marketing agents can learn about customer firms' needs and preferences from regular exchange activities and recurrent dealings. I define *Reflexivity* as IR agents' ability to notice, selectively retain, and interpret implicit contextual cues. Because IR agents are knowledgeable and reflexive, they are able to pick up on nonverbal cues, interpret unstated information, and thereby infer meanings given the context. Highly reflexive agents have the ability to notice, accumulate, and interpret implicit and unstated cues from the physical and social context in which social interactions occur. Social

interactions are embedded in provisional temporal, spatial, and social context, and reflexive IR agents are able to gain knowledge and derive understanding of the situation by reflecting on unstated, implicit, contextual cues. Research suggests that agents' Reflexivity is a prerequisite condition for improvised learning (Boudreau and Robey 2005) and Sense-making (Weick, Sutcliffe, and Obstfeld 2005). It is important to note that Reflexivity differs from IR agents' cognitive Sense-making. Reflexivity pertains to interpretation of implicit and peripheral information in one specific episodic occasion whereas Sense-making entails systematically organizing, labeling, and interpreting behavior patterns extracted from routines and cognitively translate results into actionable knowledge to regulate future actions.

Routinization

Routines are "repeated patterns of behavior that are bound by rules and customs and that do not change very much from one iteration to another (Feldman 2000, p.611)." *Routinization* refers to the repetitiveness and regularity of interfirm activities that recur in a similar and consistent pattern. As interfirm practices and activities are repeated regularly, patterns emerge (Feldman 2000). As further interactions unfold, recurring activities are standardized, routinized, and eventually institutionalized. When practices and activities are routinized, standardized, and eventually institutionalized, they are set to be the way things are, and alternatives are out of the question (Weick, Sutcliffe, and Obstfeld 2005). The institutionalized practices then serve as rules and resources, i.e. social structures, to signify, prescribe, and control for future consequential actions (Giddens 1984). Highly routinized activities are often characterized by stability (Feldman 2000), which facilitates the extraction of patterns and institutionalization of practices. For instance when interfirm exchange

activities follow the same procedures overtime, they become standardized protocols that both partner firms mutually understand, expect, and follow in completing the exchange tasks. As such the procedures are institutionalized as relational structures, which both guide and limit individual agents' choice of actions in conducting future exchange activities. In interfirm relations, routinized interactions reduce task uncertainty and facilitate mutual understanding and confidence.

Literature suggests that routinized activities are stable yet possess the quality of change (Feldman 2000), which enables the process of structuration. While actors are socialized to follow the institutionalized protocols, IR agents, as knowledgeable and reflexive individuals, have the flexibility to choose from a repertoire of possible actions. They exercise judgment in interpreting how the underlying "rules" are best associated with certain actions. As situations vary, IR agents adjust their understanding of the appropriateness of an array of actions as new information comes available. Consequently reflexive IR agents notice and selectively retain variations from routinized interfirm interactions, make sense of the deviations, make incremental changes (Feldman 2004), and thereby enable and facilitate the structuration process.

Information Technology

In previous studies, information technology has been operationalized in terms of the scope and frequency of IT systems (e.g. Coulter and Ligas 2003), firms' monetary investment in technology (e.g. Stump and Sriram 1997, and technological complexity of IT applications and infrastructures including hardware, software, telecommunications, and IT personnel skills (e.g. Mittal and Nault 2004), as well as technology integration and embeddedness (Chen and

Ching 2004). Literature suggests that the effects of IT on IRs are rooted in the fact that use of technology facilitates sophisticated information management (Bordia 1997; Jayachandran et al. 2005; Poole and DeSanctis 2004). Because IT enables easy and efficient flow of information especially among geographically scattered trading partners (Ganesan, Malter, and Rindfleisch 2005), use of technology enhances efficient information processing (Jayachandran et al. 2005) with superior economies of scale and scope (Peters 1997). As a result, IT use reduces total transaction costs (Leek, Turnbull, and Naudé 2003; Malone, Yates, and Benjamin 1987). Thus, firms can offer superior value propositions (Boyd and Spekman 2004; Subramani 2004; Ulaga and Eggert 2006), and IT thereby facilitates favorable relationships (e.g. Perry, Cavaye, and Coote 2003; Ryssel, Ritter, and Gemünden 2004). For instance firms may use IT to link forward in the value chain to connect its operations with those of customers, which reduces customers' acquisition costs and creates a disincentive for customers to seek alternative suppliers (Dewett and Jones 2001; Fulk and DeSanctis 1995). Myhr and Spekman (2005) study impact of electronically mediated exchange in the context of supply chain of subsidiaries of multinational corporations and report enhanced collaboration in electronically mediated exchange relationships.

Conversely detrimental effects of IT (Ryssel, Ritter, and Gemünden 2004; Stump and Sriram 1997) often pertain to the effectiveness, as opposed to efficiency, of communication (Bordia 1997). It is argued that IT-mediated communication removes physical, spatial, and temporal cues from interactions (Leek, Turnbull, and Naudé 2003) and disrupts the time-space veracity of social interactions (Bordia 1997). As such IT constrains IR agents' capacity to observe and interpret tacit and practical knowledge (Giddens 1984) and therefore impedes improvised learning (Schultze and Orlikowski 2004). As a consequence, ambiguity results,

and relational bonding is hindered. For instance DeSanctis and Monge (1999) observe that heavy reliance on IT for interfirm communication leads to increased alienation among employees. Jap (2003) also report that suppliers perceive internet-mediated reverse auction to be detrimental to building customer relationships.

IT Infusion

Conceptual definitions of IT in the extant literature vary greatly (Melville, Kraemer, and Gurbaxani 2004; Tippins and Sohi 2003). Previous studies have developed a number of divergent conceptualizations of IT, addressing both the physical form of technology and use of IT as a strategic choice (e.g. IT competency in Tippins and Sohi 2003). While the structurational perspective emphasizes technological structures, it does not deny the importance of technological artifact and acknowledges the role technological features play in interfirm activities (Orlikowski 1992). Accordingly I examine the physical properties of technology in terms of *IT Infusion*.

This dissertation focuses on the enterprise-wide technology use and study commonly shared characteristics of IT instead of a particular IT application. While previous IT studies typically examine the effects of IT based on the deployment of one specific IT application (e.g. CRM or EDI), I believe that such approach suffers from limited practical implications (Tippins and Sohi 2003). Because of the fast pace in technology advancement and wide availability of most IT innovations in today's marketplace, advantages based on specific IT systems are rather temporary (Dos Santos and Peffer 1995) and erode quickly as rival firms easily gain access to it (Carr 2003). Consequently strategic value derived from specific IT applications diminishes because new IT innovation quickly obsoletes previous ones (Tippins

and Sohi 2003). In light of this, I argue that conclusions drawn from studying one particular IT innovation are neither generalizable to other systems nor sustainable over time. Therefore studying any given IT innovation makes little practical sense (Huber 1990). To avoid the narrow focus, I define IT in a general and encompassing term that consists of technological hardware, software, and personnel skills.

I define *IT Infusion* as the extent to which state-of-the-art technology is extensively implemented and integrated in various aspects of interfirm interactions (Chang and Lung 2002). Deriving from the definition, IT Infusion entails three key components, technological sophistication, magnitude or intensity of technology use, and the scope of technology use in various activities of interfirm interactions (Chang and Lung 2002). Accordingly I conceptualize IT Infusion in terms of the three components, *IT Artifact*, *IT Intensity*, and *IT Embeddedness*.

Early IT research has conceptualized IT as a useful tool to process information, engineer work processes, and generate business values, particularly in terms of enhanced productivity (Melville, Kraemer, and Gurbaxani 2004, Tippins and Sohi 2003). Accordingly IT was viewed as objects, a bundle of technological artifact, and a compilation of hardware, software, and personnel's technological skills (Ryssel, Ritter, and Gemünden 2004; Stump and Sriram 1997). IT has been measured in terms IT expenditure, counts of systems, and technological complexity (Dewett and Jones 2001). Tippins and Sohi (2003) refer to this aspect of IT as IT object, and Orlikowski (2000) terms it technology artifact. Accordingly I define *IT Artifact* as the degree of technological superiority of a firm's IT infrastructure, the extent to which IT hardware, software, and personnel skills approach state-of-the-arts level (Ryssel, Ritter, and Gemünden 2004; Tippins and Sohi 2003). From a structurational

perspective, technological superiority implies the level of restrictiveness of the technology structures. More advanced technologies tend to have fewer constraints imposed by design because state-of-the-arts technologies often allow multiple and relatively flexible applications in practice (DeSanctis and Poole 1994).

IT Intensity refers to the relative pervasiveness of technology use in interfirm interactions, benchmarking respective industry average. Intense deployment of IT implies that the firm has a relatively strong inclination toward using IT-enabled business interactions than industry average (Zmud and Apple 1992). It is benchmarked against corresponding industry average to control for differing points of reference of different industries. Perceived magnitude of technology use in interfirm interactions entails the amount and scale of technology use.

IT Embeddedness refers to the degree IT is integrated into all aspects of interfirm activities. Since most IT applications are widely available in the marketplace (Powell and Dent-Micallef 1997), IT alone cannot be a source of sustainable competitive advantage (Kim, Cavusgil, and Calantone 2006). One way to make IT unique and imperfectly mobile (Barney 1991) is to integrate technology use into existing business processes, align suitable technological features with appropriate structures and strategies, and construct an integrated system with an array of interlocked elements (Olson, Slater, and Hult 2005). Stump and Sriram (1997) find that assimilated IT use in transaction processes facilitates the development of closer relationships. From a structurational perspective, only when IT use becomes assimilated in all aspects of marketing and exchange interactions, can rules and resources function to regulate behaviors and affect IRs. The level of IT Embeddedness also indicates the degree of constraint on IR agents' enactment of technology. The more embedded technology

is in all aspects of interactions, the more flexible the technology is, and hence the more potential for IR agents' enactment.

Human Agency and Information Technology in Interfirm Relationships

While the presence of technology is important and merit careful research, current technology research suffers from a narrow focus that emphasizes one aspect of technology use at the expense of another. Orlikowski (1992) states that neither the technological perspective (e.g. IT investment) nor the strategic choice perspective (e.g. IT capability, IT competency) portrays a complete picture of technology use. This issue is particularly problematic in studying a socially complex and affect-laden phenomenon such as IRs. Recent IR research has shed light on the human aspect of technology (e.g. Schultze and Orlikowski 2004). A structurational perspective views technology use as an emergent process of technology enactment (Orlikowski 2000). I incorporate both human agency and technology component and develop the notion *IT Enactment*.

Human agency plays a significant role in the structuration process (Boudreau and Robey 2005; DeSanctis and Poole 1994; Orlikowski 1992, 2000) as human agents are relatively free to enact structural features (Orlikowski 2000). Recent business studies have shown rising interests in human agency, especially in studies of organizational change (Feldman 2000, 2004) and technologies (e.g. Boudreau and Robey 2005; Orlikowski 2000; Schultze and Orlikowski 2004). IR agents exploit, modify, and assimilate the technological components to incorporate structural features into designated work processes for business objectives, a process referred to as appropriation (DeSanctis and Poole 1994) or actors' enactment of technology (Orlikowski 2000).

Technology Enactment

Since technology is tightly coupled with the choices technology users make, the effect of IT cannot be detached from corresponding structural, organizational, and strategic contexts in which IT operates (Daft and Lengal 1986; Devaraj and Kohli 2003; Tyre and Orlikowski 1993). Because IR agents exercise considerable discretion in their use of technology, actuated use of technology involves careful evaluation of technological features and reflects a perceived alignment among technological structures, relational structures, and existing organizational structures (Poole and DeSanctis 2004). Therefore technology enactment mirrors the effects of human agency in the sense that the actuation of technology in practice is a result of IR agents' assessment and discretion (Orlikowski 2000).

I examine IT use in terms of technology in practice for the following reasons. First, while previous studies have focused on technology potentials such as firm capabilities, IT capacity, and IT competency (e.g. Saini and Johnson 2005; Tippins and Sohi 2003), a practice perspective examines the *use* of technology, i.e. what IR agents actually do with technology as opposed to what they *can* do (Orlikowski 2000). It has become increasingly clear that it is what people actually do with IT, rather than the mere presence of technological artifact, that shapes interactions (DeSanctis and Poole 1994). Through a practice lens, technology use realizes firms' potentials (i.e. capabilities) and therefore is both theoretically advantageous (Orlikowski 2000) and managerially relevant. Second, because engagement of IT is temporally and contextually provisional within a time frame (Boudreau and Robey 2005), a practice view allows IT to be examined in the context of everyday situated interaction activities. Third, since structures only exist through recurrent human actions, it is only when technological features are repeatedly drawn on in practice, IT becomes a source of "rules and

structures" that shape social actions (Orlikowski 2000). Fourth, literature suggests that the process of appropriation may be best captured by isolating a particular enactment on IT within a specific context (e.g. task) and at a specific point in time (DeSanctis and Poole 1994). Technology in practice offers a means to capture the materialization of technology appropriation. Moreover, because firms choose to use IT to enhance the effectiveness of its existing work process (Huber 1990), the fact a firm enacts on IT for certain purposes bears rich information critical to a structurational study of IT. Lastly some structural features of technology may be readily available but never enacted on, and studying IT by its properties and attributes available in the package may be misleading. Studying actuated technology in practice yields more managerially meaningful results because acquiring firms do not always deploy technology as intended (Orlikowski 2000).

Assuming people are "purposive, knowledgeable, adaptive" beings (Orlikowski 2000 p.423) who engage in IT use to accomplish intended business objectives, I conceptualize the notion *IT Enactment* to investigate technology use in recurrent situation practices. I define IT Enactment as the degree to which a firm chooses to actuate IT in interfirm functions. Because the social structure of organizations is embedded in technological structures, it is implied that underlying each set of features is a general intent, value, or goal (DeSanctis and Poole 1994). In other words, technological features are laden with values, intents, or goals in line with organizational structures. Enactment of technology mirrors the degree to which social structure of an organization is aligned with structural feature embedded in technology. As a result, deployment of technology is believed to be indicative of a particular set of values, intents, goals, or styles being promoted. DeSanctis and Poole (1994) term it as "Spirit" of technology.

As social structure, the 'spirit' of technology influences other structure by signification, legitimization, and domination. "Spirit" of technology represents and delivers a sense of value corresponding to the social structure a firm enacts. Some commonly cited ones include organizational emphasis on efficiency and purpose of decision-making or conflict resolution among others (DeSanctis and Poole 1994). Promotion of a certain value often encourages certain style of social interactions (DeSanctis and Poole 1994). I will examine IT Enactment from coordination and relationship management functions and present hypotheses on basis of the "spirit" argument in Chapter Three.

IT can influence interfirm activities in generally three ways, communication, transaction, and collaboration. While communication and transaction both focus on transmission of information, collaboration highlights IT use on strategic decisions and substantial management of relationships. IT facilitates inter-organizational activities at two levels, by lubricating efficient and accurate transmission of data, and by managing coordination problems (Kraut, Steinfield, Chan, Butler, and Hoag 1999). Particularly relationship management functions require greater involvement of human agents. I develop notions of *IT Enactment of Coordination* and *IT Enactment of Relationship Management.*

I define *IT Enactment of Coordination* as the extent to which IT is used in facilitating planning, scheduling, and simple exchange of information (Kraut et al. 1999). In this arena, technology functions as a mere means of information transmission, as opposed to substantial relational management tasks. In the latter, IT functions as a main communication channel through which strategic management of interfirm exchange and relationship management activities occur (e.g. contacting customers, learning preferences, resolve disagreement etc.). I define *IT Enactment of Relationship Management* as the extent to which technology is

implemented to perform substantial relationship management functions including customer identification and disagreement resolution among others. For firms that use pervasive IT to manage relationships, communication effectiveness is difficult to achieve when IT is used extensively in solve cognitively demanding tasks and consensus focused goals. IT-mediated communication tends to facilitate divergent thinking tasks (DeSanctis and Monge 1999) rather than consensus. Exchange involving information elicitation and sharing may be more suitable in a virtual mode than those involving consensus formation or relationship management.

Sense-Making

Taking in provisional information and peripheral cues during interfirm interactions, knowledgeable and reflexive IR agents are constantly faced with a collection of cues that instigate Sense-making. Sense-making allows IR agents to organize and interpret such chaotic information and translate resulting patterns into actionable knowledge. Sense-making is an ongoing process where people organize and process random observations to extract patterns and impose meanings to and rationalize actions of their own and others (Weick, Sutcliffe, and Obstfeld 2005).

An analogous concept in the marketing literature is absorptive capacity (Cohen and Levinthal 1990). The central components of absorptive capacity include ability to build upon previous experience, ability to assimilate information, and finally ability to re-apply the knowledge to action situation (Cohen and Levinthal 1990). Drawing upon the absorptive capacity (Cohen and Levinthal 1990), I define *Sense-making* as IR agents' cognitive ability to exact cues from past experiences (Weick, Sutcliffe, and Obstfeld 2005) to make sense of interactional knowledge (Johnson, Sohi, and Grewal 2004) and most importantly translate it

into actionable knowledge and sensible and appropriate responses to guide actions. Johnson, Sohi, and Grewal (2004 p.23) define interactional knowledge store as "knowledge about issues related to interactions in partner relationships," and point out that accumulation of relevant knowledge stores of interactions, function, and market environment facilitate relationship building.

Sense-making is the very process that brings the extracted contextual cues and actions into material existence. Relational structures, being results of agents' cognitive interpretation of previous actions and events, emerge through Sense-making (Weick, Sutcliffe, and Obstfeld 2005). Sense-making facilitates human agents' effort to enact on resulting senses and act accordingly in attempt to make future actions more orderly with desirable outcomes. Sense-making elicits IR agents' comprehension and interpretation of the circumstances and extracted cues and actions in interfirm interactions and serves as a springboard to formulate appropriate actions and behaviors in the future. Sense-making allows IR agents to cognitively interpret recurring actions within the context and utilize resulting knowledge to revise existing meanings and structures (Weick, Sutcliffe, and Obstfeld 2005). IR agents draw from the past by retrospectively asking the question "what did that mean?" and formulate future actions by prospectively asking the question "what does that mean to our future actions?" The literature suggests that an important component of Sense-making is to ask the future-oriented question "what should I do with this information next?"

Sense-making is an attempt to deal with and hopefully reduce uncertainty (Weick, Sutcliffe, and Obstfeld 2005). Sense-making typically occurs around deviations from and variations of normative actions and events (Weick, Sutcliffe, and Obstfeld 2005). During routine activities, any interruption from the expected norm tends to catch agents' attention and

calls for interpretation in order to place such deviation in order with the rest of the organizational structures. Resulting "meanings" of the interruption serve as an amendment to the existing structures that agents already acquired and help formulate appropriate actions in the future. Therefore to make sense of interactions is to discover and predict future appropriate responses in the future with a series of approximations (Weick, Sutcliffe, and Obstfeld 2005). Such Sense-making can be investigated however in terms of prospective stage of the process, that is, firms' knowledge (sense) of appropriate responses in interfirm interactions.

Building on the aforementioned conceptual background and theoretical foundation of the key concepts, I propose a conceptual model in the next Chapter to explain how IRs as relational structures may be influenced by human agency at technology deployment stage as well as during on-going interactions and technology in practice. The model highlights the role of human agents in enacting technological features and cognitively interpreting interactional knowledge, and how shapes consequential relational structures. In Chapter Three, I review the dependent variable Relationship Quality in the existing literature and then present a structurational view of Relationship Quality. I then propose the conceptual model and the general flow of relationships, and a section of hypothesis development follows.

CHAPTER THREE

THEORETICAL FRAMEWORK AND HYPOTHESES

Because human agency is an essential element in any interfirm interactions, I have argued that it is imperative to incorporate human actors and their actions in examining interfirm relations. Indeed recent proliferation of technology in business relationship management (Schultze and Orlikowski 2004) calls for particular attention to the role agents play in shaping IRs. From a structurational perspective, I cast IRs as structural features that are instantiated by the daily activities and corresponding recurrent human actions. I place IRs within the structurational framework and argue that understanding interfirm relationships demands an understanding of how IR agents and their enactment of technology produce relational structures. In this dissertation, I study IRs as a result of IR agents' technology enactment and cognitive Sense-making. I draw on the existing IR literature and conceptualize Relationship Quality as a multi-dimensional construct consisting of Trust, Commitment, and relationship Stability (Johnson, Sohi, and Grewal 2004).

In general I expect that greater IT Infusion will facilitate greater level of IT Enactment. Heavy use of IT for coordination purposes is expected to result in a S-shape curve in that use IT for coordination improved Relationship Quality to a certain point before the effect levels off and eventually declines. In contrast I expect that heavy reliance on IT for relationship management may result in less favorable Relationship Quality. Agents' Reflexivity is expected to facilitate Sense-making, and so is greater Routinization of interactions. Moreover Sense-making is expected to improve Relationship Quality. Furthermore, I expect that greater Sense-making will alleviates the negative relationship

between IT Enactment of Relationship Management and Relationship Quality. Figure 1 provides a conceptual depiction the model.

Relationship Quality

I use Relationship Quality as the final dependent variable for the following two reasons. First, Relationship Quality is a global construct that offers an overall assessment of relationship strength (Kumar, Scheer, and Steenkamp 1995). Positive Relationship Quality is strategically important and desirable in B2B markets (Johnson, Sohi, and Grewal 2004). Marketing literature has long realized the theoretical and strategic importance of Relationship Quality in relationship marketing (Crosby, Evans, and Cowles 1990; Johnson, Sohi, and Grewal 2004; Kumar, Scheer, and Steenkamp 1995). For example Palmatier and colleagues (2006) point out that Relationship Quality is one of the key relational mediators for effectiveness of relationship marketing. In addition because Relationship Quality has been one of the key variables in the existing literature, examining Relationship Quality from a structurational perspective offers meaningful points of comparison by which the structurational view of IRs may be evaluated and contrasted with researching findings from alternative theoretical frameworks.

Although marketing literature has defined Relationship Quality in terms of several different yet related constructs (Crosby, Evans, and Cowles 1990; Dwyer and Oh 1987; Kumar, Scheer, and Steenkamp 1995), it is commonly agreed that Relationship Quality is a multi-dimensional construct that anchors on trust and commitment (e.g. Dwyer, Schurr, and Oh 1987; Hibbard, Kumar, and Stern 2001; Johnson, Sohi, and Grewal 2004; Kumar, Scheer, and Steenkamp 1995). Commitment refers to “an enduring desire to maintain a valued

relationship" (Moorman, Zaltman, and Deshpande 1992, p. 316). Trust is a "confidence in an exchange partner's reliability and integrity" (Morgan and Hunt 1994, p. 23).

Also commonly studied in IR literature are *Relationship Stability* (e.g. Johnson, Sohi, and Grewal 2004; Kumar, Scheer, and Steenkamp 1995) and relationship satisfaction (e.g. Palmatier et al. 2006). Relationship Stability pertains to the outlook of IRs, particularly expected continuity of the relationships in the future (Johnson, Sohi, and Grewal 2004). Relationship Stability addresses the converse of relationship disengagement (Kumar, Scheer, and Steenkamp 1995), which is a key component in relationship development (Dwyer, Schurr, and Oh 1987). Relationship satisfaction is an overall affective and emotional statement regarding IRs (Palmatier et al. 2006). Accordingly I conceptualize *Relationship Quality* as a multi-dimensional construct encompassing Trust, Commitment, and Relationship Stability (Johnson, Sohi, and Grewal 2004; Kumar, Scheer, and Steenkamp 1995). Following Johnson, Sohi, and Grewal (2004), I operationalize *Relationship Quality* as a second order construct with the three dimensions. Good Relationship Quality manifests as greater trust, stronger commitment, and more stability and security for future interactions.

Viewing IRs from a structurational perspective, I argue that Relationship Quality within the structuration framework may be viewed as the extent to which specific structural features are enacted to function as guidelines and control mechanism in prescribing and regulating normative behaviors. The existing IR literature suggests that no single relational dimension can assess the full scope and depth of relationship (Kumar, Scheer, and Steenkamp 1995). I suggest that the multi-dimensionality of Relationship Quality reflects distinct yet related structural features that are embedded in IRs. The multiple dimensions of Relationship Quality mirror the multiple structural features of IRs. Among the important ones, Trust,

Commitment, and Relationship Stability are the most prominent features that IR agents often enact in practice to derive meaning of interfirm activities, validate normative behaviors, and re-affirm the appropriateness of possible actions given organizational and relational values and goals.

I argue that better Relationship Quality reflects the extent to which highly valued relational properties and positive structural features of the relational interaction system are developed in the structuration process. Schultze and Orlikowski (2004) suggest that Relationship Quality involves assumptions, expectations, protocols of interactions, and governance structures among others. In light of this, trust can be viewed as a form of expectation in terms of partners' honesty, reliability, and concern for partners' welfare (Johnson, Sohi, and Grewal 2004). Developed and accrued from previous interactions, IR agents' confident belief reflects its cognitive interpretation of its interactional knowledge regarding any issues relevant to its customers and previous interactions. From this perspective, trust can be viewed as a result of distributed and institutionalized knowledge, i.e. structural resources, regarding partner firms' honesty, reliability, and benevolent intention. Similarly a structurational view may view commitment and stability as institutionalized values and goals respectively that provide meanings to the daily interactions and guide IR agents' judgment of normative actions and behaviors for future interactions. Together these structural features function as behavioral guidelines that enable and validate IR agents' decisions on appropriate actions and at the same time constrain against behaviors deviant from the norm. In the next section, I consider the effects of important antecedents that enable the process of structuration, namely Routinization and Reflexivity.

Conditions of Structuration

Routinization: Routines are characterized by regularity and repetition of certain actions and practices in interfirm interactions. In the course of production and reproduction of social structures Routinization is a crucial condition for structuration processes to occur (Giddens 1984). Patterns emerge as recurring organizational practices or activities take place following the same procedures (Feldman 2000). Routinized practices tend to reinforce the idea that because such practices have been repeatedly carried out in previous interactions and retained, they must be at least to some extent appropriate and successful in executing similar sort of tasks. Social structures result as such routines and patterns are repeated, standardized, and eventually institutionalized. Highly routinized interactions are relatively simple, regular, and repetitive, generally associated with highly standardized work processes (Mintzberg 1979). In routinized work processes, uncertainties are minimized to ensure smooth and effective progress without interruption, and decision-making tends to follow the formal chain of authority (Feldman 2000). Therefore routines typically involve little novelty, demand less improvisation, and lead to stability over time (Howard-Grenville 2005).

Sense-making involves retrospection and rationalization (Weick, Sutcliffe, and Obstfeld 2005) of actions and interactions in IR research. In interfirm relations, Routinization enables actors to find patterns of appropriate behaviors, which are eventually standardized with Routinization of the actions and as a result institutionalized to become standard procedures and protocols of interactions. Routinized interactions formulate and reinforce patterns of interactions and offer a sense of consistency (Giddens 1984; Dewett and Jones 2001) with which patterns can be easily identified. Therefore highly routinized interfirm activities make it easy for partners to define patterns of interactions and derive meanings and

understanding of actions of their own and partners. As a result of the consistency in routinized activities, IR agents feel more confident to rely on the structures of signification and reapply resulting knowledge to similarly situations in the future. Routinization allows IR agents to share the structural understandings of behavioral norms. It reinforces IR agents' cognitive Sense-making by developing a working understanding of appropriate behaviors in similar situations.

> *H_{1a}: Greater the Routinization of interaction activities between partner firms, greater will be the extent of Sense-making.*

Reflexivity: Reflexivity pertains to IR agents' ability to collect and interpret implicit and peripheral cues from the physical and social environment where interactions occur. According to the Structuration Theory (Giddens 1984), IR agents are constrained by existing rules and resources (being results from previous actions) in making choices from a pool of possible actions. However a working understanding of appropriate behavioral norms does not deterministically dictate IR agents' actions in all interactions (Orlikowski 2000). IR agents are free to improvise and make choices to the extent that IR agents exercise discretion in deciding appropriate actions and behaviors given deviations from the structural "rules". This improvisational act is especially important when IR agents are challenged with unprecedented situations (Weick, Sutcliffe, and Obstfeld 2005). Since all interfirm interactions take place in temporally and spatially provisional contexts, IR agents always need to draw on existing structural features relevant to the social system to impose meanings on partner firms' actions, make sense of emergent actions, and predict future actions.

A highly reflexive IR agent is sensitive to contextual information such as temporal, spatial, or environmental cues that are inherently embedded in social interactions. As social

structures demarcate boundaries of appropriate actions, Reflexivity affords agents opportunities to ensure appropriate and suitable actions with the help of collecting and interpreting these cues. Greater Reflexivity allows IR agents to gather rich contextual information that are often neglected or ignored. The more reflexive and sensitive agents are to peripheral information that is embedded in the environment and context in which interactions and interfirm activities occur, the richer interactional information (Johnson, Sohi, and Grewal 2004) is likely to accumulate. Therefore Reflexivity enables IR agents to notice and collect context cues and thereby provides the basic collection of events from which IR agents derive meaning and develop interpretations. Thus greater Reflexivity of IR agents enables accumulation of implicit and peripheral cues and as a result facilitates the cognitive development and interpretation of comprehensive and shared understandings.

H_{1b}. The more Reflexivity characterizes IR, the greater will be the extent of Sense-making.

I now turn to technology and consider the effects of IT Infusion on agents' technology enactment. In the next section I develop hypotheses regarding IT Infusion on technology enactment.

Effects of IT Infusion

IT Infusion refers to the scale and scope of technology use in interfirm interactions as well as the technological sophistication of firms' IT infrastructures. While the structurational perspective emphasizes the enactment effect of human agency, it does not deny the importance of physical properties of technology infrastructure (Orlikowski 2000). The Structuration Theory suggests that facilities, along with norms and interpretive schemes,

enable and mediate the enactment of structural properties (Giddens 1984). I examine the technological properties in terms of IT Infusion, which provides an overall assessment of the structural features of technology.

Literature has long recognized that technology entails more than a bundle of tangible hardware and software (Tippins and Sohi 2003). Beyond the mere presence of the physical form of technology, IT Infusion offers significant benefits to firms' operational efficiencies, response time, and flexibility. I examine IT Infusion in terms of IT Artifact, IT Intensity, and IT Embeddedness. The intensity of technology deployment indicates the pervasiveness in technology use, while the extent to which IT is embedded in various aspects of relational activities implies the integration and alignment of technology with the existing organizational work processes. In general I expect greater IT Infusion enables and facilitates agents' enactment of technology for both coordination and relationship management purposes. Below I consider the effects of each of these IT Infusion dimensions.

IT Artifact: IT Artifact pertains to the technological state-of-the-arts in hardware, software, and personnel skills. From a structurational perspective, technology entails a bundle of technological features that embody various organizational structures and procedures (DeSanctis and Poole 1994; Orlikowski 2000). IR agents exercise discretion in selectively enacting certain technological features. These choices of use may or may not be entirely in line with or consistent with the features and original purposes of the technology by design (Orlikowski 2000). For example, when people use Microsoft Excel to manage information, it is not always used as a simple spreadsheet as it was designed. Rather, IR agents may choose to enact alternative features such as a calculation tool or statistic analysis tool that are made

possible by the availability of the advanced technology features. More technologically advanced systems tend to be less restrictive (DeSanctis and Poole 1994) and offer greater possibilities for IR agents to selectively enact technological features that they deem suitable and appropriate to their existing working processes. Therefore more sophisticated IT Artifact (state-of-the-arts) is more flexible and versatile and thereby provides greater enactment opportunities and options in comparison with less advanced basic technologies. As such technologically superiority IT systems likely facilitate a wide range of possible applications in various interfirm activities.

Using technology for simple coordination purposes, e.g. managing schedules, typically requires less state-of-the-art technological features because the core function technology performs in coordinating simple tasks is straightforward exchange of information. While basic IT systems may have the capability for information transmission, more sophisticated technologies may execute such tasks more efficiently and effectively. For example instead of managing scheduling through emails, specialized scheduling tools such as Outlook Meeting scheduling allow users to synchronize individual calendars and automatically generate meeting schedules, invitations, and reminders without excessive efforts. More superior technology artifact offers flexibility and greater possibility of enactment for coordination purposes.

However, I argue that enactment of IT for simple coordination purposes declines as technological features become highly sophisticated and specialized. Because such highly sophisticated systems are typically developed to achieve more complex information management, using it for simple transmission of information may create a perception that the great potential of such technology is not full realized. As such IR agents may choose to use

more sophisticated technology to manage more cognitively demanding tasks such as relationship management. Therefore:

H_{2a}: The more state-of-the-art IT Artifact (i.e. hardware, software, and personnel skills), the greater level of IT Enactment of Ccoordination; this trend will level off and eventually decline beyond a certain level of technological sophistication.

Relationship management, on the other hand, engages a series of key relational activities that involve cognitively demanding tasks ranging from making initial contacts with customer to providing post-purchase service (Johnson, Sohi, and Grewal 2005; Kumar, Scheer, and Steenkamp 1995). As I discussed above, more sophisticated technologies are relatively less restrictive and therefore afford greater possibilities for IR agents to explore and exploit potential technological features suitable and effective for particular customer interactions. For instance, E-mail exchange may be used to make initial contacts with customers or manage disagreements but a video conferencing system is able to improve the communication effectiveness by adding the visual elements of information that tend to be lost in text-based messaging such as Email messages. Superior technologies are therefore more likely to be explored for features that IR agents can use for relationship management tasks.

H_{2b}: The more state-of-the-art IT Artifact (i.e. state-of-the-art hardware, software, and personnel skills), the greater level of IT Enactment of Relationship Management.

IT Intensity: IT Intensity is conceptualized as the extent to which technology is pervasively used in interfirm activities benchmarking respective industry average. Bensaou (1995) suggests that the scope of EDI use is positively associated with cooperative atmosphere. Sriram and Stump (1997) also report that IT involved transactions increase the closeness of

buyer-seller relationships in purchasing. I argue that the proposed relationship between IT Intensity and favorable relational outcomes can at least be partially attributed to agents' enactment of technology with specific purposes. The extent to which technology is deployed in interfirm activities indicates the potential and possibility of technology enactment. As the structurational view of technology suggests (DeSanctis and Poole 1994), the structural features of technology exist in human actions, that is, actual deployment of technology to perform certain tasks. Since IT Intensity provides the material possibility of technology enactment regardless of specific functions it performance, I hypothesize:

H_{3a}: The greater IT Intensity, the greater level of IT Enactment of Coordination.

H_{3b}: The greater IT Intensity, the greater level of IT Enactment of Relationship Management.

IT Embeddedness: While IT Intensity focuses on the magnitude and the scale of technology use in interfirm activities, IT Embeddedness addresses the scope to which technology is ingrained in various facets of interfirm activities. IT Embeddedness is conceptualized as the degree to which technology is integrated with relational activities and facilitates decision making. I argue that highly integrated technology in relational interactions indicates tight coupling between specific relationship work processes and technology, which in turn indicates technologies are placed and deployed with designated working functions, i.e. relationship management, by design. Therefore highly embedded technological features in interfirm activities are more likely to be enacted by human agents for relationship management as well as coordination. I hypothesize:

H_{4a}: The greater IT Embeddedness, the greater level of IT Enactment of Coordination.

H_{4b}: The greater IT Embeddedness, the greater level of IT Enactment of Relationship Management.

Emphasizing the role of human agency in interfirm interactions, this study proposes two key constructs, Sense-making and IT Enactment. In the next section, I discuss the effects of Sense-making on Relationship Quality and develop the hypotheses for both the direct relationship and the full mediation effects of Sense-making.

Sense-making and Relationship Quality

Marketing literature has long recognized the importance of Sense-making (e.g. Johnson, Sohi, and Grewal 2004). Organization studies suggest that structures are results of firms' interpretation of the subtle and relational cues as well as the formal structures (Weick, Sutcliffe, and Obstfeld 2005). Fundamental in relationship development are accumulation of interactional knowledge (Johnson, Sohi, and Grewal 2004). In particular, the three central components of absorptive capacity (Cohen and Levinthal 1990) speak to the interpretation of new information, integration with existing knowledge, and application of the resulting knowledge to guide future behaviors. While knowledgeable and reflexive managers are able to notice and accumulate implicit and contextual cues from daily interactions, Sense-making is the process where meanings materialize (Weick, Sutcliffe, and Obstfeld 2005). It is only through Sense-making that IR agents systematically organize, interpret, and integrate these cues with existing structural rules and resources and generate actionable knowledge. The accumulated information from the daily interactions are no more than scattered and random information pieces until IR agents process, label, and derive cognitive interpretations of the accumulated information to find common grounds among these independent events (Weick,

Sutcliffe, and Obstfeld 2005). Greater Sense-making in interfirm interactions allows IR agents to quickly codify chaotic information, explicitly articulate comprehension in words, translate isolated observations into concrete yet schematic themes, and thereby give meanings to actions across the board based on such common grounds.

Particularly important in IR development, Sense-making functions as structures of signification (Giddens 1984). By comprehending and articulating meanings of their own actions and those of partners, IR agents translate information into knowledge through their cognitive efforts (Weick, Sutcliffe, and Obstfeld 2005). Such knowledge acts as a cognitive guide to direct IR agents' behaviors in future interactions. A greater degree of Sense-making indicates a greater likelihood that IR agents can quickly and accurately process past experience in conjunction with currently emerging information to make educated decisions. Practices become structural rules and resources, and IR agents are able to draw on the ever emergent structures and apply the resulting knowledge to prescribe normatively appropriate responses (Weick, Sutcliffe, and Obstfeld 2005). As such IR agents rely on structures of signification to derive meanings and understandings of actions of their own and others (Giddens 1979; Scott 1995). Structures of signification provide cognitive guides with which IR agents judge the appropriateness of their behaviors and actions especially in novel situations that deviate from routines. To this extent, Sense-making signifies meanings to interactions and legitimates interactions by prescribing normative responses and behaviors. As a consequence, important structural features of relationships such as trust and commitment are put into use, and IR agents judge the appropriateness of their tentative actions accordingly.

This is in consistence with the argument that successful relationships are results of relevant knowledge stores that enable firms to build necessary routines to create and maintain

relationships in the marketplace (Johnson, Sohi, and Grewal 2004). According to Johnson, Sohi, and Grewal (2004), among the three types of knowledge stores, interactional knowledge stores process and manage knowledge relevant to interfirm interactions (Johnson, Sohi, and Grewal 2004). Such knowledge stores entail how trust, trust worthiness, and commitment are communicated and play a key role in building trust and commitment in a relationship.

H_{5a}: The greater the Sense-making, the better the Relationship Quality.

As I have argued above, Sense-making is the very process where meanings materialize. Highly reflexive agents may collect a vast amount of information from daily interactions, yet the information remains random and independent events that cannot be translated into actionable knowledge until cognitive Sense-making occurs. Similarly highly routinized practices mean nothing more than simple repetition of actions unless patterns of behaviors are extracted and meanings imposed through the cognitive Sense-making process. Therefore I argue that effects of Routinization and agents' Reflexivity are only materialized through agents' cognitive Sense-making. Therefore:

H_{5b}. The relationship between Routinization and Relationship Quality is fully mediated by Sense-making.

H_{5c}. The relationship between Reflexivity and Relationship Quality is fully mediated by Sense-making.

The other key construct in addressing the role of human agency in this study pertains to the extent to which IR agents implement technology to perform coordination and relationship management tasks. In the next section, I hypothesize two different effects of technology enactment of coordination and technology enactment of relationship management

on Relationship Quality. A full mediation effect is also proposed for the IT Infusion and Relationship Quality relationship.

Technology Enactment and Relationship Quality

Literature suggests that although they are very valuable in implementing value adding strategies, technical skills are typically either widely available (e.g. through hiring or consulting) (Ray, Muhanna, and Barney 2005) or highly mobile due to high personnel mobility (Mata, Fuerst, and Barney 1995). Therefore technical skills and abilities alike, even when heterogeneously distributed across firms, do not constitute a sufficient source for sustainable advantage and consequently do not explain variations of IT effects. I argue that the way IT Artifact is organized and actually deployed in an organization is a manifestation of actuated IT capabilities and competency given accessible technological properties. Therefore IR agents' enactment of technology, either for coordination purposes or relationship management purposes, mediates the technological properties and Relationship Quality.

Technology enactment is conceptualized as the situated and actual use of technology in practice for coordination and relationship management. Decisions of using IT to perform a particular function are results of conscious deliberation. It reflects IR agents' understanding of the structural features embedded in IT and its concurrence regarding the perceived appropriateness and suitability between IT and the social structure of its organization (DeSanctis and Poole 1994; Orlikowski 2000). Technology is comprised of technological artifact and technological structures, rules and resources by which technology is designed to function (DeSanctis and Poole 1994; Orlikowski 1992). Likewise, within the structure of an organization also exists a system of rules and resources, termed organizational structures,

which delineate how an organization prefers to operate. Because IT is developed through a social-political process, organization structures are to some extent incorporated into technology in the course of development. The resulting syndicated structure consists of two structural components: a) structural features such as rules, resources, and capabilities of technology and b) the general intent, values, and goals of using certain sets of features, termed "*spirit"* of technology (DeSanctis and Poole 1994; Poole and DeSanctis 2004). In other words, technological features are laden with organizational and relational values, intents, or goals inherent from corresponding organizational structures. Thus enactment on structures implies a compliance of structural features and the value orientation such structures embody (Poole and DeSanctis 2004; Orlikowski 2000).

It is therefore argued that IT Enactment mirrors the degree to which social structure of an organization is aligned with the structural feature embedded in technology (DeSanctis and Poole 1994). As a result, use of IT is indicative of firms' perceived alignment between technological structures and organizational values, intents, goals, and work processes. For instance, salespeople would only choose to use enterprise-wise data management systems to record and share client information if the organizational structure is set up so that such information sharing is rewarded. As structures, the "spirit" of technology influences other structures such as relationships by signification, legitimization, and domination. The "spirit" of technology represents, delivers, and promotes a sense of value corresponding to the very social structure agents choose to enact (DeSanctis and Poole 1994). As a result, promotion of a certain value often encourages certain style of social interactions (DeSanctis and Poole 1994). Below I consider the specific effects of the coordination and relationship management dimensions of IT Enactment.

Coordination: Based on the "spirit" of technology argument (DeSanctis and Poole 1994), an organization that uses pervasive IT in simple coordination embodies a heavy emphasis on efficiency (DeSanctis and Poole 1994). Quantity and timeliness of information transmission cumulatively emphasize organizational pursuit of efficiency (Malone and Crowston 1990). Kraut and colleagues (1999) found that the more firms use IT for coordination, the poorer the overall quality of the ordering process with suppliers. However customers are nonetheless satisfied with the primary supplier who delivered orders more efficiently and with fewer errors. Interfirm coordination helps channel members to coordinate activities with efficiency at lower acquisition and process cost (Kim, Cavusgil, and Calantone 2006). Information exchange by itself does not offer much benefit but contributes to channel capabilities such as responsiveness and coordination of partnership. The efficiency gains as a result of IT-enabled coordination signify and legitimate appropriate IT use as it concurs with relevant goals and values of the relationship and trading firms.

In addition, research also suggests that using IT in interfirm interactions fosters improved interfirm relations (e.g. Sriram and Stump 2004) because it enables efficient information flow and enhances communication quality. IT expands the temporal and spatial boundaries of interfirm communication that have historically constraint efficient flow of information (Bordia 1997). Improved communication quality in turn leads to enhance relationships (Mohr and Nevin 1990). Along the same line, it is also implied in the literature (Boudreau and Robey 2005; Schultze and Orlikowski 2004) that although technology-enabled coordination does not directly contribute to the development of Trust, Commitment, and Stability, it facilitates relationship development by freeing organizational resources. With technology taking over simple information management tasks such as scheduling and

coordination, organizational resources such as boundary spanning agents are free to pursue more relationally constructive tasks with customer firms. Therefore:

H_{6a}: The greater IT Enactment of Coordination, the higher Relationship Quality.

Relationship Management: While enactment of technology for relationship management also reflects IR agents' attempt to align technological structures with relational interaction processes, I argue that this perceived alignment may be overwhelmed by the rigidity technology imposes to the relationship management process (Schultze and Orlikowski 2004). Heavy use of technology for relationship management suggests that firms must institute policies, goals, and values to encourage IR agents to use technology as the media to management relationships. For instance, Schultze and Orlikowski (2004) report that boundary spanning agents are reluctant to shift to WebGA, an online quoting system, because the firm's incentive structures were not set up to reward or even comply with the procedures the WebGA system assumes. However in terms of using IT to manage relationships, I argue that the expected results may be tampered by impaired flexibility in work processes (Boudreau and Robey 2005), which can be a key to organizational outcomes (e.g. Moorman and Minor 1998).

As the structurational argument suggests, technological structures put constraints to what IR agents are able to modify the existing work processes and deviate from structurally prescribed actions and procedures (Giddens 1984; DeSanctis and Poole 1994; Schultze and Orlikowski 2004). Taking the WebGA for example, the online quoting system, once implemented, defines a work process with predetermined flow of procedures. Sales agents using this system are likely bounded by the predetermined work process and have little

flexibility in completing a quoting task without completing each step as the system requires. As such using WebGA system to a large extant denies agents alternative procedures. In general, when technology is heavily used in relationship management, corresponding work processes are to a large extent configured and as a consequence constraint by the structures the technological structures impose. As a result, modifications to work processes are discouraged, and relationship management is carried out largely by standardized procedures with impaired flexibility to improvise (Boudreau and Robey 2005). In relationship management, standardized "vanilla" customer treatment tends to alienate customers (Robey, Ross, Boudreau 2002) and result in less favorable Relationship Quality. Therefore from a structurational perspective, while the enactment of technology mirrors IR agents' attempt and perception of structural alignment, the rigidity of relationship management processes may result in more overwhelming negative effects on IRs overall.

In addition, IT-mediated communication is relatively less effective in obtaining "soft" information (Mintzberg 1975), "rich" information (Daft, Lengel, and Trevino 1987), or the "meaning" of information (Weick 1985). Along the same line, Sarbaugh-Thompson and Feldman (1998) suggest that use of electronic communication possibly has negative effects in terms of reduced casual conversation, which may lead to fewer opportunities to signal "trustworthiness" in social situations. These contentions suggest a deficiency of IT-mediated communication with respect to the depth of information exchanged. Kraut and colleagues (1999) suggest that EDI may be very effective for arranging routine orders for standardized products but not be as suited for supporting negotiation, resolving disagreements, or dealing with unusual situations that fall outside of standard procedures. Since effective communication is a pivotal antecedent to good Relationship Quality, I hypothesize:

H_{6b}: The greater IT Enactment of Relationship Management, the lower Relationship Quality.

Additionally on grounds of the very basic notion of technology enactment, I argue that the mere presence of technology does not have direct effect on Relationship Quality, and the impact of IT Infusion on Relationship Quality is fully mediated by IR agents' enactment of technology. Therefore:

H_{6c}: The relationship between IT Infusion and Relationship Quality is fully mediated by technology enactment.

Lastly, I expect that human agents' Sense-making has a moderating effect on the relationship between technology enactment and Relationship Quality. The next section details the hypothesis development.

The Moderating Effect of Sense-making

Sense-making is conceptualized as IR agents' ability to organize, interpret, and reapply resulting knowledge to guide future behaviors. I argue that Sense-making remains relevant throughout the entire process of structuration because interfirm relationships are not determined by one episodic event but are results of on-going activities and hence are emergent in nature. Therefore the appropriateness of any actions and behaviors is temporally and contextually provisional and may be different in subsequent interactions with different environmental and contextual conditions. Once technology has been deployed to use in interfirm interactions, it is the IR agents who are engaged in specific episodes of interfirm activities, draw on the existing structures, and derive meanings of applicable structures to understand the current situation. At the same time knowledgeable and reflexive IR agents

constantly collect and accumulate new information from the daily interactions and make sense of unique variations in each specific episode of interactions. By so doing agents are able to improvise inherent meanings of the structures to make decisions regarding the appropriate actions that align with the goals and values of organizational and relational structures. Therefore Sense-making is an on-going process where new rules and structures emerge as a sequence of interactions unfolds. While heavy use of IT in relationship management may generate some structural rigidity in work processes, firms with greater Sense-making may draw on its evolving knowledge from recurrent interactions and alleviate the negative impact through incremental changes and improvisation. I hypothesize:

H_7: Greater Sense-making alleviates the negative relationship between IT Enactment of Relationship Management and Relationship Quality.

In general I expect that technology enactment, influenced by IT Infusion, to lead to positive relationship structure, which manifests as positive Relationship Quality. Sense making, while enabled by Reflexivity and Routinization of activities, both leads to positive Relationship Quality and moderates the relationship between technology enactment and Relationship Quality. In the next chapter, I discuss the research design and data collection methods as well as measure development for the empirical study.

CHAPTER FOUR

RESEARCH DESIGN AND METHOD

Research Design

This dissertation studies IRs from a structurational perspective (Giddens 1984) and examines the effects of IT Enactment and agents' Sense-making on Relationship Quality. I adopt a commonly accepted research convention in marketing research (e.g. Cannon and Perreault 1999; Olson, Slater, and Hult 2005) and conduct an empirical study with a key informant based mail survey approach. Based on results from extensive field interviews, this study identifies marketing and IT managers to be appropriate key informants because they are involved in boundary spanning activities at the point of contact with customer firms (i.e. interface of interactions) as well as in decision making of technology deployment.

While this approach may potentially be vulnerable to common method bias, I argue that this approach is appropriate for a structurational view of IRs because the structuration theory particularly emphasizes the role of agents' cognition (i.e. IR agents' understanding and interpretation of interactions) (Giddens 1984). According to the theory (Giddens 1984), it is agents' somewhat subjective interpretation of social interactions that works together with the existing structural features to shape behaviors and future actions. Since the key question of this inquiry pertains to the crucial role of human agency in enacting technology and making sense of interactions, a key informant design is not only appropriate but also advantageous in addressing the research question.

To ensure high-quality data, I follow Huber and Power's (1985) guidelines for data collection using key informants. I combine qualitative research approach with a quantitative

cross-sectional study and follow rigorous marketing research procedures to qualify key informants, develop measures and instrument, and administer surveys. The following sections detail the research context, field studies and pre-testing, instrument and measure development, as well as data collection procedures for the main study.

Research Context

The research context for this study focuses on industrial service providers in North America. With the main research interests in interfirm relationships, human agency, and technology, this study demands a context with extensive relational contacts, heavy involvement of human agency, and widespread applications of technology. I study this research question with business service providers because research suggests that relational interactions are particularly critical and intense among industrial service trading partners (Meuter et al. 2005). Partly because of the simultaneous production and consumption of services in business markets, service-based exchange typically involves some level of interactions, which are the "moment of truth" in customer relationship development. Therefore not only are IRs relevant to business service providers, they are particularly important in service setting. Studying IRs with service providers in business markets is therefore both theoretically appropriate and managerially meaningful.

Furthermore because technology has such a profound impact on interfirm relations in the service arena (Bitner, Brown, and Meuter 2000), research findings from this dissertation, when completed, may be particularly relevant and meaningful in addressing IR development to business service providers. Because the focus of this study is interfirm relationships and interactions between partner firms, rather than individual organizations, are cast as the focal

social systems. As a result, the unit of analysis is individual relationships, where some transactions occurred recently.

Research Approach

This study combines qualitative research with a cross-sectional quantitative study. The qualitative portion of the project is designed to both set the stage for the theoretical framework development and testing and affirm the managerial relevance of the research question. With this in mind, the qualitative component of this research aims to achieve the following three objectives. First, qualitative research was conducted to verify and validate both the managerial relevance of the research question and the nomological net. Extensive field interviews with marketing and IT managers serve to verify the practical significance of the research question to managers as well as the validity of the theoretical framework. Results from the qualitative research help to affirm that the proposed conceptual model was appropriately defined with no important variables neglected.

Second, the qualitative portion of this study is to assist with instrument development. Qualitative interviews with managers provided assurance of appropriate conceptualization and operationalization the key constructs in this research. Individual items for the key constructs were discussed, developed, and refined as a result of the qualitative study. Finally, the qualitative part of this study was also used to pretest the instrument for the main study. The questionnaire was administered to several pretesting subjects, who were later debriefed after completion of the survey. Researchers then sought feedbacks and comments regarding both the contents and questionnaire design issues from the subjects. Notes were taken during the pretest and explored with the subject for elaborations and insights. Potentially confusing items

were revised and instructions clarified to improve the quality of the instrument as a result of the qualitative research. After a few iterations of refinement, the questionnaire was ready to be used in the cross-sectional data collection for the main study. Specific data collection procedures are detailed in the next sections,

Qualitative Data Collection Procedures

Field interviews were arranged with three managers who have extensive experience in both technology use and interfirm boundary spanning activities. Six individual appointments were made with the six managers prior to the interviews. Interviews were conducted on a personal face-to-face basis so that the researchers were able to observe first hand managers responses and explore for insights and elaborations whenever necessary. The interviews were semi-structured with a discussion guide to organize the questions but held sufficient open to explore comments and issues that were raised by these managers. The six interviews lasted approximately 45-60 minutes each. The discussion guide for the field interviews is presented in Appendix A. A general description of the interviews is presented in Appendix B.

The six in-depth interviews resulted in little conceptual modifications but a few revisions in instrument development. All six managers found the key constructs to be appropriate, relevant, and accurate based on their experience in practicing technology and managing interfirm relationships. Some issues were raised from the interviews regarding potentially ambiguous wording of several questions and measurement items. I discuss the specific questionnaire development in the next section.

Questionnaire Development

The survey instrument was developed with an extensive literature review complemented by multiple interviews with field managers, expert panel reviews, and an iterative process of pretesting and revising. At the qualitative research phase, the researchers particularly attended to the operationalization of the new constructs (i.e. Routinization, Reflexivity, and Sense-making). Because there was no existing measures available in the existing literature, I draw closely from the structuration theory, in which these new constructs were rooted. Items were derived from the conceptual definitions and elaborations from the structuration theory and discussed with managers for conceptual appropriateness and managerial relevance. Feedbacks and comments from qualitative interviews were compared with the conceptual definitions from the theory and incorporated to refined measures.

A few rounds of pretesting were carried out in person with industry executives. Subjects were extensively debriefed after completing the survey pretest, and wording of a few items was further refined as a result of the pretesting feedbacks. To further ensure the quality of the instrument, several academic experts were asked to review the questionnaire and provided comments regarding general presentation, instructions to respondents, arrangement and flow of items, response formats, and item content appropriateness and clarity of presentation. Some clarification and format adjustments were made as a result of this step. A few important changes resulted from the qualitative research stage, and several revisions were processed before a survey instrument was finalized.

In general the field interviews provided researchers with insights regarding firms' relationships with their customer firms, meanings of interactions, beliefs and attitudes towards trading partners, and perceived nature of their exchange relationships, among others.

Academic expert reviews further promise conceptual accuracy of constructs as well as attend to questionnaire design issues such as clarity of instructions, potential order effects, question clarity, and content appropriateness among others. A final version of the instrument is presented in Appendix B.

Measures

Some constructs have established measures in the extant literature. For those measures, I drew extensively on marketing, management, information systems, and communication literature for operationalizations. New constructs in this study include Reflexivity, Routinization, IT Enactment, and Sense-making. Measure development on these constructs began with a thorough review of these theories in which these constructs are rooted (e.g. DeSanctis and Poole 1994; Giddens 1979, 1984; Orlikowski 1992, 2000; Poole and DeSanctis 2004). Based on the definitions in the theories, I first derived observable manifestations underlying the constructs according to my understanding of the constructs. These initial items were then turned to three executives in interviews. Each concept was discussed in depth with each interview managers, and feedbacks and comments were sought in a format of brainstorming. Results were incorporated to refine the measures.

In the following sections I outline the measurement items for all the constructs included in the conceptual model. Appendix C presents the details of the measurement items and scales, and Appendix B presents the final version of the questionnaire.

Measurement of IT Infusion

The three dimensions of IT Infusion (e.g. Bitner, Brown, and Meuter 2000; Coulter and Ligas 2004; Melville, Kraemer, and Gurbaxani 2004) are measured as IT Artifact (e.g. Tippins and Sohi 2003), IT Intensity (e.g., Coulter and Ligas 2004), IT Embeddedness (e.g., Mittal and Nault 2004; Stump and Sriram 1997). In particular, IT Intensity consists of three questions including managers' self-assessment of IT use benching marking the industry average, preference of IT in business interactions, and the total percentage of business activities that involve some IT. Some example items are:

Approximately what percentage of your interaction with this customer (please circle one number)...

involves some form of IT (e.g., email, database, EDI, CRM, conference calls, computer automated ordering, internet etc.)?	*< 10%*	*10%*	*30%*	*50%*	*70%*	*90%*	*>90%*

To what extent do you disagree or agree with the following statements (please check the appropriate box).

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
In our relationship with this customer, we use IT more than average of our industry.	☐	☐	☐	☐	☐	☐	☐
IT-enabled interface is usually the preferred means of our interactions with this customer.	☐	☐	☐	☐	☐	☐	☐

IT Artifact concerns three questions inquiring how technologically advanced a firm's IT infrastructures, including technology hardware, software, and personnel skills.

Relative to an industry average, how sophisticated is the IT infrastructure you use with this customer (please check the appropriate box for each item)?

	Basic						State-of-the-Art
	1	2	3	4	5	6	7
Hardware	☐	☐	☐	☐	☐	☐	☐
Software	☐	☐	☐	☐	☐	☐	☐
IT personnel skills	☐	☐	☐	☐	☐	☐	☐

IT Embeddedness is measured with three items including the degree IT is integrated in daily interactions, the firm's reliance on IT to make important decisions, and finally an overall assessment of how much IT is embedded in interfirm activities.

Please indicate the extent you disagree or agree with the following statements by checking the appropriate box.

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
IT is largely integrated in our regular interactions with this customer.	☐	☐	☐	☐	☐	☐	☐
We rely on IT to make important decisions regarding this customer.	☐	☐	☐	☐	☐	☐	☐
IT is embedded in many aspects of our interactions with this customer.	☐	☐	☐	☐	☐	☐	☐

Measurement of Reflexivity

Reflexivity is conceptualized as the extent to which IR agents are able to notice and collect implicit contextual cues in the course of interactions. Since there was no existing measure in the existing literature for Reflexivity, a new scale is constructed to reflect human agents' ability to be aware and collect implicit contextual cues. The conceptual definition and descriptions in the structuration theory (Giddens 1984) are used to derive manifestations of IR agents' Reflexivity. The qualitative portion of the research resulted in four items that depict this notion. Managers were asked to indicate their perceived frequency of four types of activities, including:

We are able to interpret their unstated messages;

We pick up on implicit, unstated, or nonverbal cues;

We can understand what they mean even if they don't say it;

We can learn a lot based on the implicit cues that are often unstated.

The scale is anchored from 1 to 7 with 1 being *rarely* and 7 being *always*. The pretests and preliminary analysis indicate that the four item scale performs well with an acceptable reliability.

Measurement of Routinization

Routinization is conceptualized as the degree to which interfirm activities are regular and follow repetitive patterns. Given that no existing measure is available in marketing literature, I draw from the theory of structuration (Giddens 1984) and organizational studies (e.g. Feldman 2000, 2004) to construct a three item scale. The three items were developed to capture the core concept of routines in the structuration theory. Items such *as "Our interactions with this customer mostly involve scheduled activities that repeat periodically"* and *"Most activities in our interactions with this customer are pretty much set in an order that we both follow"* were used to gauge the extent to which interfirm activities, IR agent's actions, and IR practices are recurrent and standardized. Human actions and IR practices can only be sources of structures if they occur regularly, repeatedly, and follow similar patterns (DeSanctis and Poole 2004; Feldman 2000; Giddens 1984)

Measurement of Sense-making

Sense-making refers to the extent to which IR agents can understand and interpret information they noticed and collected from the daily interactions and reapply the resulting interactional knowledge to guide their future behaviors. While IR agents are reflexive and therefore able to notice and collect implicit and peripheral information, such information does not serve as interactional knowledge unless IR agents are able to make sense of such

information and translate their interpretations into interactional knowledge. Therefore Sense-making is the platform where implicit meanings of actions and interactions materialize (Weick, Sutcliffe, and Obstfeld 2005).

From a structurational perspective, I argue that there are two stages of Sense-making. The first stage of Sense-making involves agents' understanding and interpreting a collection of information trying to making sense of it by deriving meanings to symbols and actions. In addition Sense-making also pertains to agents' ability to apply such resulting knowledge to interactions in future practices. Therefore to develop a scale for Sense-making, two important aspects must be addressed, namely agents' ability to interpret and predict what the customer firm means and the ability to make use the knowledge in deciding appropriate responses and actions. According to these two aspects, a three item scale is developed to capture IR agents' Sense-making regarding the customers as well as their appropriate response. Respondents were asked to indicate:

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
We are reasonably confident that we know how this customer will behave in certain conditions.							
	Rarely						Always
We know the appropriate ways to respond to this customer.	1	2	3	4	5	6	7
For the most part, we can interpret their situation and respond accordingly.	1	2	3	4	5	6	7

Measurement of Technology Enactment

Technology enactment concerns the extent to which technological features are actuated at the discretion of IR agents to function in practice. While enactment of technology refers to an on-going and provisional process (Orlikowski 2000), research suggests that IR agents' appropriation of technological features may be reasonably captured by examining

technology use in practices at a given point in time (DeSanctis and Poole 1994). Accordingly technology enactment is measured by the extent to which IR agents use IT to perform interaction activities. Since this study focuses on interfirm relations, I examine technology enactment in two relational activities, simple coordination and relationship management.

Coordination

Coordination is defined in this study to involve activities requiring basic exchange of information. Coordination activities in interfirm interactions concern basic yet efficient organization and management of information. A three item scale is developed to capture the degree to which a firm uses IT to *coordinate social activities* and *schedule* and *facilitate meetings*.

Relationship Management

In contrast with coordination activities, IT Enactment of Relationship Management pertains to the extent to which an organization uses IT to manage customer relationships. Marketing research has identified several interfirm activities that are crucial to relationship formation and development (Palmatier et al. 2006). Among them, communication (e.g. Day 1994; Mohr, Fisher, and Nevin 1996) has been widely recognized as critical to relationship management. Accordingly a three item scale is proposed to capture the extent to which IT is used to "*make initial contacts"* with customers and communicate to "*learn customer preferences*," and a general item "*manage customer relationships*" is also included to ask respondents' overall assessment of technology use for other relationship management oriented activities.

Measurement of Relationship Quality

Measure development for Relationship Quality derives from Johnson, Sohi, and Grewal (2004) as a second order construct consisting of trust, commitment, and relationship stability. Measures of each dimension are adopted from existing scales (Johnson, Sohi, and Grewal 2004). Example items for trust measurement are:

Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree						Strongly Agree
This customer keeps promises and commitments made to our firm.	1	2	3	4	5	6	7
This customer is always frank and truthful with us.	1	2	3	4	5	6	7
We believe the information this customer provides us.	1	2	3	4	5	6	7
This customer is genuinely concerned that our business succeeds.	1	2	3	4	5	6	7
This customer is trustworthy.	1	2	3	4	5	6	7
When making important decisions, this customer considers our welfare as well as their own.	1	2	3	4	5	6	7

Commitment is measured with a four item scale. The following are some example items from the scale:

	Strongly Disagree						Strongly Agree
This customer has a strong sense of loyalty to us.	1	2	3	4	5	6	7
We expect this customer to be working with us for a long time.	1	2	3	4	5	6	7
We see this relationship as a long-term alliance.	1	2	3	4	5	6	7
This customer is really committed to developing a working relationship with us.	1	2	3	4	5	6	7

Stability is measured with a scale of three items with bipolar adjectives. The question stem reads: "*In general how would you characterize your firm's current relationship with this customer?"* One item was reverse coded.

Stable	1	2	3	4	5	6	7	Unstable
Insecure	1	2	3	4	5	6	7	Secure
Unsteady	1	2	3	4	5	6	7	Steady

Control Variables

In order to control for the variation in organizational characteristics, which may lead to confounding relationships in the proposed conceptual model, three control variables are considered and included in the empirical model testing, 1) relational power balance; 2) relationship length; and 3) the extent to which face-to-face interactions are implemented in relational activities.

Measures of the three variables are collected toward the end of the instrument by self-report. Relationship power balance is measured with a three item scale gauging the relative bargain power, control, and dependence between partner firms. Relationship length is captured by respondents' responses to *"How long have you worked with this customer?"* and face-to-face interactions is measured by a three item scale inquiring the extent to which contacts are made *in addition to* IT-mediated activities. Example items include:

In addition to using IT in our interactions with this customer (please circle the appropriate number),

	Rarely						Frequently
we make an effort to have personal contact.	1	2	3	4	5	6	7
we schedule personal meetings or visits.	1	2	3	4	5	6	7
we make it a point to call or visit this customer.	1	2	3	4	5	6	7

Main Data Collection

Sample: A list of 1,500 business service providers was purchased to serve as the starting point of a sampling frame. The list consists of names and addresses of 1,500 firms that operate in the business service sector. The firms cover a wide range of industries from telecommunication corporations to marketing research providers. This list however does not contain contact information for marketing managers or IT managers. Therefore the first step

in list purification is to obtain the contact information of the firms and identify marketing and IT executives as potential key informants. The list is preliminarily vetted by an extensive search and verification process through web-based search engines (such as google.com and yahoo.com) and information sources of business (such as Hoovers.com, Goliath.com, and finance.yahoo.com). Contact information including phone numbers was carefully verified and recorded.

To ensure high data quality, this research rigorously followed Huber and Power (1985) guidelines for research with a key informant design. First qualifications for key informants were defined and used for initial identification of potential key informants. Desirable key informants should be a marketing or IT manager (who uses IT in IR activities or manages technology in IRs) who has some experience working with business customers and has recently been involved in exchange transactions with a business customer (to be able to answer questions regarding one specific customer relationship). Potential key informants should have titles such as Director of Marketing, Director of Customer Relationships, Director of Client Interactions, Director of Sales, General Manager (in the function area of marketing), Marketing Manager, Sales Manager, and other titles of this nature.

To identify and qualify key informants, pertinent information and descriptions were thoroughly vetted via various sources including corporate websites, firm profiles, industrial and business reports, as well as personal phone calls. Relevant information such as name, title, job description, phone number, and mailing address was carefully verified and recorded for all potential key informants. A number of firms were excluded from the sample frame because they were either no long in business or because no potentially qualified key informant

was identified. Therefore the vetting procedures and informant qualification process resulted in approximately 780 retained firms, which were used to construct the final sample.

Data Collection Procedures

The main data collection commenced with a first contact attempt via telephone prescreening to verify the key informants to be appropriate and contact information accurate. Then a questionnaire was administered following the conventional mail survey procedures (Dillman 1978). A pre-notification letter was sent as the initial contact, which then was followed by a package containing a cover letter with a one dollar incentive attached, the questionnaire and a self-addressed postage prepaid return envelope. In the field interviews being conducted prior to the main study several industrial executives expressed interests in responding to online format of the survey. This preference was accommodated by including in the cover letter a link to an identical and password protected online survey should they prefer it. This web survey option is used in all subsequent data collection to ensure consistency. Two weeks after the initial mailing, a telephone follow-up was conducted. A copy of the telephone follow-up protocol is attached in Appendix D. Four weeks following the first mailing, a reminding note was sent with a full package identical to the one in the first mailing to those who had not responded.

Packages for both mailings are 9 inch by 12 inch envelopes that are hand-stamped and mailed via First Class postage. The potential respondent's name and mailing address was printed on a 11/3 inch by 4 inch mailing label, and a return address was printed on a mailing label of the same size. The return envelope was 6.5 inch by 9.5 inch in size and pre-printed with receiving address and pre-paid postage. The pre-notification letter, cover letter, and the

follow-up letter were all printed on paper with the researchers' institution letterhead. The pre-notification letter introduced the project and prepared the key informant for the forthcoming questionnaire, and the cover letter in the second mailing package emphasized the importance and relevance of the study and requested participation. A hand-written "thank you" note was included in the cover letter to personalize the researchers' appreciation and encourage response. A copy of the pre-notification letter, first mailing cover letter, and follow-up letter are presented in Appendix D.

The initial mailing and one follow-up yielded 159 responses in total, a response rate of 20%, acceptable for this type of study in the field of marketing (e.g. Cannon and Perreault 1999; Olson, Slater, and Hult 2005). Key measures were checked for potential non-response bias by comparing key measures of early respondents against those of later respondents (Armstrong and Overton 1977). No significant difference was found between early and late respondents, indicating trivial non-response bias. Next, collected data were validated by examining pertinent characteristics of the achieved sample and key informants.

Data Validation Check

The achieved sample contains mostly marketing/sales/IT managers, account executives and Customer Relationship Management (CRM) directors. The achieved sample covers a wide range of industrial services including financial services, telecommunication services, utility/energy services, health care and health insurance services, and consulting services among others. About half of the respondent firms are publicly held (52%) with the other half (48%) being private firms. Because this research focuses on interfirm relations and technology, I further examine selected relationship and IT characteristics.

Respondent firms reported that an average of 9.89% of annual sales revenue was allocated to serve their IT budget, suggesting the strategic importance of IT in firms' considerations. With regard to relationship characteristics, the reported relationships were mostly in the growing stage (40.1%) or mature and established stage (57.9%), indicating sufficient history in firm interactions for meaningful responses. Additionally, respondent firms also suggested that in average 15.2% of their total sales were generated by the reported customers, indicating the substantial importance of the reported relationships to respective firms. A summary of the sample characteristics is presented in Table 1.

TABLE 1

Sample Characteristics

Sample Characteristics	**Mean Score / Percent Distribution**
IT budget	9.89%
Sales contribution	15.17%
Relationship stage	2% Initial; 40.1% Growing; 57.9% Mature
Ownership	52% Public; 48% Private

In addition, data validation is further assessed by examining pertinent characteristics of key informants. A key informant approach is a commonly accepted research convention in marketing research when appropriately complemented by quality data collection procedures (e.g. Jayachandran et al 2005; Moorman and Rust, 1999; Olson, Slater, and Hult, 2005). However it is acknowledged that it may impose potential threats to data quality if the key informants were ill qualified. This research has undertaken rigorous procedures following Huber and Power (1985), which was accompanied by extensive in-depth field interviews, to identify, screen, and qualify key informants to ensure high quality data.

As a result, key informants in the achieved sample reported characteristics that warrant quality data. Specifically, it was reported that respondents (95.5%) in the achieved sample had completed college with 38.1% respondents holding a Masters/MBA degree. Particularly relevant to this study, respondents in the achieved sample reported an average of 5.7 years in their current positions and an average of 5.8 years working with the reported relationship. Among those, 64% respondents had held their current position for 3 years or longer, and 62.8% of the respondents had been working with the reported relationship for at least 3 years. Pertinent informant characteristics are summarized in Table 2.

TABLE 2

Informant Characteristics

Informant Characteristics	**Mean Score / Percent Distribution**
Length of relationship	5.8 years
Length of current position	5.7 years
Education	3.9% High school; 55.5% College; 38.1 Masters/MBA; 1.9% Ph.D.

Taken together, these statistics provide evidence that the achieved sample is adequate for studying the subject matter for this research, and the respondents have sufficient capability, history, and knowledge to provide quality information for this research. As such it is reasonable to conclude that resulting data are valid and suitable for this research. In the next Chapter I details the resulting responses, provides measure validation, and report results of hypothesis testing.

CHAPTER FIVE

DATA ANALYSIS AND RESULTS

This chapter details the methods and results of measure purification and validation as well as hypothesis testing results. This chapter is organized in two sections. The first section provides a discussion of the measure purification and validation process and resulting final measures of the key constructs. The first section also offers an assessment of construct reliability and validity including content validity, convergent validity, discriminant validity, and nomological validity. The second section describes the hypothesis testing procedures and presents the path analysis results of the structural equation models.

Measure Purification

The purpose of measure purification is to elicit valid and reliable items for the key constructs by minimizing measurement error variance (Churchill 1979). A response score is composed of a true score of the trait (i.e. construct) and measurement error (Cote and Buckley 1988). Because measurement error represents threats to the validity and unbiased estimation of structural relationships (Cote and Buckley 1988), the objective of measure purification and refinement is to examine the correspondence between items and a common trait.

Essentially the measures were evaluated and revised following the purification procedures recommended by Churchill (1979). The following steps were iteratively carried out: 1) check the inter-item agreement and reliability 2) remove the item that performed poorly on the scale; 3) repeat step 1 and 2 until the scale achieves high internal consistency and high reliability; and 4) lastly the resulting scales were confirmed or further refined by

using Confirmatory Factor Analysis (CFA) models. This purification process has been widely accepted in marketing studies (e.g. Gerbing and Anderson 1988; Kim and Lee 1997).

First, an Exploratory Factor Analysis (EFA) was done on all the measurement scales. While the initial measurement scales were carefully developed and purified through pre-testing, this EFA was performed to provide a preliminary evaluation of the retained scales on the achieved sample. Each dimension of the second order construct Relationship Quality (i.e. Trust, Commitment, and Stability) was treated as a separate scale (Churchill 1979). Results suggested that all items loaded as expected on corresponding hypothesized factors. Employing principle component analysis, varimax factor rotation, and eigenvalues greater than one (Burnkrant and Page 1982), this EFA findings reported that Cronbach's reliability alphas for all scales ranged from .77 to .89, all exceeding the recommended .70 (Nunnally and Bernstein 1994), and scale factor loadings ranged from .74 to .95, all greater than the recommended .70 benchmark (Churchill 1979). Results also showed that all scales achieved adequate inter-item agreement, as indicated by item-total correlations ranging from .56 to .87, all greater than the recommended .50 (Churchill 1979; Nunnally and Bernstein 1994). As such, EFA provided preliminary evidence for adequate factor patterns and internal consistency of all scales. On the basis of satisfactory EFA results, I proceeded to the recommended subsequent procedure to further evaluate the measures validity using CFA estimation (Churchill 1979).

Measure Validation

A good measure must be both valid and reliable (Peter 1981). Based on the classical measurement theory, an observed score can be partitioned into three sources of variances,

trait, random error, and systematic error, and a valid and reliable measure entails minimized error variances (Churchill 1979; Cote and Buckley 1988). In the following sections, I first discuss the procedures of CFA model specification and estimation and then proceed to review evidence of measure validity by evaluating both construct reliability and construct validity. In particular, I use CFA estimates to assess measure reliability by demonstrating internal consistency, unidimensionality, and adequate construct reliability (Fornell and Larcker 1981) and evaluate construct validity by providing evidence for convergent validity and discriminant validity. A discussion of nomological validity follows thereafter to complete the measure validation procedure. In the following section, I commence the construct validity discussion with procedures and evidence of construct reliability.

Construct Reliability

According to classic measurement theory, reliability is the degree to which a measurement is free from random error (Cote and Buckley 1988). I examine reliability from three related but distinct aspects, namely internal consistency, unidimensionality, and overall construct reliability. While internal consistency entails the inter-item agreement of a set of items, unidimensionality addresses the pattern of measure items and specifically focuses on whether one and only one factor underlies all items within a construct (Gerbing and Anderson 1988). As such, internal consistency is a necessary but not sufficient condition for unidimensionality, and both are necessary conditions for construct reliability (Gerbing and Anderson 1988). In other words, internal consistency and unidimensionality must be established before construct reliability can be meaningfully evaluated (Gerbing and Anderson 1988).

I followed procedures recommended by Gerbing and Anderson (1988) to assess internal consistency and unidimensionality using CFA model estimation. Particularly key constructs were modeled in four subsets due to sample size constraint (Bentler and Chou 1988), and factor structures and factor loadings of CFA estimation results were examined for internal consistency. Internal consistency may be established if all items are positively and significantly loaded on, and only on, corresponding constructs as hypothesized (i.e. no cross-loading) (Gerbing and Anderson 1988). Unidimensionality implies that there exists one single construct or trait underlying a set of measurement items (Gerbing and Anderson 1988). According to Gerbing and Anderson (1988), unidimensionality may be established by following the product rule or by achieving adequate factor loadings and factor patterns for each construct as well as satisfactory construct reliability and Average Variance Extracted (AVEs).

Once unidimensionality is established, satisfactory reliability must be established. reliability assessment is the next step. I used CFA estimates to compute construct reliability because construct reliability takes in consideration the error variance terms in the measurement models and thereby provides accurate estimation of scale reliability (Fornell and Larcker 1981). Construct reliability of each construct was calculated using the following method as recommended by Fornell and Larcker (1981):

$$(\sum \lambda)^2 + \frac{(\sum \lambda)^2}{\sum Var(\varepsilon)} \qquad (1)$$

According to Fornell and Larcker (1981), a scale is considered reliable if the above computation yields a construct reliability greater than .70.

The scale development paradigm in marketing research (e.g. Churchill 1979; Gerbing and Anderson 1988; Peter 1981) has clearly pointed out that reliability alone does not promise a good measure. Construct validity must be evaluated and established before these constructs may be employed for hypothesis testing. Next, I discuss the procedures and evidence to demonstrate construct validity, particularly convergent validity and discriminant validity, as well as nomological validity.

Construct Validity

Measurement theory argues that validity is the degree to which a measurement is free from systematic error, and invalid measures pose serious threats to the validity of research findings (Churchill 1979; Cote and Buckley 1988). In particular construct validity addresses the vertical correspondence between each measure item and the underlying construct (Peter 1981). In general construct validity suggests that a set of measure items represent all and only characteristics of the underlying construct (Peter 1981). Accordingly, construct validity entails two types of validity, namely convergent validity and discriminant validity.

Convergent validity

Convergent validity implies the degree to which measures of the same construct are similar to and hence highly correlated with each other (Peter 1981). Convergent validity is a type of operational validity finding evidence mostly using Multi-Trait-Multi-Method (MTMM) approach (Peter 1981). While MTMM was not used for this study, evidence of convergent validity may be obtained by achieving the following three standards. First, because composite construct reliability reflects the degree of correspondence between measure items and the underlying construct, a construct reliability greater than .70 can be

used to assess convergent validity (Fornell and Larcker 1981, Marsh and Hocevar 1985). Second, Average Variance Extracted (AVE) estimates the shared variation for all measure items of a common construct, and therefore a value greater than 0.5 can be used to assess convergent validity (Fornell and Larcker 1981, Kim and Lee 1997). AVEs were computed using the following formula recommended by Fornell and Larcker (1981):

$$(\sum \lambda^2) + \frac{\sum \lambda^2}{\sum Var(\varepsilon)} \quad (2)$$

Where λ = unconstraint factor loadings for indicators on the corresponding latent constructs (Lamda matrix), and *Var(ε)* = error variance, the amount of variance due to measurement error of each indicator (diagonal elements of the Theta-delta or Theta-epsilon matrices). $(\sum \lambda)$ = sum of all factor loading on a construct, and $\sum Var(\varepsilon)$ = sum of the error variance terms of all indicators on a construct. Additionally positive and statistically significant factor loadings indicate convergence of items to the common trait and therefore provide evidence for convergent validity (Bagozzi and Yi 1991). Next, I continue the discussion of construct validity with the procedures and evidence of discriminant validity.

Discriminant validity

Discriminant validity implies that measures of theoretically distinctive constructs should be different and hence not highly correlated with each other (Peter 1981). Discriminant validity can be demonstrated by finding evidence in following procedures. First, discriminant validity can be indicated if the smaller AVE of the two is greater than the common variance shared by the two constructs in question (Fornell and Larcker 1981; Kim and Lee 1997; Peter 1981). Because AVEs represent shared variation of latent constructs, an AVE greater than the shared inter-construct variance indicates that the correlations between a latent construct and

its measure items are higher than the correlation between the two latent constructs, indicating discriminant validity.

Second, discriminant validity among constructs can be indicated by finding inter-construct correlations significantly different from unity (Bagozzi, Yi, and Phillips 1991; Burnkrant and Page 1982; Anderson and Gerbing 1988). For each of all possible pairs of constructs in each CFA model, discriminant validity was assessed by estimating and comparing two nested models, with the inter-construct correlation constrained to unity for and unconstraint for the other. Discriminant validity may be established if the unconstrained model performs significantly better than the constraint model (Anderson and Gerbing 1988; Fornell and Larcker 1981). This approach is conventionally accepted and commonly used to evaluate discriminant validity of constructs in marketing studies alike (e.g. Johnson and Sohi 2001). A series of such nested CFA models were estimated to assess discriminant validity. In the next section, I report procedures and results of another type of validity, nomological validity.

Nomological Validity

Addressing theoretical relationships among constructs, nomological validity implies that a construct measured in a particular way should exhibit the same pattern and magnitude as predicted by the theory employed (Peter 1981). To assess the nomological validity of the resulting measures, a correlation matrix was presented to show inter-construct correlations. Nomological validity may be established if the constructs that were measured in a particular way exhibit the same patterns as being predicted in theory (Peter 1981).

Upon reviewing necessary procedures and criteria to reliability, construct validity, and nomological validity, I next describe the measure validation procedures that were employed in

this study, report CFA results, and discuss implications of these findings on measure validation. Appendix C provides the final measures of the key constructs. The rest of measure validation discussion is organized as following. A brief justification of using subset CFA models commences the next section, which is followed by a brief summary of CFA findings from each of the four CFA subset models and implications to measure validation. Discriminant validity tests for constructs within each model group are presented at the end of each CFA model as each test involves more than one construct, and discriminant validity tests for constructs across model groups are summarized after the three first-order CFA models were examined because each test involves constructs from two model groups.

LISREL 8 (Jöreskog and Sörbom 1993) was used to specify and estimate all CFA measurement models. The 10 reflective constructs in the proposed structural model were grouped and estimated in four separate measurement models, each of which contained a subset of theoretically related constructs. This approach was preferred because it allowed theoretically similar constructs to be assessed simultaneously (Campbell and Fiske 1959). In addition, inclusion of all constructs and indicators in one model would have violated the recommended five-to-one ratio of observations to parameters to be estimated (Bentler and Chou 1988). This subset approach has been widely used in the marketing studies (e.g. Grewal and Tansuhaj 2001; Rindfleisch and Moorman 2001). The first measurement model assesses structurational condition constructs, namely Sense-making, Reflexivity, and Routinization; the second includes technology enactment constructs, namely IT Enactment of Coordination and IT Enactment of Relationship Management; and the third model evaluates technology constructs, namely IT Artifact, IT Intensity, and IT Embeddedness.

The last measurement model evaluates the second order construct, Relationship Quality, and each of the three dimensions was treated as a separate scale for measure validation (Churchill 1979; Gerbing and Anderson 1988). A second order construct model essentially uses the same estimation methods as those of first order constructs with an additional assumption that a portion of the variance in the first order constructs (i.e. Trust, Commitment, and Stability) is caused by a shared underlying construct (i.e. Relationship Quality). To determine whether a second order construct is preferred, a target coefficient (Marsh and Hocevar 1985) needs to be calculated.

CFA Model Findings

Model 1

Model 1 consists of structurational condition constructs, including Sense-making, Reflexivity, and Routinization. These three constructs describe human agents' acts and activities in interfirm interactions and therefore may most likely share common theoretical basis. Grouping and modeling these constructs together allows simultaneous examination of the maximumly alike constructs and thereby ensures distinctions among the theoretically similar constructs. The measurement model yielded a χ^2 of 70.86 with 32 degrees of freedom ($p < .05$) and a low χ^2/d.f. ratio of 2.21, indicating plausible model fit (Marsh and Hocevar 1985). Model fit was further evaluated in terms of conventionally reported model fit indices. Goodness of Fit Index (GFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI) reported .90, .89, and .93 respectively, approaching or exceeding the minimum satisfactory standard of .90 (Bentler 1990), indicating a good fit of the overall model. Table 3 summarizes

the range of factor loadings; model fit indices, construct reliability, and Average Variance Extracted (AVE) for each construct.

Table 3
Results from Confirmatory Factor Analysis Models

Measurement Model	Range of Factor Loadings[1] (Standardized)	Construct Reliability	Average Variance Extracted (AVE)	GFI[2]	NFI	CFI	RSMEA	χ^2 (d.f., p-value)
First Order Constructs								
Routinization –	.80 - .98	.90	.76	.90	.89	.93	.10	70.86
Reflexivity –	.63 - .85	.84	.56					(32, <.01)
Sense-making	.61 - .83	.80	.58					
IT Enactment of Coordination –	.69 - .94	.83	.63	.98	.97	.99	.02	8.32
IT Enactment of Relationship Management	.63 - .78	.77	.53					(8, =.40)
IT Artifact –	.83 - .88	.89	.73	.96	.97	.98	.09	15.87
IT Embeddedness	.77 - .95	.91	.77					(8, =.04)
Higher Order Construct								
Relationship Quality	.62 - .95	.87	.70	.83	.86	.91	.11	159.92
Trust –	.69 - .89	.90	.60					(62, < .01)
Commitment –	.69 - .87	.85	.59					
Stability	.67 - .95	.84	.65					

Notes:
[1] For clarity and brevity purposes, ranges of factor loadings are reported in Table 3. This presentation is common in marketing studies (e.g. Johnson, Sohi, and Grewal 2004).
[2]GFI = Goodness of Fit Index, NFI = Normed Fit Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; and d.f. = degrees of freedom.

Sense-making refers to IR agents' ability to build upon previous experience, ability to assimilate information, and finally ability to re-apply the knowledge to action situation. Sense-making is conceptualized as IR agents' cognitive ability to exact cues from past experiences (Weick, Sutcliffe, and Obstfeld 2005) to make sense of interactional knowledge (Johnson, Sohi, and Grewal 2004) and most importantly translate it into actionable knowledge and sensible and appropriate responses to guide actions. The final measurement scale of Sense-making consists of three items, tapping into the extent to which agents can interpret implicit information and make use of such information to form appropriate response and guide its future interactions with partner firms. CFA estimation reported a construct reliability of .80, exceeding the recommended .70 benchmark (Bagozzi and Yi 1988, Nunnally and Bernstein 1994), and an AVE of .58, also greater than the recommended .50 criterion (Fornell and Larcker 1981). Construct factor loadings ranged from .61 to .83, all positive and statistically significant ($p<.05$) and consistent with the factor structure as theory predicted. No cross-loading was found. On basis of these results, it appears that Sense-making has achieved internal consistency with one single dimension, as indicated by satisfactory construct validity, AVEs, and factor loadings and patterns. Construct reliability further provided evidence for adequate reliability of the scale. Additionally, CFA results offered evidence for adequate convergent validity, as indicated by the construct reliability, AVEs, and significant factor loadings.

Reflexivity entails human actors' ability to elicit to and reflect on implication information (Giddens 1984). It is conceptualized as the IR agents' ability to notice, selectively retain, and interpret implicit contextual cues. The final measurement scale of Reflexivity consists of four items, which capture IR agents' ability to react to implicit and unstated cues during interactions. CFA estimation reported a construct reliability of .84, exceeding the recommended .70 (Bagozzi

and Yi 1988, Nunnally and Bernstein 1994), and an AVE of .56, greater than the recommended .50 (Fornell and Larcker 1981). Factor loadings ranged from .63 to .85, all positive and statistically significant ($p<.05$) and consistent with the factor structure as theory predicted. No cross-loading was found. Again on basis of these results, it can be concluded that Reflexivity is internally consistent with satisfactory construct validity, AVEs, and factor loadings and patterns, indicating unidimensionality of the scale. Construct reliability further provided evidence for adequate reliability of the scale. Adequate convergent validity was indicated by the satisfactory construct reliability, AVEs, and significant factor loadings and factor patterns consistent with theory predictions.

Routinization refers to the process where interfirm interactions are programmed to repeat on a regular basis (Giddens 1984). It is conceptualized as the repetitiveness and regularity of interfirm activities that recur in a similar and consistent pattern. The final measurement scale of Routinization consists of three items, and CFA estimation reported a construct reliability of .90, exceeding the recommended .70 (Bagozzi and Yi 1988, Nunnally and Bernstein 1994), and an AVE of .78, greater than the recommended .50 (Fornell and Larcker 1981). Factor loadings ranged from .80 to .98, all positive and statistically significant ($p<.05$) and consistent with the factor structure as theory predicted. No cross-loading was found. Again on basis of these results, it can be concluded that Routinization is internally consistent with satisfactory construct validity, AVEs, and factor loadings and patterns, indicating unidimensionality of the scale. Construct reliability provided further evidence for adequate reliability of the scale. Adequate convergent validity was indicated by satisfactory construct reliability, AVEs, and significant factor loadings and factor patterns consistent with theory predictions.

Next, I examine discriminant validity among the three theoretically similar constructs. First, all AVEs were compared with the shared variance of any two constructs in evaluation. In comparing Reflexivity with Routinization, the smaller AVE (.56 for Reflexivity) is greater than the shared variance of .02, indicating two distinct constructs. In comparing Reflexivity with Sense-making, the smaller AVE (.56 for Reflexivity) is greater than the shared variance of .09. Similarly in comparing Routinization with Sense-making, the smaller AVE (.58 for Sense-making) is greater than the shared variance of .06. Therefore the AVE approach provides positive evidence for discriminant validity. In addition, nested models were compared for discriminant validity testing. Results of the paired construct models showed a significant decrease in χ^2 with one degree of freedom change for Routinization-Sense-making ($\Delta\chi^2$=9.25, p<.05), for Reflexivity-Sense-making ($\Delta\chi^2$=6.82, p<.05), and for Routinization-Reflexivity ($\Delta\chi^2$=17.02, p<.05), indicating that the three constructs are evidently distinct from one another. Taken together CFA results offered sufficient evidence for discriminant validity. A summary of the nested model comparison is presented in Table 4, and a zero order correlation matrix is presented in Table 5.

Table 4
Discriminant Validity Analysis Results

Paired Measurement Models	**χ^2 (d.f.) (*p*-value) (Phi- matrix Unconstrained)**	**χ^2 (d.f.) (*p*-value) (Phi- matrix Constrained)**	**$\Delta\chi^2$**	***p*-value**
Routinization – Sense-making	χ^2 (8)= 25.52 (p <.01)	χ^2 (9)= 34.77 (p <.01)	9.25	< .05
Routinization – Reflexivity	χ^2 (13)= 22.19 (p <.04)	χ^2 (14)= 39.24 (p <.01)	17.05	< .05
Routinization – IT Enactment of Coordination	χ^2 (8)= 7.40 (p =.49)	χ^2 (9)= 28.74 (p <.01)	21.34	< .05
Routinization – IT Enactment of Rel. Management	χ^2 (8)= 11.08 (p =.20)	χ^2 (9)= 30.83 (p <.01)	19.75	< .05
Routinization – IT Artifact	χ^2 (8)= 4.52 (p =.81)	χ^2 (9)= 89.80 (p <.01)	85.28	< .05
Routinization – IT Embeddedness	χ^2 (8)= 7.52 (p =.48)	χ^2 (9)= 109.00 (p <.01)	101.48	< .05
Reflexivity – Sense-making	χ^2 (13)= 30.79 (p <.01)	χ^2(14)= 37.61 (p<.01)	6.82	< .05
Reflexivity – IT Enactment of Coordination	χ^2 (13)= 23.*71* (p =.03)	χ^2 (14)= 33.09 (p <.01)	9.38	< .05
Reflexivity – IT Enactment of Rel. Management	χ^2 (13)= 29.46 (p <.01)	χ^2 (9)= 41.11 (p <.01)	11.65	< .05
Reflexivity – IT Artifact	χ^2 (13)= 20.16 (p =.09)	χ^2 (14)= 91.08 (p <.01)	70.29	< .05
Reflexivity – IT Embeddedness	χ^2 (13)= 25.96 (p =.02)	χ^2 (14)= 111.36 (p<.01)	85.40	< .05
Sense-making – IT Enactment of Coordination	χ^2 (8)= 4.80 (p =.78)	χ^2 (9)= 19.15 (p =.02)	14.35	< .05
Sense-making – IT Enactment of Rel. Management	χ^2 (8)= 24.90 (p <.01)	χ^2 (9)= 40.38 (p <.01)	15.48	< .05
Sense-making – IT Artifact	χ^2 (8)= 6.40 (p =.60)	χ^2 (9)= 79.09 (p <.01)	72.69	< .05
Sense-making – IT Embeddedness	χ^2 (8)= 8.11 (p =.42)	χ^2 (9)= 87.99 (p <.01)	79.88	< .05
IT Enactment of Coordin – IT Enactment of Rel. Management	χ^2 (8)= 8.28 (p =.40)	χ^2 (9)= 13.79 (p =.13)	5.51	< .05
IT Enactment of Coordination – IT Artifact	χ^2 (8)= 36.66 (p <.01)	χ^2 (9)= 65.82 (p <.01)	29.16	< .05
IT Enactment of Coordination – IT Embeddedness	χ^2 (8)= 13.74 (p =.09)	χ^2 (9)= 34.44 (p <.01)	20.70	< .05
IT Enactment of Rel. Management – IT Artifact	χ^2 (8)= 12.11 (p =.15)	χ^2 (9)= 22.15 (p =.01)	10.04	< .05
IT Enactment of Rel. Management – IT Embeddedness	χ^2 (8)= 17.74 (p =.02)	χ^2 (9)= 26.62 (p <.01)	8.88	< .05
IT Embeddedness – IT Artifact	χ^2 (8) = 16.37 (p =.04)	χ^2 (9)= 20.82 (p =.01)	4.45	< .05

Table 5
Descriptive Statistics: Mean, Standard Deviation, Correlations, and Construct Reliability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relationship Quality (1)	.87[1]							
Sense-making (2)	.25**[2]	.80						
IT Enactment of Coordination (3)	.23**	.05	.83					
IT Enactment of Relationship Management (4)	.25**	.07	.58**	.77				
Routinization (5)	.05	.24**	.13	.04	.90			
Reflexivity (6)	.26**	.29**	.14	.07	.09	.84		
IT Artifact (7)	.22**	.16	.38**	.46**	.06	.09	.89	
IT Embeddedness (8)	.27**	.20**	.49**	.63**	.12	.08	.61**	.91
Mean	5.24	5.30	3.65	3.90	3.27	4.64	4.58	4.45
Standard Deviation	.98	1.16	1.73	1.48	1.31	1.07	1.43	1.60

[1] Diagonal elements are Construct Reliabilities
[2] $p < .01$

Model 2

The next SEM model assessed the measures for IT Enactment constructs, including IT Enactment of Coordination and IT Enactment of Relationship Management. Similar to the construct specification in the first model, these two constructs were grouped and evaluated together because these two constructs are rooted in the same notion of technology enactment. As such these two constructs are considered similar in terms of theoretical basis, and this model intended to show that the two constructs, while apparently related, are distinct from each other and represent two conceptually different constructs. CFA results yielded a χ^2 of 8.32 with 8 degrees of freedom ($p < .05$), with a low χ^2/d.f. ratio of 1.04 indicating good model fit (Marsh and Hocevar 1985). Goodness of Fit Index (GFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI) reported .98, .97, and .99 respectively. Model fit indices all exceeded the minimum satisfactory standard of .90 (Bentler 1990), indicating a good fit of the overall model.

IT Enactment is based on the observation that IR agents exercise judgment and discretion in putting technology to practice. *IT Enactment of Coordination* is conceptualized as the extent to which IT is used in facilitating planning, scheduling, and simple exchange of information (Kraut et al. 1999). The final measurement scale of IT Enactment of Coordination consists of three items, tapping into the extent to which agents use technology as a means of scheduling events. CFA estimation reported a construct reliability of .83, exceeding the recommended .70 benchmark (Bagozzi and Yi 1988, Nunnally and Bernstein 1994), and an AVE of .63, greater than the recommended .50 standard (Fornell and Larcker 1981). Construct factor loadings ranged from .61 to .83, all positive and statistically significant ($p<.05$) and consistent with the factor structure as theory predicted. No cross-loading was found. On basis of these results, it appears that IT Enactment of Coordination has achieved internal consistency with a single underlying

trait, as indicated by satisfactory construct validity, AVEs, and factor loadings and patterns. Construct reliability further provided evidence for adequate reliability of the scale. Additionally, CFA results offered evidence for adequate convergent validity, as indicated by the construct reliability, AVEs, and significant factor loadings.

IT Enactment of Relationship Management is conceptualized as extent to which technology is implemented to perform substantial relationship management functions including customer identification and disagreement resolution among others. The final measurement scale of IT Enactment of Relationship Management consists of three items, capturing the extent to which agents use technology as a means of scheduling events. CFA estimation reported a construct reliability of .77, exceeding the recommended .70 (Bagozzi and Yi 1988, Nunnally and Bernstein 1994) and an AVE of .53, greater than the recommended .50 (Fornell and Larcker 1981). Construct factor loadings ranged from .63 to .78, all positive and statistically significant ($p<.05$) and consistent with the factor structure as theory predicted. No cross-loading was found. On basis of these results, it appears that IT Enactment of Relationship Management achieved internal consistency with a single trait dimension, as indicated by satisfactory construct validity, AVEs, and factor loadings and patterns. Construct reliability further provided evidence for adequate reliability. CFA results offered additional evidence for adequate convergent validity, as indicated by the construct reliability, AVEs, and significant factor loadings.

Next, I examine discriminant validity of the two theoretically similar constructs. First, construct AVEs are compared with the amount of common variance shared by the two constructs, and results showed that the smaller construct AVE (.53 for IT Enactment of Relationship Management) was greater than the shared variance (.34), indicating adequate discriminant validity (Fornell and Larcker 1981). Nested models were compared for discriminant

validity testing. Results showed a significant decrease in χ^2 with one degree of freedom change for IT Enactment of Coordination-IT Enactment of Relationship Management ($\Delta\chi^2$=5.51, p<.05), indicating that the two constructs are evidently distinct from one another. Taken together CFA results offered sufficient evidence for discriminant validity of within-model constructs.

Model 3

The next model included IT Artifact, IT Intensity, and IT Embeddedness. Again these constructs were grouped because each entails a theoretically important component of technology and therefore are theoretically related in this study. The initial model yielded a χ^2 of 50.15 with 24 degree of freedom (p < .05), with a χ^2/d.f. ratio of 2.09. However CFA results revealed that the construct IT Intensity might be potentially problematic, as indicated by a composite construct reliability of .60, lower than the recommended .70 standard, and an AVE of .34, lower than the recommended .50. Moreover factor loadings range from.53 to .67 for IT Intensity, making the construct validity of IT Intensity questionable. For the validity of research findings, IT Intensity was removed from the model, and a modified model resulted with IT Artifact and IT Embeddedness. CFA was performed on the revised model, which yielded a χ^2 of 15.87 with 8 degree of freedom (p < .05), with a low χ^2/d.f. ratio of 1.98, indicating good model fit (Marsh and Hocevar 1985). The Goodness of Fit Index (GFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI) reported .96, .97, and .98 respectively indicating a good fit of the overall model.

IT Artifact addresses the physical availability of technology, viewing technology as objects, particularly a compilation of hardware, software, and personnel's technological skills (Ryssel, Ritter, and Gemünden 2004, Stump and Sriram 1997). IT Artifact is conceptualized as the degree of technological superiority of a firm's IT infrastructure, the extent to which IT hardware, software, and personnel skills approach state-of-the-arts level (Ryssel, Ritter, and

Gemünden 2004, Tippins and Sohi 2003). The final measurement scale of IT Artifact consists of three items, inquiring the technical complexity of hardware, software, and personnel skills. CFA estimation reported a construct reliability of .89, exceeding the recommended .70 benchmark (Bagozzi and Yi 1988), and an AVE of .73, greater than the recommended .50 standard (Fornell and Larcker 1981). Construct factor loadings ranged from .61 to .83, all positive and statistically significant ($p<.05$) and consistent with the factor structure as theory predicted. No cross-loading was found. On basis of these results, it appears that IT Artifact achieved internal consistency with a single dimension, as indicated by satisfactory construct validity, AVEs, and factor loadings and patterns that are consistent with theory predictions. Construct reliability further provided evidence for adequate reliability of the scale. CFA results offered additional evidence for adequate convergent validity, as indicated by the construct reliability, AVEs, and significant factor loadings.

IT Embeddedness is conceptualized as the degree IT is ingrained into all aspects of interfirm activities. The final measurement scale of IT Embeddedness consists of three items, inquiring the extent to which technology is tightly coupled and integrated with interaction activities. CFA estimation reported a construct reliability of .91, exceeding the recommended .70 (Bagozzi and Yi 1988, Nunnally and Bernstein 1994), and an AVE of .77, greater than the recommended .50 (Fornell and Larcker 1981). Construct factor loadings ranged from .61 to .83, all positive and statistically significant ($p<.05$) and consistent with the factor structure as theory predicted. No cross-loading was found. On basis of these results, it appears that IT Embeddedness achieved internal consistency with a single dimension, as indicated by satisfactory construct validity, AVEs, and factor loadings and patterns that are consistent with theory predictions. Construct reliability further provided evidence for adequate reliability of the

scale. Additionally, CFA results offered evidence for adequate convergent validity, as indicated by the construct reliability, AVEs, and significant factor loadings.

Next, I examine discriminant validity of the two theoretically similar constructs. First, construct AVEs are compared with the amount of common variance shared by the two constructs, and results showed that the smaller construct AVE (.73 for IT Artifact) was greater than the shared variance (.36), indicating adequate discriminant validity (Fornell and Larcker 1981). Nested models were compared for discriminant validity testing. Results showed a significant decrease in χ^2 with one degree of freedom change for IT Artifact- IT Embeddedness ($\Delta\chi^2$=4.45, p<.05), offering additional evidence for discriminant validity for IT Artifact and IT Embeddedness.

In addition to establishing discriminant validity of constructs within each model group, I assessed discriminant validity for constructs across model groups. Following the same procedures, evaluation of discriminant validity for cross-group constructs began with the AVEs approach (i.e. comparing with the shared variance of any two construct in question), which was further complemented by comparing two nested models of the constructs (i.e. phi constraint vs. phi unconstraint). In comparing Routinization with IT Enactment of Coordination and IT Enactment of Relationship Management, the smaller AVEs (.63 for the first pair and .53 for the second pair) are greater than the shared variance in both cases (.02 for the first pair and .001 for the second pair), suggesting three distinct constructs. In comparing Routinization with IT Artifact and IT Embeddedness, the smaller AVEs (.73 for the first pair and .76 for the second) are greater than the shared variance in both cases (.03 and .01 respectively). Nested model comparison resulted in a significant decrease in χ^2 with one degree of freedom change for each model pair, specifically Routinization - IT Enactment of Coordination ($\Delta\chi^2$=21.34, p<.05),

Routinization - IT Enactment of Relationship Management ($\Delta\chi^2$=19.75, p<.05), Routinization – IT Artifact ($\Delta\chi^2$=85.28, p<.05), and Routinization – IT Embeddedness ($\Delta\chi^2$=109.00, p<.05), offering additional evidence for discriminant validity for Routinization.

In comparing Reflexivity with IT Enactment of Coordination and IT Enactment of Relationship Management, the smaller AVEs (.56 for the first pair and .53 for the second) are greater than the shared variance in both cases (.02 and .01 respectively). In comparing Reflexivity with IT Artifact and IT Embeddedness, the smaller AVEs (.56 in both cases) are greater than the shared variance (.001 for both cases). Nested model comparison resulted in a significant decrease in χ^2 with one degree of freedom change for each paired model, specifically Reflexivity - IT Enactment of Coordination ($\Delta\chi^2$=9.38, p<.05) and Reflexivity - IT Enactment of Relationship Management ($\Delta\chi^2$=11.65, p<.05), Reflexivity – IT Artifact ($\Delta\chi^2$=70.29, p<.05), and Reflexivity – IT Embeddedness ($\Delta\chi^2$=85.40, p<.05), offering evidence for discriminant validity for Reflexivity.

Similarly, in comparing Sense-making with IT Enactment of Coordination and IT Enactment of Relationship Management, the smaller AVEs (.58 and .53 respectively) are greater than the shared variance (.001 in both cases). In comparing Sense-making with IT Artifact and IT Embeddedness, the smaller AVEs (.58 in both cases) are greater than the shared variance in both case (.02 and .04 respectively). Nested model comparison resulted in a significant decrease in χ^2 with one degree of freedom change for each model pair, specifically Sense-making - IT Enactment of Coordination ($\Delta\chi^2$=14.35, p<.05), Sense-making - IT Enactment of Relationship Management ($\Delta\chi^2$=15.48, p<.05), Sense-making – IT Artifact ($\Delta\chi^2$=72.69, p<.05), and Sense-making – IT Embeddedness ($\Delta\chi^2$=79.88, p<.05), offering evidence for discriminant validity for Sense-making.

Also across model groups, IT Enactment of Coordination was compared with IT Artifact and IT Embeddedness. Results showed that the smaller AVEs (.63 in both cases) are greater than the shared variance of .14 and .24 respectively. Nested model comparison resulted in a significant decrease in χ^2 with one degree of freedom change for each model pair, specifically IT Enactment of Coordination – IT Artifact ($\Delta\chi^2$=29.16, p<.05) and IT Enactment of Relationship Management – IT Embeddedness ($\Delta\chi^2$=20.70, p<.05), offering evidence for discriminant validity for IT Enactment of Coordination. In comparing IT Enactment of Relationship Management with IT Artifact and IT Embeddedness, the smaller AVEs (.53 in both pairs) are greater than the shared variance in both cases (.21and .40 respectively), suggesting the three constructs are distinct constructs. Additionally, nested models resulted in significant decreases in χ^2 with one degree of freedom change for each model pair, specifically IT Enactment of Relationship Management – IT Artifact ($\Delta\chi^2$=10.04, p<.05) and IT Enactment of Relationship Management – IT Embeddedness ($\Delta\chi^2$=8.88, p<.05). These results provided evidence for distinct constructs and thereby successfully establish construct discriminant validity for IT Enactment of Coordination and IT Enactment of Relationship Management.

Therefore the AVE approach provides positive evidence for discriminant validity for all constructs both within and across model groups. Additionally, nested models were compared in pairs, and results showed significant decreases in χ^2 and provided evidence that all constructs are evidently distinct constructs. As such construct validity has been successfully established for all first order constructs.

Model 4

The last measurement addressed the ultimate dependent variable, *Relationship Quality.* Based on Johnson, Sohi, and Grewal (2004), Relationship Quality is conceptualized as a higher

order construct with Trust, Affective Commitment, and Relationship Stability as its three dimensions. Following Johnson, Sohi, and Grewal (2004), a second order Confirmatory Factor Analysis (CFA) model was specified and estimated. A target coefficient was first calculated to determine whether a second order construct model is preferred (Marsh and Hocevar 1985). The target coefficient reported a value of one (1), acceptable in a three dimensional construct model (Marsh and Hocevar 1985). The second order construct model was able to explain all variations from the first order construct, and therefore a second order construct is indeed preferred.

The second order model Relationship Quality with three dimensions (i.e. Trust, Commitment, Stability) yielded a χ^2 of 159.92 with 62 degree of freedom ($p < .05$), with a low χ^2/d.f. ratio of 2.58, indicating good model fit (Marsh and Hocevar 1985). The Goodness of Fit Index (GFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI) reported .83, .86, and .91 respectively. CFA results show that composite construct reliabilities for the three dimensions yielded .90, .85, and .84 for Trust, Commitment, and Stability respectively, all greater than the recommended .70, and AVEs of .60, .59, and .65, all exceeding the recommended 0.5 (Fornell and Larcker 1981, Marsh and Hocevar 1985). Factor loadings ranged from .69 to .89 for Trust, .69-.87 for Commitment, and .67 to .95 for Stability, all positive and significant ($p < .01$), and consistent with the factor structure as theory predicted. No cross-loading was found.

For the second order construct Relationship Quality model, CFA estimation reported a construct reliability of .87 for the higher order construct, greater than the recommended .70 (Bagozzi and Yi 1988, Nunnally and Bernstein 1994), and Average Variance Extracted (AVE) of .70, greater than the recommended .50 (Fornell and Larcker 1981). All three sub-constructs loaded positive and significantly (i.e. $\beta_{trust} = .91$, $p < .01$; $\beta_{commitment} = .95$, $p < .01$; and $\beta_{stability} = .62$, $p < .01$) on the second order construct Relationship Quality. The three dimensions were

mostly consistent with the factor structure in Johnson, Sohi, and Grewal (2004). On basis of these results, it can be reasonably concluded that Relationship Quality as a second order construct achieved adequate construct reliability and validity and therefore constitutes a good measure for the construct.

In summary measure validation procedures provided evidence for satisfactory construct reliability (ranging from .83 to .91) and construct validity (i.e. convergent and discriminant validity) as well as established preference for a second order construct of the dependent variable. Therefore it can be concluded that all remaining measures are valid and reliable. Before these measures are to be used for hypothesis testing, nomological validity of all remaining scales is examined in the next section.

Nomological validity

Nomological validity implies that a construct measured in a particular way should exhibit the same pattern and magnitude as predicted by the theory employed (Peter 1981).Table 5 summarizes the inter-construct correlations, descriptive statistics including means and standard deviations, as well as construct reliabilities. As the theory predicts and hypotheses suggests, both Reflexivity and Routinization are positively correlated with Sense-making, and the correlations in Table 5 show relationships consistent with the predictions ($r = .29, .24, p < .01$). IT Artifact and IT Embeddedness are both predicted to be positively related with IT Enactment of Coordination and IT Enactment of Relationship Management. The correlations in Table 5 indicate that IT Artifact is positively and significantly correlated with IT Enactment of Coordination ($r = .38, p < .01$) and IT Enactment of Relationship Management ($r = .49, p < .01$). Similarly IT Embeddedness is positively and significantly associated with IT Enactment of

Coordination (r = .46, $p < .01$) and with IT Enactment of Relationship Management (r = .63, $p < .01$). As the results suggest, constructs exhibit consistent patterns as the theory predicts. Moreover, Sense-making and IT Enactment of Coordination were predicted to be positively related with Relationship Quality, which is also consistent with the correlations in Table 5 (r = .25, $p<.01$; r = .23, $p < .01$). Finally IT Enactment of Relationship Management was predicted to be negatively correlated with Relationship Quality. Although the resulting positive direction is opposite of the predicted effect, the correlation table suggests a significant correlation between IT Enactment of Relationship Management of Relationship Quality (r = .25, $p < .01$). Therefore the correlation matrix demonstrated patterns of inter-construct correlations essentially consistent with the proposed nomological net and hypotheses, providing evidence for adequate nomological validity, and thereby supported adequate nomological validation (Peter 1981).

Hypothesis Testing

LISREL 8 (Jöreskog and Sörbom 1993) was used to specify and estimate a two-stage Structural Equation Model (SEM) for hypothesis testing (Anderson and Gerbing 1988). A two-stage SEM examines relationships using latent constructs and structural path analysis. This approach was preferred for hypothesis testing in this study because it is methodologically superior to performing regression models using averaged composite scores (Burnkrant and Page 1982, Gerbing and Anderson 1988). First, hypotheses were tested using latent constructs because error variances, embedded in composite scores, were not correlated and therefore tend to deflate the true construct correlations (Cote and Buckley 1988). In addition a two-stage SEM allowed simultaneous estimation of path coefficients of interest and thereby facilitates a comprehensive examination of the proposed framework (Anderson and Gerbing 1988).

In addition to main effects, Sense-making was also hypothesized to moderate the relationship between IT Enactment of Relationship Management and Relationship Quality. An interaction term was therefore created to capture the proposed moderation effect. While products of independent variables are often used as indicators for interaction terms in SEM, literature suggests that inclusion of both independent variables and their product term in the same equation may present serious threats of multi-collinearity (Cohen and Cohen 1983). As a result of multi-collinearity, estimates of structural relationships may not be stable and therefore likely to result in estimation errors. To alleviate this threat, I followed Grewal and Tansuhaj (2001) approach and take an alternative approach in an attempt to minimize the potential collinearity issues (Jaccard, Turrisi, and Wan 1990) among exogenous constructs. Specifically the interaction effect was captured by using residuals from an Ordinary Least Square (OLS) regression where the product of the two constructs was regressed on the two constructs.

Let Y = (Sense-making) * (ITRelMgt)

Estimate an OLS model: $Y = \beta_0 + \beta_1$ (Sense-making) + β_2 (ITRelMgt) + ε (3)

The resulting residuals of the OLS model (ε) were included as the instrument for the interaction term in path analysis. This instrumental approach is methodologically advantageous because the residuals are in theory orthogonal to the two constructs in question and therefore explain variance in addition to the main effects. This approach thereby provided a more meaningful assessment of the interaction effect.

For control variables, interfirm Power Balance, Face-to-Face Contact, and Relationship Duration were included to control for potential confounding effects in path analysis. As I expected, interfirm Power Balance reported a significant and negative effect on Relationship Quality (b = -.17, $p < .05$). However neither Face-to-Face Contact nor Relationship Duration

resulted in significant effects on Relationship Quality and therefore were excluded from the final path analysis for a more parsimonious model. SEM coefficient estimates for hypothesis testing are summarized in Table 6.

Table 6
Hypothesis Testing: Coefficient Estimates in Structural Equation Model

Endogenous Variables	**Exogenous Variables**	**Hypothesis**	**Standardized parameter estimates**	***t*-Value**	**Testing Results**
Sense-making	*Predictor variables*				
	Routinization	H1a	.21	2.25	Supported
	Reflexivity	H1b	.54	4.16	Supported
IT Enactment Coordination	*Predictor variables*				
	IT Artifact	H2a	.06	.46	Not supported
	IT Embeddedness	H4a	.48	3.43	Supported
IT Enactment Relational Management	*Predictor variables*				
	IT Artifact	H2b	.14	1.12	Not supported
	IT Embeddedness	H4b	.68	5.05	Supported
Relationship Quality	*Predictor variables*				
	Sense-making	H5a	.39	3.01	Supported
	IT Enactment of Coordination	H6a	.11	1.20	Not supported
	IT Enactment of RelMgt	H6b	.18	1.85	Partially Supported
	Interactions				
	Sense-making*IT RelMgt	H7	-.16	-2.03	Supported
	Control variable				
	Power		-.35	-4.17	

* $p < .05$ (one-tail test)

Hypothesis 1a and 1b

Hypothesis 1a addresses the relationship of Routinization and Sense-making. The hypothesis states that the greater the Routinization of interaction activities between partner firms, the greater will be the extent of Sense-making. Results from path analysis yielded a positive and significant coefficient ($b = .21$, $p < .05$), lending support for hypothesis 1a. This result suggests that as interfirm activities become more routinized, firms are able to make sense of past interactions and utilize the resulting knowledge to compose appropriate responses to guide future interactions.

Hypothesis 1b addresses the impact of Reflexivity on Sense-making. The hypothesis states that the more Reflexivity characterizes IR, the greater will be the extent of Sense-making. Results from path analysis again yielded a positive and significant coefficient ($b = .54$, $p < .05$) providing support for hypothesis 1b. This result suggests that the more firms are aware and able to interpret implicit and unstated cues in interaction activities, the more firms are able to make sense of past interactions and develop appropriate responses for future interactions. Thus, hypothesis 1 is supported.

Hypothesis 2a and 2b

Hypothesis 2a addresses effect of IT Artifact on IT Enactment of Coordination. It is hypothesized that the more state-of-the-art IT Artifact (i.e. hardware, software, and personnel skills), the greater level of IT Enactment of Coordination. As results show, the SEM estimated coefficient is not significant ($b = .06$, $p > .05$). However, since hypothesis 2 also states that the hypothesized positive trend will level off and eventually decline beyond a certain level of technological sophistication, this result may entail an indication of a curvilinear relationship. In

light of such, a squared term of IT Artifact is then created and estimated in the path model to test the nonlinear relationship (e.g. Johnson, Sohi, and Grewal 2004). Results do not show support for a nonlinear relationship (b = -.03, $p > .05$). Hypothesis 2a is not supported.

Hypothesis 2b addresses the impact of IT Artifact on IT Enactment of Relationship Management. It is hypothesized that the more state-of-the-art IT Artifact (i.e. hardware, software, and personnel skills), the greater level of IT Enactment of Relationship Management. The estimated coefficient resulting from SEM is not significant (b = .14, $p > .05$), and therefore hypothesis 2b is not supported. As such, hypothesis 2 is not supported. This result suggests that mere presence of state-of-the-art technology is not directly related with deployment of technology for either interfirm coordination or relationship management. The construct IT Intensity was not modeled because of the lack of discriminant validity, hypothesis 3a and 3b were not tested in the final model.

Hypothesis 4a and 4b

Hypothesis 4a addresses the impact of IT Embeddedness on IT Enactment of Coordination. The hypothesis states that the greater IT Embeddedness, the greater level of IT Enactment of Coordination. SEM yielded a positive and significant result (b=.48, $p < .05$), lending support for hypothesis 4a. As IT Embeddedness is conceptualized as the degree to which technology is coupled with interfirm work processes, this result suggests that as technology becomes tightly integrated with interfirm activities, firms have greater propensity to use technology for interfirm coordination activities such as scheduling and event coordination.

Hypothesis 4b addresses the impact of IT Embeddedness on IT Enactment of Relationship Management. The hypothesis states that the greater IT Embeddedness, the greater

level of IT Enactment of Relationship Management. Again, SEM yielded a positive and significant coefficient (b= .68, $p < .05$) offering support for hypothesis 4b. This result suggests that as technology becomes tightly integrated with interfirm activities, firms have greater propensity to use technology for relationship management purposes such as learning customers' needs and preferences. Hypothesis 4 is supported.

Hypothesis 5a, 5b, and 5c

Hypothesis 5a speaks to the relationship of Sense-making and Relationship Quality. The hypothesis states that the greater the Sense-making, the better the Relationship Quality. SEM yielded a positive and significant coefficient (b= .39, $p < .05$), providing support for hypothesis 5a. Sense-making is conceptualized as firms' ability to interpret past interactions and develop consequential knowledge to compose and guide behaviors in future interactions. This result suggests that as firms are able to draw on and more importantly make sense of past experiences with partner firms, Relationship Quality increases. Hypothesis 5a is supported.

Hypothesis 5b attends to the mediating role of Sense-making. It is hypothesized that the relationship of Routinization and Relationship Quality is fully mediated by Sense-making. A mediating effect exists if an independent variable influences the dependent variable through the mechanism of the mediator in question. In other words, a mediator serves as a necessary condition via which the effect of the independent variable can be cast on the dependent variable. Mediating effects are typically tested using the procedures recommended by Baron and Kenny (1986). Two necessary properties must be established: 1) the dependent variable is correlated with both the mediator in question and the independent variable; and 2) the relationship of the

dependent and independent variables approaches zero correlation when the mediator is controlled.

Accordingly, the mediating effect of Sense-making on Routinization and Relationship Quality was tested using the product of coefficients method (Baron and Kenny 1986; Sobel 1982), which was further complemented by examining the significance tests of indirect effects resulting from Structural Equation Model estimation. While Sobel (1982) demonstrated the product of coefficients method using unstandardized regression coefficients, standardized coefficients were used in this study because coefficients from SEM estimation accounted for effects of covariates, control factors, and interaction effects, and therefore reflect less tainted effects of the mediator in question (Johnson and Sohi 2001). In addition, using standardized coefficients and their products does not violate the assumptions of the product of coefficients method because they, too, follow an asymptotically normal distribution (Sobel 1982). In light of such, standardized coefficients from Table 6 were used to compute the magnitude of indirect effects and conduct respective significance tests. Indirect effects were computed and tested for significance following the procedures and formula recommended by Sobel (1982) and Baron and Kenny (1986). Let:

$Y = bM + cX_1 + e_1$

$M = aX_1 + e_2$

The magnitude of the indirect effect = a*b, and standard error of indirect effect coefficient

$S_{ab} = \sqrt{b^2 S_a^{\,2} + a^2 S_b^{\,2} + 2ab\,\mathrm{cov}(a,b)}$, which approximates $S_{ab} = \sqrt{b^2 S_a^{\,2} + a^2 S_b^{\,2}}$ (4)

Furthermore, mediation was also examined by reviewing the significance tests of indirect effects in SEM estimation. Because the product of coefficient method is based on coefficients' asymptotic properties and therefore assumes a large sample size (Sobel 1982, 1987), the SEM

approach complements the assessment of the indirect effects by estimating the exact significance of each indirect effect given the sample size. Moreover, because SEM allows simultaneous estimation of both direct and indirect effects in one model, a nested model with an unconstraint direct path (i.e. unconstraint element of gamma matrix) both examines the significance of the direct effect and provides insights for potential partial mediation effects. A full mediating effect may be established if the indirect effect is significant and the unconstraint direct path is not significant holding the mediator in question constant whereas a partial mediation exists if both the direct and the indirect paths are significant.

H5b proposed a full mediation of Sense-making. The hypothesis suggests that the impact of Routinization on Relationship Quality is completely mediated by Sense-making. Results from the product of coefficients method show that the indirect effect of Routinization on Relationship Quality via Sense-making is positive and significant (b= .08, $p < .05$), lending support for the mediating role of Sense-making. Significance tests from SEM analysis yielded a consistent result (b= .09, $p < .05$), offering complementing evidence for mediation. Moreover, estimation of the direct path (i.e. Routinization to Relationship Quality) yielded a significant but negative coefficient (b= -.17, $p < .05$), indicating a partial mediation of Sense-making. Because hypothesis 5b states a full mediation role of Sense-making, results provide partial support for hypothesis 5b. Results of mediation tests based on product of coefficients method are presented in Table 7a, and significance test results from SEM estimation are presented in Table 7b.

Table 7a
Tests for Mediating Effects based on the product of coefficient methods

Exogenous Variable *X*	**Mediator Variable *M***	**Endogenous Variable *Y***	**Hypothesis**	**Path Coefficient *X→M, a***	**Path Coefficient *M→Y, b***	**Indirect Effect *(a*b)***	**Significance of *a*b* (*z*-Value)**
Routinization	Sense-making	Relationship Quality	H5b	.21	.39	.08	1.84
Reflexivity	Sense-making	Relationship Quality	H5c	.54	.39	.21	2.37
IT Embeddedness	IT Enactment of RelMgt	Relationship Quality	H6c	.68	.18	.12	2.65

Table 7b
Tests for Mediating Effects based on LISREL 8 SEM Indirect Effects

Exogenous Variable *X*	**Mediator Variable *M***	**Endogenous Variable *Y***	**Hypothesis**	**Indirect Effect**	***t*-Value**	**Conclusion**
Routinization	Sense-making	Relationship Quality	H5b	.09	2.03	Partially Supported
Reflexivity	Sense-making	Relationship Quality	H5c	.21	2.42	Supported
IT Embeddedness	IT Enactment of RelMgt	Relationship Quality	H6c	.10	2.69	Supported

Hypothesis 5c also contends a full mediation of Sense-making. The hypothesis suggests that the impact of Reflexivity on Relationship Quality is completely mediated by Sense-making. Results from product of coefficients method show that the indirect effect of Reflexivity on Relationship Quality via Sense-making is positive and significant (b = .21, $p < .05$), lending support for the mediating role of Sense-making. Consistently, SEM estimation yielded a positive and significant indirect effect (b = .21, $p < .05$), supporting the mediating effect of Sense-making. SEM estimation of the direct path (i.e. Reflexivity to Relationship Quality) resulted in a non-significant coefficient (b = .11, $p > .05$) when the mediator is controlled, indicating a full mediation of Sense-making in the Reflexivity and Relationship Quality relationship. Hypothesis 5c is thus supported. Hypothesis 5 is partially supported.

Hypothesis 6a, 6b, and 6c

Hypothesis 6a addresses the impact of IT Enactment of Coordination on Relationship Quality. The hypothesis states that the greater IT Enactment of Coordination, the higher the Relationship Quality. Results from the path analysis report a non-significant path coefficient (b=.11, $p > .05$). Hypothesis 6a is not supported. This result suggests that IT Enactment of Coordination is not directly associated with Relationship Quality.

Hypothesis 6b addresses the impact of IT Enactment of Relationship Management on Relationship Quality. The hypothesis states that the greater IT Enactment of Relationship Management, the lower the Relationship Quality. Path analysis yielded a marginally significant but positive path coefficient (b = .18, $p < .05$), suggesting that the more firms engage information technology in managing interfirm relationships, the higher the Relationship Quality. While this result supports the association of IT Enactment of Relationship Management and Relationship

Quality, the relationship is in the opposite direction of the hypothesized relationship. Therefore hypothesis 6b is partially supported.

Hypothesis 6c suggests a full mediating of IT Enactment. The hypothesis states that the relationship between IT Infusion and Relationship Quality is fully mediated by IT Enactment. Since IT Enactment of Coordination is not significantly correlated with the dependent variable (i.e. Relationship Quality) (b=.11, $p > .05$), IT Enactment of Coordination does not qualify as a mediator in this relationship. Additionally the mediating effect of IT Enactment of Relationship Management is not supported for IT Artifact and Relationship Quality relationship because IT Artifact is not significantly correlated with IT Enactment of Relationship Management (b = .06, $p > .05$).

Based on the product of coefficients method, results report a positive and significant indirect effect of IT Embeddedness on Relationship Quality (b= .12, $p < .05$), indicating a mediating role of IT Enactment of Relationship Management in the relationship of IT Embeddedness and Relationship Quality. This mediating effect is also evidenced by a positive and significant coefficient (b = .10, $p < .05$) resulting from SEM estimation of this indirect effect. Furthermore, with the mediator controlled, the direct path yields a non-significant coefficient (b = .18, $p > .05$), indicating a full mediation of IT Enactment of Relationship Management. Hypothesis 6c is therefore supported. The test results for mediating effects are presented in Table 7a and Table 7b. Since hypothesis 6a was not supported, hypotheses 6b was partially supported, and hypothesis 6c was supported. Thus, hypothesis 6 is partially supported.

Hypothesis 7

Hypothesis 7 suggests a moderating effect of Sense-making on the relationship of IT Enactment of Relationship Management and Relationship Quality. The hypothesis states that greater Sense-making alleviates the negative effect of IT Enactment of Relationship Management on Relationship Quality. Although hypothesis testing results reported a significant but positive relationship between IT Enactment of Relationship Management and Relationship Quality, which is opposite to the hypothesized direction, it is justifiable to test the moderating role of Sense-making because a significant interaction effect nonetheless captures the moderating effect of Sense-making on the relationship of IT Enactment of Relationship Management and Relationship Quality. Results from path analysis report a negative and significant coefficient (b= -.16, $p < .05$), providing support for the moderating effect of Sense-making as stated in hypothesis 7. This result suggests that while engaging technology in managing relationship is associated with better Relationship Quality, high level of Sense-making may undermine the magnitude of this association. A summary of the hypotheses, proposed relationships, and hypothesis testing results are presented in Table 8.

Table 8
Summary of Hypothesis Testing Results

Hypothesis	Relationship	Result
H1a	Routinization is positively related with Sense-making	Supported
H1b	Reflexivity is positively related with Sense-making	Supported
H2a	IT Artifact is positively related with IT Enactment of Coordination	Not supported
H2b	IT Artifact is positively related with IT Enactment of Relational Management	Not supported
H4a	IT Embeddedness is positively related with IT Enactment of Coordination	Supported
H4b	IT Embeddedness is positively related with IT Enactment of Relational Management	Supported
H5a	Sense-making is positively related with Relationship Quality	Supported
H5b	Sense-making mediates the relationship of Routinization and Relationship Quality	Partially supported
H5c	Sense-making mediates the relationship of Reflexivity and Relationship Quality	Supported
H6a	IT Enactment of Coordination is positively related with Relationship Quality	Not supported
H6b	IT Enactment of Relationship Management is negatively related with Relationship Quality	Partially Supported
H6c	IT Enactment of Relationship management mediates the relationship of Routinization and Relationship Quality	Supported
H7	Sense-making alleviates the negative effect of IT Enactment of Relationship Management on Relationship Quality	Supported
Control	Power is related with Relationship Quality	Significant effect
	Relational length is related with Relationship Quality	No effect
	Face-to-face contact is related with Relationship Quality	No effect

CHAPTER SIX

DISCUSSION AND IMPLICATIONS

In the previous chapter I reported the key findings of the study. In this chapter, I expand on these findings and discuss what they mean and how they are related to the goals of the study and extant marketing literature. Accordingly, this chapter is organized as the following. This chapter commences with a brief overview of the study reviewing the purpose of the research. It then continues with a section discussing general contributions of the study, which is followed by a more detailed discussion of each of the key findings. Managerial implications are discussed next, and this Chapter concludes with a consideration of the limitations, directions of future research, and a brief summary of the study.

Overview of the study

This dissertation investigated the role IR agents play in appropriating technology features and utilizing everyday interactions to effectively formulate and manage IRs. It drew on Giddens' (1979, 1984) Structuration Theory to highlight two key functions of human agents in interfirm interactions: exercising discretion and judgment in using IT to achieve various purposes and cognitively process relational information to construct and amend relationship structures. A mail survey of marketing and IT managers was administered to industrial service providers to examine a conceptual framework. Key constructs include structurational conditions (i.e. Routinization and Reflexivity), IT Infusion constructs (i.e. IT Artifact and IT Embeddedness) Technology Enactment (i.e. Coordination and Relationship Management), Sense-making, and the outcome variable Relationship Quality.

Empirical findings support the central contention that human agents' cognitive efforts (i.e. Technology Enactment and Sense-making) were necessary mediating conditions to realize the benefits of IT Infusion and structurational conditions in Relationship Quality enhancement. This key finding concurs with extant marketing and IT literature that examines the effect of IT (e.g. Armstrong and Sambamurthy 1999; Chatterjee, Grewal, and Sambamurthy 2002; Tippins and Sohi 2003) and the effect of relational knowledge (Johnson, Sohi, and Grewal 2004) on organizational outcomes. In particular, results agree with previous IT work (e.g. Deeter-Schmelz and Kennedy 2004; Payton and Zahay 2005; Ryssel, Ritter, and Gemünden 2004) that state-of-the-art technology infrastructures do not have a compelling impact on IR Quality, and instead it is human agents' enactment of technology that directly impacts IR Quality. Similarly it is not the scattered relational information but human agents' interpretation and its resulting interactional knowledge (Johnson, Sohi, and Grewal 2004) that contribute to better Relationship Quality. Interestingly while Technology Enactment and Sense-making both positively contribute to a trusting, committed, and stable relationship, greater ability in making sense of everyday interactions appears to mitigate the effect of Technology Enactment on Relationship Quality.

General Contributions of the Study

This dissertation makes several contributes to both IT-IR literature and effective management of technology in interfirm interactions. First of all, this study tests the power of Giddens' (1984) Structuration Theory in IR formation and management. It offers a novel yet theoretically compelling viewpoint of IRs as social structures and proposes a conceptual framework to highlight the role of human agents in enhancing IR quality. In addition, this study conceptualizes the notions of Technology Enactment and Sense-making and develops

operationalizations to empirically test relationships of these two notions and Relationship Quality. By doing so, this research examines how IT impacts core business processes such as customer relationship management (Tyre and Orlikowski 1993). It advances prior IT-IR research by further differentiating the effects of IT infrastructure, IT integration and assimilation, and the actual use of technology in practice (Schultze and Orlikowski 2004) and particularly highlighting the critical role IR agents play in the process as well as its impact on Relationship Quality (Boudreau and Robey 2005).

Finally this research identifies significant intermediate factors (i.e. IT Enactment and Sense-making) that relate IT Infusion and everyday interactions with IR Quality. These mediating factors offer possible explanations for how the effects of technology and IR interactions may be realized to enhanced Relationship Quality. In this regard, these research findings further caution managerial over-reliance on technology in strategizing, which has been cited as a common cause for IT implementation failure (Rigby, Reichheld, and Schefter 2002). In general this empirically validated conceptual framework offers academic researchers a novel yet theoretically grounded perspective in investigating IR as social structures and also provides insights for marketing practitioners on effectively management of technology and IR interactions.

Discussion of Findings

The results of this study highlight the joint effect of two important antecedents on IR Quality, namely IR agents' selective enactment of technology and their cognitive efforts to transform accumulated relational information from everyday activities into actionable relational knowledge. This section presents a detailed discussion of each key research finding. For clarity

and brevity, this discussion is organized into two parts. In the first part, I discuss the direct effects of all key construct including the mediation effects of Sense-making and IT Enactment. The second part discusses the interaction effect of Sense-making and IT Enactment on Relationship Quality. I begin this discussion with the direct effects.

Direct Effects

As predicted in H_1, both Routinization and Reflexivity seem to strongly influence Sense-making. In particular this result suggests that as interaction activities between trading partners become increasingly routinized, it is more likely that IR agents can develop actionable relational knowledge by processing implicit and peripheral cues that have been collected during everyday interactions. The notion of Routinization suggests that IR interactions involve repetitive patterns of activities (Nelson and Winter 1982) that are characterized with regularity, consistency, and stability. Therefore as a clear pattern of actions is extracted, routines serve as a form of organizational memory (Nelson and Winter 1982) that enables IR agents to mentally develop a programmed script that describes expectations and defines appropriate behaviors accordingly (Walsh and Ungson 1991). In highly routinized interactions, IR agents follow this script and use it to understand actions of their own and those of their partners. Moreover, as a web of inter-linked routines in IR interactions eventually form a trajectory of expected actions (Nelson and Winter 1982), IR agents may easily identify any deviations and interruptions that depart this pattern. Because IR agents try to handle future uncertainty by means of interpreting the acts of others, such departure is often signals of changed expectations and calls for careful considerations. This finding is consistent with prior work in organizational routines (e.g. Feldman 2000; Nelson and Winter 1982). For example, prior research has noted that patterns emerge from recurring practices (Feldman 2000) and eventually defines the way things are

(Weick, Sutcliffe, and Obstfeld 2005). This institutionalized pattern future serves as rules to prescribe future actions by defining appropriateness of actions (Giddens 1984).

Similarly Reflexivity was also a strong predictor of Sense-making. IR agents with highly sensitive minds notice and collect implicit cues and peripheral information during interactions positively facilitate Sense-making. As a key assumption and prerequisite of Giddens' (1984) notion of structuration, Reflexivity mirrors IR agents' ability to learn from everyday activities by means of noticing and selectively retaining nonverbal and unstated cues. Reflexivity often implies a reason underlying variation in interfirm interactions (Orlikowski 2000) especially when IR agents encounter unprecedented situations (Weick, Sutcliffe, and Obstfeld 2005). Despite the expectation and available script, IR agents do not behave identically in all situations. Instead, individuals make provisional adjustments based on their interpretation and judgment of specific situations. Although such adjustments may temporally and contextually provisional and does not yet constitute Sense-making, it often leads to Sense-making when repeated adjustments are systematically categorized, labeled, and developed into relational knowledge for future actions. Therefore Reflexivity allows IR agents to accumulate unstated cues as well as variations in interactions, which makes the cognitive effort of Sense-making possible. This finding is in agreement with the extant research. Boudreau and Robey (2005) contend that Reflexivity is a necessary condition for improvised learning to occur, and Weick, Sutcliffe, and Obstfeld (2005) explicitly stated that Reflexivity is a prerequisite condition for organizational Sense-making.

H_2 predicted that the more state-of-the-art technology is, the greater level of Technology Enactment. However, the impact of IT Artifact on Technology Enactment was not as expected. Research finding suggests that state-of-the-art IT facilities are not directly related to actual implementation of technology in practice. As prior research has consistently demonstrated a

facilitating, as oppose to a deterministic, effect of IT infrastructures (e.g. Mittal and Nault 2004; Perry, Cavaye, and Coote 2003; Ryssel, Ritter, and Gemünden 2004), this result coincides with the extant research suggesting that available technology features do not necessarily lead to technology use (e.g. Schultze and Orlikowski 2004). For example, when salespeople are equipped with communication devices such as Blackberry handhelds, the fact that it is a state-of-the-art technology does not guarantee that it would be put to use. This result suggests that availability of state-of-the-art technology may offer the potential possibility for technology enactment to take place but does not warrant actual technology deployment in practice. In other words, sophisticated IT may be a necessary but certainly not sufficient condition for IR agents to deploy technology in practice. This is an important result because it explicitly reveals the possible disassociation of available technology features and actual use of technology in practice.

IT Embeddedness, as predicted in H_4, is an important predictor of IT Enactment. That is, the degree to which IT is coupled with various work processes in interfirm interactions is shown to be highly correlated with Technology Enactment. In particular, the more IT is highly integrated with various activities in interfirm interactions, the more likely such IT is used for both interfirm coordination activities (e.g. scheduling and event coordination) and relationship management purposes (e.g. learning customers' needs and preferences). The notion of IT Embeddedness implies a degree of integration and assimilation of technology in interfirm work processes and activities. This result provides affirmative evidence for the impact of technology integration on actual deployment of technology. This finding is as expected and concur with the extant research that argues technology alignment and assimilation (e.g. Olson, Slater, and Hult 2005; Stump and Sriram 1997).

As predicted in H_{5a}, Sense-making is shown to be an important antecedent of Relationship Quality. Specifically Sense-making positively reinforces favorable IRs, which is consistent with extant literature. The importance of Sense-making on Relationship Quality has long been noted in marketing literature (e.g. Johnson, Sohi, and Grewal 2004). Particularly relevant to IR interactions is the notion of interactional knowledge store (Johnson, Sohi, and Grewal 2004) which argues that accumulated interactions knowledge has a direct and positive effect on Relationship Quality. This research finding confirms the extant research and suggests that Sense-making allows IR agents to systematically organize, label, and categorize otherwise scattered information pieces and cognitively process the chaotic information into actionable relational knowledge. Such knowledge helps IR agents to determine the appropriateness of actions in future interactions. Because the purpose of making sense of past experiences is to make predictions about the future with a series of approximations, Sense-making reduces uncertainty and minimizes perceived risks in IR interactions (Weick, Sutcliffe, and Obstfeld 2005). As a result, reduced risks and rationalized predictions tend to lead trading partners to develop trusting, committed, and stable relationships.

Furthermore, as H_{5b} and H_{5c} suggested, Sense-making mediates the relationship of Relationship Quality and Reflexivity as well as the relationship of Routinization and Relationship Quality. This research finding suggests that the impact of Reflexivity on Relationship Quality is fully mediated by IR agents' Sense-making. Because Sense-making is the very process where scattered information and peripheral cues are systematically processed and transformed into meaningful and actionable relational knowledge, the potential value of IR agents' sensitivity to unstated cues cannot be fully rewarded until Sense-making takes place. A trusting, committed, and stable relationship therefore is not a direct product of IR agents'

inherent abilities but instead a result of IR agents' cognitive efforts to make sense of everyday interactions. This research finding is important because it provides affirmative evidence to the central contention of this dissertation that human agents' cognitive effort is a key mediation factor in IR management.

Similarly, Sense-making is also shown to mediate the relationship of Routinization and Relationship Quality. The notion of Routinization entails recurring interfirm activities, yet until Sense-making takes place and patterns are extracted as a result of cognitive deliberation, these activities are nothing more than simple repetition of events and procedures. Thus the value of Routinization only materializes by means of IR agents making sense of the recurring activities and making predictions for future interactions based on resulting patterns. Interestingly, this research finding suggests a partial mediation of Sense-making. That is, after accounting for the indirect effect via Sense-making, a direct but negative effect of Routinization on Relationship Quality remains significant. While this effect was not as expected, I speculate that this negative direct effect on Relationship Quality may be a result of standardization that is often embedded in routines. As extant literature noted, Routinization is often tightly coupled with highly standardized work processes (Feldman 2000; Weick, Sutcliffe, and Obstfeld 2005). For example, in supplier-buyer interactions, computerized order handling may be programmed to follow a standard protocol, which eventually become institutionalized and routines for both the supplier and the buyer. While values may generate from this routinized activity once cognitive efforts (i.e. Sense-making) were exerted to conceive a stable relationship with reduced risks, such programmed working procedures tend to be highly standardized. The resulting rigidity in the work process may unintentionally signals a lack of attention and interest on the relationship and cast a negative effect on Relationship Quality (Schultze and Orlikowski 2004).

This is an intriguing and important finding because this partial mediation raises interesting questions regarding the total effect of Routinization on Relationship Quality. How to acquire the value of Routinization without being overwhelmed by the potentially harmful direct effect? Future research addressing this question should provide important implications in relationship management strategies. Nonetheless, this research sufficiently highlights the imperative role IR agents play in effectively managing relationships. This result reveals that IR agents' cognitive Sense-making is the key to harvest potential values of Routinization.

Findings also suggest that IT Enactment of Coordination is not directly associated with Relationship Quality, and this effect is not as expected in H_{6a}. IT Enactment of Coordination entails the degree to which IT is actually used in practice to perform coordination functions. H_{6a} predicted a positive effect of IT Enactment of Coordination on Relationship Quality but this research finds no support for this predicted association. While it is difficult to draw any generalizable conclusion from this null result, it seems possible that alternative factors may be responsible for confounding this relationship. I speculate that a number of additional factors may be necessary to materialize the effect. For instance, partner firms' responsiveness may moderate this relationship because even if the use of technology is fitting, a relationship may not directly benefit from it if parties are less than responsive to partner communication efforts. Similarly because the purpose of using IT for coordination is mainly to improve communication (e.g. Sriram and Stump 2004), it is also possible that communication quality is a critical factor to realize this relationship. Additionally, literature suggests that IT use for coordination may free up organizational resources that may alternatively be used to pursue relational tasks (Boudreau and Robey 2005; Schultze and Orlikowski 2004). Therefore another consideration may be the effect of IT Enactment of Coordination on resource allocation. An examination of resource allocation

and re-allocation in this process may shed some light on how IT Enactment of Coordination may operate in shaping Relationship Quality.

As predicted in H_{6b}, IT Enactment of Relationship Management is a statistically significant predictor for Relationship Quality. However, contrary to my expectation, results suggest that the relationship is in the opposite direction of the hypothesis. Instead of an adverse effect on Relationship Quality, IT Enactment of Relationship Management appears to make a positive contribution to Relationship Quality. I speculate that this reversed relationship may be explained by recent advancement of technology, especially those particularly designed for Customer Relationship Management (CRM). While literature suggests that IT-mediated technology may suffer from rigidity of work processes and inflexibility of customer accommodations, it is possible that recent advances in technology may have dramatically reduced these concerns. This may also relieve concerns of technology use on communication quality (e.g. Bordia 1997; Daft, Lengel, and Trevino 1987). Fast development of communication devices such as videoconferencing may enable IR agents to communicate in a virtual environment without sacrificing "soft" information (Mintzberg 1975).

H_{6c} predicts a full mediation of IT Enactment. As expected, results suggest that IT Enactment of Relationship Management fully mediates IT Embeddedness and Relationship Quality. This is a simple yet important finding because it again provides supporting evidence for the assertion that technology alone does not produce positive values to enhance Relationship Quality. Instead, IR agents' exercise discretion and judiciously deploy technology for fitting tasks. It is only through IR agents' judgement that technology may positively contribute to Relationship Quality. Additionally, it appears that the magnitude of the relationship of IT Enactment of Relationship Management and Relationship Quality seems relatively small (b =.18)

and marginally significant (t=1.85). However, this effect may be well justified by the negative moderating effect of Sense-making on this relationship. This moderation is discussed in the next section.

Moderation Effect

H_7 predicted that Sense-making influences the degree to which IT Enactment of Relationship Management affects Relationship Quality. There is a significant interaction between Sense-making and IT Enactment of Relationship Management. Because IT Enactment of Relationship Management was found to have a positive effect on Relationship Quality, the alleviating effect of Sense-making on the relationship, as predicted in H_7, does not seem sensible. Even so, it appears reasonable to conclude from the finding that Sense-making nonetheless mitigate the effect of IT Enactment of Relationship Management on Relationship Quality. The negative interaction provides affirmative evidence to suggest that as IR agents achieve better Sense-making, the effect of IT Enactment on Relationship Management on Relationship Quality diminishes. This finding is important because it reveals the two facets of IR agents in interfirm interactions and suggests how they work together to influence Relationship Quality. Interfirm relationships are results of long tern interactions rather than an immediate product of an isolated or episodic event. IT Enactment of Relationship Management entertains the idea that it is IR agents' deliberate efforts to appropriate technological features that are deemed to be suitable for the current relational structures in order to achieve better Relationship Quality. However, these technological features, once being deployed, tend to be set in place and remain in function with little changes over a long period of time. In other words, technology, once being put into use in practice, turns into a relatively fixed and even rigid structure. On the other hand Sense-making constantly molds relational structure as IR agents continue to incorporate new information from

the latest interactions. As such there exists an increasingly widening gap between the changing relational structure and the relatively fixed technology structure. The better IR agents are at Sense-making, the more and the faster a relational structure is modified, and consequently the faster the gap between relational structure and technology structure widens. Therefore the greater Sense-making, the less IT Enactment of Relationship Management may positively contribute to a trusting, committed, and stable relationship.

Post-hoc Analysis

While this research did not initially hypothesize a relationship between structurational conditions (i.e. Routinization and Reflexivity) and IT Enactment (i.e. Coordination and Relationship Management), further exploration of the issue suspects two potential effects. Specifically it was suspected that Routinization has a positive effect on IT Enactment of Coordination and Reflexivity has a positive effect on IT Enactment of Relationship Management. As Routinization is defined as the repetitiveness and regularity of recurring interfirm activities, it is reasoned that IR agents may likely further streamline relevant work processes by setting up programmed IT operations to carry out these routinized activities. Similarly, as Reflexivity refers to IR agents' ability to notice and accumulate peripheral cues in interactions, it is argued that greater level of Reflexivity may encourage IR agents to be confident in managing relational activities by means of technology instead of face-to-face interactions. Furthermore, because interfirm coordination is relatively less demanding on peripheral cue analysis, and relationship management rarely relies purely on routinized activities, it is argued that greater level of Routinization may be associated with greater level of IT

Enactment of Coordination while greater level of Reflexivity may be associated with greater level of IT Enactment of Relationship Management.

Thus a post-hoc analysis was performed to probe these relationships. Specifically two direct paths were included in the SEM estimation to test the two relationships respectively. However SEM estimation reported null result for both relationships (b = .16, p>.05; b= -0.18, p>.05), indicating that structurational conditions such as Routinization of IR interactions and Reflexivity of peripheral cues in IR interaction are not necessarily related with how IR agents choose to deploy technology for coordination or relationship management.

Theoretical Implications

This dissertation offers several contributions to the literature. First it is strategically imperative to leverage technology to develop and maintain trusting, committed, and stable interfirm relationships in today's technology-intensive business marketplace (Ulaga and Eggert 2006). Accordingly marketing research calls for more studies on identifying missing links between technology and performance outcomes such as interfirm Relationship Quality (e.g. Tippins and Sohi 2003). This dissertation answers this call and attempts to conceptually construct and empirically validate a conceptual framework that highlights IR agents' Sense-making and actual use of technology in practice as possible missing links in connecting IR interactions and technology with relationship performance outcomes.

More importantly this dissertation contributes to IR research by drawing on a sociology theory of structuration (Giddens 1984) and proposing a structurational view of IR. Much of the previous IR research has implicitly yet consistently (with a notable exception of Heide and Wathne 2006) considered relationships in terms of some type of bonds and ties between firms.

While this view and the extant research based are extremely valuable, little research has been done to discover the theoretical foundation of IRs. As such the extant research implicitly assumes relationships to be fixed and passive, which I argue does not fully capture the true nature of IRs. In this regard, this dissertation contributes to IR literature by proposing a theoretical account for IR and posits that IRs can be viewed as social structures, i.e. rules and resources. These rules and resources both enable and constrain IR agents choice of actions in interfirm interactions and are developed and iteratively amended as everyday interactions take place. In light of such IR agents inevitably become an indispensable component and thereby play a critical role in shaping IR structures and affecting Relationship Quality.

On one hand, this structuration view of IR is consistent with prior IR research paradigm that defines and measures IR in terms of trust, affective commitment, and relationship stability. As such this novel view of IR can be aligned side by side with the extant IR research for comparison and scrutiny. On the other hand, this structuration view of IR offers a theoretical foundation that describes the true nature of IRs and brings to light a dynamic perspective on IR formation and management. Importantly this view of IR acknowledges the interactive nature of micro-level IR agents and firm level activities such as everyday interactions and technology and provides a new yet theoretical solid foundation for IR research. To this end, this study advances IR research with refinement and a foundation for further development of relationship theory.

On basis of the structurational view of IR, this dissertation proposes a theoretical framework that highlights the critical mediating role of human agents in technology, IR interactions, and IR management. Empirical evidence provides substantial validation for the proposed framework. Research findings positively confirm the imperative role human agents

play in enhancing IR quality. Therefore the structurational view of IR offers a theoretical basis and some starting points for analyzing the alternative approach in future IR research.

Additionally, this research contributes to the literature by introducing the notions of structurational conditions and Technology Enactment and by developing conceptualization and operationalizations accordingly. This dissertation develops a conceptualization and operationalizations of Technology Enactment in an attempt to connect the availability of technology with actual use of technology in interfirm activities. Similarly the notion of Sense-making is conceptualized and operationalized to denote the cognitive processing of information before such information can contribute to Relationship Quality. Technology Enactment was shown to be particularly important in translating available state-of-the-art technology via IR agents' judicious deployment of technology in fitting tasks. IR agents must exercise judgment and make proper decisions in deploying technology in practice. This mirrors an integrated view of technology determinism (e.g. Markus and Benjamin 1997) and human agent view of IT adaptation (e.g. Beaudry and Pinsonneault 2005) and provides support for the imperative role of human agents in both technology and IR management.

Moreover, this dissertation contributes to the theory by identifying important intermediate factors (i.e. Sense-making, Technology Enactment) in the field of IT-IR relationship research. This empirically validated mediating factors advances this field of research that has long been dominated by value-based arguments (e.g. Boyd and Spekman 2004). Prior research has identified possible links including value creation (e.g. Boyd and Spekman 2004), learning (e.g. Tippins and Sohi 2003), power and dependence (e.g. Heide and John 1988; Johnson et al. 1993), communication (e.g. Anderson and Weitz 1992; Mohr, Fisher, and Nevin 1996), and firm expertise (Palmatier et al. 2006) among others. While these are certainly relevant and plausible

explanations, this dissertation offers an alternative human agents' enactment approach. This dissertation examines mediation effects of two constructs: Technology Enactment and Sense-making. Research findings suggest that Sense-making is a necessary mediating condition for relationship development and carries value form routines and Reflexivity to Relationship Quality. In addition IR agents' judicious deployment of technology plays a key role in deploying technology in IR activities as well. These findings not only confirm the potential effects of everyday activities and technology on Relationship Quality but more importantly it reveals the necessary mediating condition that allows such effects to materialize.

Managerial Implications

Research results from this dissertation have important managerial implications for industrial managers in both effective IR management and technology management. A large body of literature has addressed the importance of relationships management and effective IR management strategies. Building on the extant research but advancing beyond it, this study proposes a novel perspective of IR, namely a structurational view of IR, and provides a framework to develop a better understanding of IR and its structural antecedents. Managers could use this new perspective to develop a better understanding of the nature of IR and its operation. The framework can equip managers to better analyze and strategically design their work processes and use of technology and ensure effective IR management.

First, the notion that IR can be viewed as a structure that both enables and constrains IR agents' choice of actions has important implications for relationship management strategies. With the growing importance of relationship marketing, it is crucial for marketing managers to understand the true nature of IR and the characteristics of its formation and operation. It is of

interest for managers because it reveals how IR functions in practice and brings an abstract concept to specific manifestations (i.e. rules and resources that guide actions. This structural view of IR would aid managers in appreciating the true nature of IRs. This study also offers an important contribution to marketing managers by bringing to light the dynamic nature of IRs. As such this novel view of IR should bring to managers' attention the interactive nature of firm level structures and IR agents, who jointly and iteratively molding relationships over time. With this insight, managers must carefully consider both the existing relational knowledge and more importantly emerging cues from on-going IR interactions. To effectively manage IRs, managers must consider these factors both individually and collectively to ensure a holistic evaluation of IRs.

Another issue of interest for marketing managers concerns strategic design of everyday interactions and practices of Sense-making. While the notion of Sense-making has long been noted in IR literature (e.g. Johnson, Sohi, and Grewal 2004), this dissertation identified two important antecedents, Routinization and Reflexivity. By illustrating that Reflexivity has a positive but indirect effect on Relationship Quality via Sense-making, this dissertation acknowledges that IR agents' ability to gather relational information is a necessary condition for the subsequent Sense-making but does not influence Relationship Quality until the IR agents cognitively process such information and develop it into relational knowledge. In addition, Routinization was shown to enhance Relationship Quality via IR agents' Sense-making and at the same time challenges Relationship Quality with a direct and negative effect. Accordingly managers must take caution in organizing and standardizing interfirm activities. Interaction activities must be designed so that measures are taken to minimize the potential harmful effect of standardized procedures and activities on IRs. This study informs managers of the contradicting

effects of Routinization and thereby aids managers to develop appropriate strategies and tactics for effective IR management.

This study also has specific implications for managers regarding appropriate deployment of IT in managing IRs. The intense competition and technological advances in recent years provokes serious challenges in how to harvest the value of technology and use it effectively in IR management. While technology may offer numerous benefits, the relational consequences of technology remain unclear and inconclusive. It is imperative for managers to understand the relational consequences of IT practices, particular IR quality. Results from this dissertation suggest that successful implementation of technology requires IR agents exercising discretion and making informed decisions on deploying suitable technology features for various functions. While state-of-the-art technology may offer the potential opportunity, it is ultimately the actual use of technology in practice that influences Relationship Quality. This research brought to light that the focus of technology management should be on IR agents' ability to make good judgment and decisions instead of pushing technological facilities. It is ultimately IR agents' judicious choice of technology deployment that leverages technology capability to enhance Relationship Quality. Finally, IT Embeddedness was shown to be important for enabling Technology Enactment. It is important that in managing technology managers ensure that technology being deployed in IR management should be tightly coupled with critical work processes and properly integrated with IR interaction activities. This is of interest to marketing managers because it points out potential benefits as well as pitfalls of IT use in IR interactions.

Additionally, as relational structures and rules evolve over time as a result of Sense-making, a gap tends to emerge between current the IR and technology. This study suggests that the better IR agents are at developing and incorporating emerging relational information to

update relational rules, the faster this gap may widen. IR agents should be constantly alert of this possible lag in technology structure and periodically perform assessment to ensure that these structures are updated and aligned.

Limitations

The results of this dissertation should be interpreted in light of a number of limitations. This may raise two concerns. First, this study was conducted in a context of industrial service providers, which may result in minimized variance in responses. This study includes a manageable number of explanatory variables but inevitably excluded factors that may be important in other industries and contexts. Therefore until this research is replicated in other contexts, generalization of the results should take extreme caution. However while limitations are acknowledged, I argue that neither the cognitive Sense-making nor IR agents' enactment of technology is unique to the service industry. Results from this research should be largely generalizable to other industries.

Second, this study was conducted using a questionnaire based key informant design. This study could be subject to potential threats of the subjectivity of key informants and common bias, especially when all questions were reported by the same respondent. However, I argue that complemented by rigorous data collection procedures such as in-depth field interviews, extensive pretesting, and panel expert reviews, this approach produces valid and high quality data. This method is commonly seen and widely accepted in marketing research (e.g. Jayachandran et al. 2005; Olson, Slater, and Hult 2005).

Additionally some measures may be further validated and improved. In particular new measure such as Routinization, Reflexivity, and Technology Enactment should be further

validated in other settings and tested for desirable psychometric properties. In addition the measure items for IT Intensity needs to be further improved and validated. In this study, IT Intensity fails to achieve satisfactory psychometric properties. Future research should develop a better measure for IT Intensity and test the corresponding hypotheses that involve this construct. While some measures may need further refinement, this dissertation did report satisfactory results for measure validation.

Future Research

This dissertation, to the best my knowledge, is the first research that takes on a structurational view of IR to empirically tested the viability of Giddens' (1984) theory on IR research and examine the effects of technology and IR interactions on Relationship Quality. Therefore it opens the door to a large collection of issues to be explored and questions to be answered. Although this research offers groundwork for a new perspective of IR research, many theoretical and empirically issues are yet to be addressed in future research. For instance, future research may provide further clarification regarding specific means and manners IR functions to enable and constrain individual behaviors. Additionally while this dissertation provides a conceptual discussion of the structural properties of IR, future research is apparently needed to elaborate on these properties as well as to empirically test these assertions. As the first attempt to test Giddens' (1984), this study is inevitably limited in generalizability. Future research may further study this phenomenon in multiple industries and contexts where the characteristics of particular industries and contexts can be taken into account.

It is also important that future research explores and documents whether relational structures that each partner firm replies on share similar structural properties. A more interesting

question may be the relational structure to differ, and how it may affect interaction dynamics. Previous research alludes to the importance of "read[ing] from a common script" (Solomon, Surprenant, Czepiel, and Gutman 1985, p. 105) for service providers to develop favorable relationships with their clients. This structuration view of IR in conjunction with Giddens' (1984) structuration theory may provide further insights regarding this issue.

Summary

Both long-term sustainable interfirm relationships and information technology are of growing theoretical and strategic importance in today's interfirm interactions. However, relational consequences of technology remain unclear and inconclusive, which imposes considerable risks and hence provokes theoretical and managerial challenges. How to leverage information technology to effectively manage interfirm relationships attracts much attention from both academic researchers and field managers. Drawing on Giddens' (1984) Structuration Theory and extant marketing and IT literature, this dissertation suggests that IR can be viewed as social structures (i.e. relational structures), and IR quality as a result is jointly influenced by both IR agents' selective enactment of suitable technology features and IR agents' cognitive efforts in Sense-making.

In this study IR agents' Sense-making is shown to positively contribute to Relationship Quality and plays a critical role in mediating effects of everyday IR interactions to Relationship Quality. Similarly IR agents' Technology Enactment of Relationship Management casts positive effects on Relationship Quality and also mediates the relationship of technology integration and Relationship Quality. Additionally cognitive Sense-making seems to mitigate the effect of Technology Enactment on Relationship Quality. In general consistent with extant marketing and

IT research these results highlight the efficacy of human agency in technology use and IR formation and management.

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APPENDIX A

FIELD INTERVIEW AND PRE-TESTING

Field Interview and Pre-testing Guide

Introduction

Hello, Good morning/afternoon. Thank you for taking the time helping us with this study. This is Dr. Johnson in the Department of Marketing at Washington State University (when at presence). My name is Ping Tong, and I'm a doctoral student in the Marketing Department. We are currently working on a research project that concerns interfirm relationships and information technology. We would like to get your insights in this issue.

Qualification

a) Would you tell us a little bit about your experience working with business customers?

b) Would you say you are reasonably familiar with technology applications in your firm?

Managerial relevance questions

Would you give us a quick overview of what you think of technology in managing relationships with your business customers?

Do you feel technology plays a part in how you manage customer relationships?

How important is technology in your management of customer relationships?

How do you feel about research on IT and relationship management? Is it important?

Questionnaire Pre-testing

Thank you for sharing your thoughts with us. Now I would like you to fill out this questionnaire for me. Before you start, please think of a customer firm that you most recently had transactions with and then answer the questions regarding this customer you have in mind. I do have one more request. Please voice your thoughts as you go through these questions, kind of like "think loud" on both question contents and presentation issues such as instruction clarity or appropriate wording etc. Please feel free to stop and ask me for clarifications whenever needed.

NOTES WERE TAKEN AS RESPONDENTS POINTED OUT CONTENT AND PRESENTATION ISSUES IN THE QUESTIONNAIRE.

Thank you very much. Now I would like to visit some of the questions and concerns you raised. Would you elaborate a bit more on this (question/comment) you mentioned? What did you mean by…?

REVIEW RESPONDENTS COMMENTS WHEREEVER RELEVANT AND PROBE FOR MORE DETAILS.

Thank you. That's very helpful. Now I would like you to take a look at these two sheets. (HAND OVER A SHEET WITH THE CONCEPTUAL MODEL AND ANOTHER SHEET WITH CONSTRUCTS, DEFINITIONS, AND MEASURES.) These are some concepts that we think are relevant and important in addressing how information technology may affect interfirm relationships. This model depicts how use of technology may shape interfirm relationships. (BRIEFLY EXPLAIN EACH CONSTRUCT AND MEASURES.)

a) How accurate do you think is this depiction? Does it make sense to you based on your experience?
b) Is there anything that you would add to this model? Would you take out any variable from this model?

Questionnaire Pre-Test

Thank you for your insights. Now in terms of the questionnaire,
(ASK THE FOLLOWING QUESTIONS)

a) Did any question or wording seem to be confusing to you?
b) Did you feel you needed clarification on any of the questions?
c) How difficult was it for you to navigate through the questionnaire?

Thank you very much for your time and insights. We appreciate it.

APPENDIX B

RESEARCH INSTRUMENT

Customer Relationship Development Study

This research project concerns how relationships with business customers are influenced by the use of information technology (IT) in interfirm interactions. Our goal is to understand how firms use IT in business interactions and how it may affect relationship development with customer firms. Please be assured that all information you provide is absolutely confidential and will be used only in summary form. Your responses will never be associated with you or your firm in any way.

This questionnaire is designed to be answered by sales/marketing/customer service/communication managers. If you feel that you are not in the right position to answer these questions, please kindly forward this questionnaire to someone you believe is appropriate in your company. Thank you very much for helping us with this research.

If you would like a copy of the executive summary of the results, please either fill in a mailing address or attach a business card. Thank you.

_____

_____

_____

_____

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

WASHINGTON STATE UNIVERSITY
World Class. Face to Face.

This project is jointly undertaken by the marketing departments at Washington State University and University of Nevada, Las Vegas. Should you have any questions, please contact Dr. Jean L. Johnson at Washington State University by phone 509-335-1877 or by Email at johnsonjl@wsu.edu .

We are interested in the use of IT in your interactions with a business customer. Please identify in your mind a **customer firm** with whom you most recently conducted business. Please provide your responses to the following questions with regard to your interactions with this particular customer firm.

Approximately what percentage of your interaction with this customer (please circle one number)…

involves some form of IT (e.g., email, database, EDI, CRM, conference calls, computer automated ordering, internet etc.)?	*< 10%*	*10%*	*30%*	*50%*	*70%*	*90%*	*>90%*
involves personal face-to-face contact?	*< 10%*	*10%*	*30%*	*50%*	*70%*	*90%*	*>90%*

Please indicate the level of investment your firm has made in (please circle the number corresponding to your answer):

	Little						Substantial
Electronic Data Interchange (EDI) with customers	1	2	3	4	5	6	7
Electronic fund transfer for payment	1	2	3	4	5	6	7
Email, fax, or other IT for customer communication	1	2	3	4	5	6	7
Automated ordering systems	1	2	3	4	5	6	7
Intranet	1	2	3	4	5	6	7
Extranet	1	2	3	4	5	6	7
Customer specific software	1	2	3	4	5	6	7
Sales force automation	1	2	3	4	5	6	7

To what extent do you disagree or agree with the following statements (please check the appropriate box).

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
In our relationship with this customer, we use IT more than average of our industry.	☐	☐	☐	☐	☐	☐	☐
IT-enabled interface is usually the preferred means of our interactions with this customer.	☐	☐	☐	☐	☐	☐	☐

Relative to an industry average, how sophisticated is the IT infrastructure you use with this customer (please check the appropriate box for each item)?

	Basic						State-of-the-Art
	1	2	3	4	5	6	7
Hardware	☐	☐	☐	☐	☐	☐	☐
Software	☐	☐	☐	☐	☐	☐	☐
Telecommunications	☐	☐	☐	☐	☐	☐	☐
IT personnel skills	☐	☐	☐	☐	☐	☐	☐

In your interactions with this customer, to what extent does your firm use IT to (please circle the number that corresponds to your answer):

	Little						Extensively
search, store, and process information	1	2	3	4	5	6	7
showcase products	1	2	3	4	5	6	7
make initial contacts	1	2	3	4	5	6	7
manage customer relationships	1	2	3	4	5	6	7
negotiate contracts	1	2	3	4	5	6	7
coordinate social activities	1	2	3	4	5	6	7
schedule meetings	1	2	3	4	5	6	7
facilitate virtual meetings	1	2	3	4	5	6	7
respond to customer comments	1	2	3	4	5	6	7
learn customer preferences	1	2	3	4	5	6	7
resolve disagreements	1	2	3	4	5	6	7

Please indicate the extent you disagree or agree with the following statements by checking the appropriate box.

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
IT is largely integrated in our regular interactions with this customer.	☐	☐	☐	☐	☐	☐	☐
We rely on IT to make important decisions regarding this customer.	☐	☐	☐	☐	☐	☐	☐
IT is embedded in many aspects of our interactions with this customer.	☐	☐	☐	☐	☐	☐	☐
Our use of IT with this customer involves mostly simple tasks such as emails.	☐	☐	☐	☐	☐	☐	☐
In online access, we tailor the material for this customer.	☐	☐	☐	☐	☐	☐	☐
Online communication with this customer is geared towards their specific needs.	☐	☐	☐	☐	☐	☐	☐
Our sales and service people adapt to the particular needs of this customer.	☐	☐	☐	☐	☐	☐	☐
We have customized online access for this customer firm.	☐	☐	☐	☐	☐	☐	☐
We have customized extranet system(s) dedicated to this customer.	☐	☐	☐	☐	☐	☐	☐
In case of emails, we tailor the content to this customer's interest.	☐	☐	☐	☐	☐	☐	☐

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
We interact with this customer on a regular basis with similar activities.	☐	☐	☐	☐	☐	☐	☐
We are rarely surprised with how this customer responds in a given situation.	☐	☐	☐	☐	☐	☐	☐
Our interactions with this customer are mostly composed of routines.	☐	☐	☐	☐	☐	☐	☐
Our interactions with this customer mostly involve scheduled activities that repeat periodically.	☐	☐	☐	☐	☐	☐	☐
Most activities in our interactions with this customer are pretty much set in an order that we both follow.	☐	☐	☐	☐	☐	☐	☐
Based on our past experiences with this customer we can easily figure out what they want.	☐	☐	☐	☐	☐	☐	☐
We are reasonably confident that we know how this customer will behave in certain conditions.	☐	☐	☐	☐	☐	☐	☐

In our everyday interactions with this customer (please circle a number corresponding to your answer) …

	Rarely						Always
we know the appropriate ways to respond to this customer.	1	2	3	4	5	6	7
for the most part, we can interpret their situation and respond accordingly.	1	2	3	4	5	6	7
we get a hang of what they really mean and want based on the situation.	1	2	3	4	5	6	7
we are able to interpret their unstated messages.	1	2	3	4	5	6	7
we pick up on their implicit, unstated, or nonverbal cues.	1	2	3	4	5	6	7
we can sense when things are not going well.	1	2	3	4	5	6	7
we are highly sensitive to their particular needs.	1	2	3	4	5	6	7
we can understand what they mean even if they don't say it.	1	2	3	4	5	6	7
we can learn a lot based on the implicit cues that are often unstated.	1	2	3	4	5	6	7

Please indicate the extent to which you disagree or agree by checking the appropriate box.

	Strongly Disagree						Strongly Agree
In general we have a clear impression about this customer.	☐	☐	☐	☐	☐	☐	☐
We are often surprised by what is expected of us from this customer.	☐	☐	☐	☐	☐	☐	☐
We believe we know this customer well.	☐	☐	☐	☐	☐	☐	☐
We go back and forth on how much we really know about this customer.	☐	☐	☐	☐	☐	☐	☐
We have a strong sense of who and what this customer firm is.	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐

	Strongly Disagree						Strongly Agree
We often feel we need more information about this customer to make informed decisions.							
In general our interaction with this customer has a positive tone to it.	☐	☐	☐	☐	☐	☐	☐
For the most part, we feel a sense of resentment from this customer.	☐	☐	☐	☐	☐	☐	☐
Many of the remarks from this customer are negative.	☐	☐	☐	☐	☐	☐	☐
This customer seems to respect and appreciate us.	☐	☐	☐	☐	☐	☐	☐
From what we can tell this customer seems to feel pretty good about us.	☐	☐	☐	☐	☐	☐	☐

In our communication with this customer (please circle the number corresponding to your answer) …

	Rarely						Always
Our message exchange is smooth.	1	2	3	4	5	6	7
They misinterpret our messages.	1	2	3	4	5	6	7
They understand our messages.	1	2	3	4	5	6	7
Clarifications are needed in our communications.	1	2	3	4	5	6	7
They seem to have difficulties understanding our messages.	1	2	3	4	5	6	7

Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree						Strongly Agree
This customer keeps promises and commitments made to our firm.	1	2	3	4	5	6	7
This customer is always frank and truthful with us.	1	2	3	4	5	6	7
We believe the information this customer provides us.	1	2	3	4	5	6	7
This customer is genuinely concerned that our business succeeds.	1	2	3	4	5	6	7
This customer is trustworthy.	1	2	3	4	5	6	7
When making important decisions, this customer considers our welfare as well as their own.	1	2	3	4	5	6	7
This customer has a strong sense of loyalty to us.	1	2	3	4	5	6	7
We expect this customer to be working with us for a long time.	1	2	3	4	5	6	7
We see this relationship as a long-term alliance.	1	2	3	4	5	6	7
This customer is really committed to developing a working relationship with us.	1	2	3	4	5	6	7

Please check the appropriate box that corresponds to your answer.

Our relationship with this customer has been a highly successful one.

Strongly Disagree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Agree

Overall, how would you characterize the results of your relationship with this customer?

Far short of expectation ☐ ☐ ☐ ☐ ☐ ☐ ☐ Greatly exceed expectation

Overall how satisfied are you in your relationship with this customer?

Not satisfied at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very Satisfied

We would now like to know about your firm's orientation toward this customer in general. Please indicate the extent to which you disagree or agree with the following statements by checking the corresponding box.

	Strongly Disagree						Strongly Agree
We are willing to do them a favor because we know it will be returned.	☐	☐	☐	☐	☐	☐	☐
They help and support us, and in turn we help and support them.	☐	☐	☐	☐	☐	☐	☐
They are willing to do us a favor because they know that it will be returned.	☐	☐	☐	☐	☐	☐	☐
In this relationship, both partners feel that one good turn deserves another.	☐	☐	☐	☐	☐	☐	☐
They make sure they do their part in the relationship, because they realize we will do ours.	☐	☐	☐	☐	☐	☐	☐
We feel obligated to do our part extremely well in this relationship because they have done their part well.	☐	☐	☐	☐	☐	☐	☐

Please indicate the degree to which the following items accurately describe the nature of your firm's overall relationship with this customer.

	Strongly Disagree						Strongly Agree
Our relationship with this customer firm can be defined as "mutually gratifying."	1	2	3	4	5	6	7
We expect that we will be working with this customer in the future.	1	2	3	4	5	6	7
We feel indebted to our customer for what they have done for us.	1	2	3	4	5	6	7
Our personnel share close social relations with the personnel from this customer firm.	1	2	3	4	5	6	7

In general how would you characterize your firm's current relationship with this customer?

Stable	1	2	3	4	5	6	7	Unstable
Long term	1	2	3	4	5	6	7	Short Term
Insecure	1	2	3	4	5	6	7	Secure
Unsteady	1	2	3	4	5	6	7	Steady

In general, use of IT in our interactions has made our communication and coordination with this customer (Please circle the number corresponding to your answer) …

Less effective	*1*	2	3	4	5	6	7	*More effective*
Lower quality	*1*	2	3	4	5	6	7	*Higher quality*
Worse	*1*	2	3	4	5	6	7	*Better*
Less efficient	*1*	2	3	4	5	6	7	*More efficient*
Less smooth	*1*	2	3	4	5	6	7	*More smooth*

Overall the use of IT in our interactions with this customer has (please check the box corresponding to your answer) …

	Not at all						Greatly
added value to products and services.	☐	☐	☐	☐	☐	☐	☐
reduced customer service time.	☐	☐	☐	☐	☐	☐	☐
reduced marketing sales cost.	☐	☐	☐	☐	☐	☐	☐
increased sales revenue.	☐	☐	☐	☐	☐	☐	☐
enhanced quality of transactions.	☐	☐	☐	☐	☐	☐	☐
Increased our productivity.	☐	☐	☐	☐	☐	☐	☐
facilitated decision making by improving quality of information handling.	☐	☐	☐	☐	☐	☐	☐
offered opportunities for more creative analysis and outputs.	☐	☐	☐	☐	☐	☐	☐
improved our firm's ability to make offers of superior value propositions.	☐	☐	☐	☐	☐	☐	☐

Since we implemented IT in our interactions with this customer, our financial performance with this customer has (please circle the number corresponding to your answer) ...

been poor	1	2	3	4	5	6	7	been outstanding
been not satisfactory at all	1	2	3	4	5	6	7	been very satisfactory
fallen short of expectation	1	2	3	4	5	6	7	exceeded expectation
much less revenue	1	2	3	4	5	6	7	more revenue
much worse gross profit margin	1	2	3	4	5	6	7	greater gross profit margin

Our relationship with this customer is characterized as (please check <u>one</u> only) ...

- ❑ Exploratory, inquiring, discovering, testing, inquisitive, and prospective.
- ❑ Building-up, developing, reinforcing, growing, promising, and budding.
- ❑ Mature, established, steadfast, stable, secure, and lasting.
- ❑ Declining, dissatisfying, retreating, diminishing, deteriorating, and losing ground.

Please continue to the next page ⇨

Our relationship with this customer is characterized as ... (please check one only)

- ❑ Sharing, equal, communal, transitive, symmetric, harmonious, and altruistic.
- ❑ Hierarchical, influential, controlling, asymmetrical, ranked, and dominant.
- ❑ Reciprocal, egalitarian turn-taking, balanced, compensatory, and one-for-one correspondence.
- ❑ Strictly economic exchange, exclusively cost-benefit based, and extremely calculating and utilitarian.

In general how would you describe the relationship with this customer (please check the appropriate box)?

Our firm:								Customer firm:
has greater bargaining power	☐	☐	☐	☐	☐	☐	☐	has greater bargaining power.
has greater control	☐	☐	☐	☐	☐	☐	☐	has greater control
has greater influence	☐	☐	☐	☐	☐	☐	☐	has greater influence
is more dependent	☐	☐	☐	☐	☐	☐	☐	is more dependent

In addition to using IT in our interactions with this customer (please circle the appropriate number),

	Rarely						Frequently
we make an effort to have personal contact.	1	2	3	4	5	6	7
we schedule personal meetings or visits.	1	2	3	4	5	6	7
we make it a point to call or visit this customer.	1	2	3	4	5	6	7

Please take a minute to fill out the following information for classification purpose.

What is the highest degree you have completed? ❑ High school ❑ College ❑ Masters/MBA ❑ Ph.D.

What is your current position? _____

How long have your been in your current position? _____

How long have you worked with this customer? _____

What percentage of total sales was generated by this customer in the past year? _____
What is your average IT budget as a percentage of your firm's annual revenue sales? _____%

In what product/market does your firm/division compete? _____

Thank you very much for your time and thoughtful support for this research!

Please return the completed questionnaire in the enclosed postage paid envelope to:

Dr. Ruby Lee
Department of Marketing
4505 Maryland Parkway
University of Nevada, Las Vegas
Las Vegas, NV 89195-9413

Note: This serial number is for tracking purposes only. Once we have received your response, we will not contact further. No particular firm or manager will be identified in any way.

APPENDIX C

MEASURES

Measures

IT Enactment *Scale anchors 1 = Little, 7 = Extensively*

Coordination

In your interactions with this customer, to what extent does your firm use IT to:

1. coordinate social activities
2. schedule meetings
3. facilitating virtual meetings

Relationship management

In your interactions with this customer, to what extent does your firm use IT to:

1. make initial contacts
2. manage customer relationships
3. learning customer preferences

Sense-making *Scale anchors 1 = strongly disagree, 7 = strongly agree*

1. We are reasonably confident that we know how this customer will behave in certain conditions.
2. We know the appropriate ways to respond to this customer.
3. For the most part, we can interpret the situation and respond accordingly.

Reflexivity *Scale anchors 1 = rarely, 7 = always*

In our everyday interactions with this customer,

1. We are able to interpret their unstated messages.
2. We pick up on implicit, unstated, or nonverbal cues.
3. We can understand what they mean even if they don't say it.
4. We can learn a lot based on the implicit cues that are often unstated.

Routinization *Scale anchors 1 = strongly disagree, 7 = strongly agree*

1. Our interactions with this customer are mostly composed of routines.
2. Our interactions with this customer mostly involve scheduled activities that repeat periodically.
3. Most activities in our interactions with this customer are pretty much set in an order that we both follow.

IT Infusion

IT Artifact *Scale anchors 1 = basic, 7 = state-of-the-art*

Relative to an industry average, how sophisticated is the IT infrastructure you use with this customer?

1. Hardware
2. Software
3. IT personnel skills

IT Embeddedness *Scale anchors 1 = strongly disagree, 7 = strongly agree.*

1. IT is largely integrated in our regular interactions with this customer.
2. We rely on IT to make important decisions regarding this customer.
3. IT is embedded in many aspects of our interactions with this customer.

Relationship Quality

Trust *Scale anchors 1 = strongly disagree, 7 = strongly agree*

1. *This customer keeps promises and commitments made to our firm.*
2. *This customer is always frank and truthful with us.*
3. *We believe the information this customer provides us.*
4. *This customer is genuinely concerned that our business succeeds.*
5. *This customer is trustworthy.*
6. *When making important decisions, this customer considers our welfare as well as their own.*

Commitment *Scale anchors 1 = strongly disagree, 7 = strongly agree*

1. *This customer has a strong sense of loyalty to us.*
2. *We expect this customer to be working with us for a long time.*
3. *We see this relationship as a long-term alliance.*
4. *This customer is really committed to developing a working relationship with us.*

Stability

In general, how would you characterize your firm's current relationship with this customer?

1. Stable *Scale anchors 1 = Stable, 7 = Unstable*
2. Security *Scale anchors 1 = Insecure, 7 = Secure*
3. Steadiness *Scale anchors 1 = Unsteady, 7 = Steady*

APPENDIX D

COVER LETTERS

The following presents the cover letters and guidelines that were used at various stages of data collection to contact and follow up with the firms in the sample. The first letter was a pre-notification letter that was sent out to the firms in the sample prior to the packet of the main study to introduce the project. The second letter was the cover letter for the main study packet that emphasized the request for participation and offered an access code for those who preferred to respond electronically. The third letter was a reminder that was used in following up with respondents to encourage response. The fourth one was a guide for telephone follow-ups.

February 14, 2006

Mr. Kenneth P. Cohen
Exxon Mobil
5959 Las Colinas Boulevard
Irving, TX 75039

Dear Mr. Kenneth Cohen:

In a few days you will receive in the mail a questionnaire from the Department of Marketing, Washington State University, for a research project studying the use of information technology (IT) in business interactions. I am writing to inform you of the upcoming survey administration and to ask for your participation. It would really help us out if you would spare a few minutes of your time to provide us your valuable responses.

In this research project, we will study the use of IT and its consequences in hope of developing a better understanding of IT in business relationships. I believe this issue is particularly pertinent for today's marketing practices given the increasing prevalence of IT applications in business markets.

I am writing in advance to introduce you to the research project. Should you decide to help us by completing the survey, I want to assure you of *complete confidentiality*. Our concern is with information aggregated over a large number of firms, not with any individual firm or manager. Neither the identity of the firms nor managers participating in the study will be disclosed in any form at any point. We will use the information in summary form only.

Our aim is to help marketing managers make effective decisions about employing IT applications in business-to-business markets. I will be happy to provide you with a summary of the results. Your generous participation will improve the power and relevance of the research as well as provide you with interesting information concerning this important issue.

Thank you in advance for your time in this matter.

Sincerely,

Dr. Jean L. Johnson,
Professor of Marketing

March 4, 2006

Mr. Kenneth P. Cohen
Exxon Mobil
5959 Las Colinas Boulevard
Irving, TX 75039

Dear Mr. Kenneth Cohen:

I am writing to you regarding a research project being conducted by Department of Marketing, Washington State University. This research focuses on customer relationship management and the use of information technology (IT) in business interactions. In this study we hope to develop a better understanding of the influence of IT use on business relationships between firms.

We believe this issue is particularly pertinent for today's marketing practices and very useful to managers given the increasing prevalence of IT applications in business markets. It would really help us out if you could spare a few minutes of your time to help us with this research by completing and returning the enclosed questionnaire. Your generous participation will improve the power and relevance of the research as well as provide you with interesting information concerning this important issue. We will be glad to provide you with a summary of results upon request.

Should you decide to help us by completing the survey, I want to assure you of *complete confidentiality*. Our concern is with information aggregated over a large number of firms, not with any individual firm or manager. Neither the identity of the firms nor managers participating in the study will be disclosed in any form at any point. We will use the information in summary form only. Thank you very much for your time and support of this research.

To make it as easy as possible for you to complete the survey, we have enclosed a hardcopy with a postage paid return envelope in addition to putting it online at http://www.cbe.wsu.edu/~jeanj. Should you choose to complete the survey online, your access code is «tracking». If you don't think you are in the right position to participate in this study, please kindly forward the enclosed questionnaire and the link to someone you believe is appropriate. Should you have questions or concerns with respect to this survey, please do not hesitate to contact me at 509-335-1877 or email johnsonjl@wsu.edu.

Thank you for your time and support in this matter.

Sincerely,

Dr. Jean L. Johnson,
Professor of Marketing

April 6, 2006

Mr. Kenneth P. Cohen
Exxon Mobil
5959 Las Colinas Boulevard
Irving, TX 75039

Dear Mr. Kenneth Cohen:

About four weeks ago we sent you a questionnaire regarding a research project on business customer relationships and information technology (IT) being conducted by researchers at Washington State University and University of Nevada, Las Vegas. While we have received responses from a wide variety of firms, we have not heard from you. I am writing to you again because your response is very important for us to get accurate results. We have selected your firm based on a scientific sampling procedure, and it is only by hearing from nearly every firm in the sample that we can be confident that our results are truly representative. We believe that this research is important, as the results will be useful for managers in firms like yours to make more effective use of IT in customer relationship management.

We understand you are very busy, so as a small token of our appreciation for your time, please allow us to buy you a cup of coffee with the enclosed dollar bill. It would really help us out if you could spare a few minutes of your time to help us by completing and returning the enclosed questionnaire. This survey should take about 10-12 minutes, just about the time you enjoy a cup of coffee. We will be glad to share the results with you. You may indicate whether you are interested in receiving a report on the cover page of the questionnaire.

Should you decide to help us by completing the survey, I want to assure you of *complete confidentiality*. Neither the identity of the firms nor managers participating in the study will be disclosed in any form at any point. The tracking number at the back of the question is for the purpose of tracking responses only. Once we have heard from you we will check your name off the list and will contact you no further. The list of the names will be destroyed as well.

To make it as easy as possible for you to complete the survey, we have enclosed a hardcopy questionnaire with a postage paid return envelope as well as put it online at http://www.cbe.wsu.edu/~jeanj (follow the CRDSurvey link). Should you choose to complete the survey online, your access code is «tracking». Should you have questions or concerns with respect to this survey, please do not hesitate to contact me at 509-335-1877 or email johnsonjl@wsu.edu.

Thank you for your time and support in this matter.

Sincerely,

Dr. Jean L. Johnson,
Professor of Marketing

Telephone Follow-up Guide

Good morning/Good afternoon, this is Ping Tong calling from the College of Business at Washington State University. May I speak with <u>Respondent's Name</u>?

YES (to the respondent)**-**

Good morning/good afternoon. My name is Ping Tong. I'm calling on behalf of Dr. Jean Johnson from Washington State University. A few days ago, we sent a survey related to Information Technology and Customer Relationship Development. I am calling to see if you have received the survey and if you have any questions or comments regarding this study at this point.

- *I have completed and mailed out the survey*
    - **Thank you very much. I really appreciate it. Have a good day. Bye.**
- *I am not in marketing. I have forwarded it to a marketing person.*
    - **Thank you for doing that. May I have his/her name?** <u>(Write down the name)</u> **May I also have his/her telephone number so that I can contact him/her?**
        - *Sure* <u>(write down the number, thank him, and call the referee).</u>
        - *No.*
            - **We would like to contact her/him in case s/he has any questions or concerns. We'd appreciate it** *<u>(if still no, thank him and hang up).</u>*
- *I have never received such survey.*
    - **We might have sent to a wrong address. Let me verify your address. -Is your current mailing address ….** <u>(read address to confirm)</u>?
        - *Yes, it is correct.*
            - **We will send you another copy tomorrow. Thank you for your time and we look forward to receiving your completed survey.**
        - *No, it's not.*
            - **May I have your current address?**
                - **OK.** *(*<u>take address</u>*)* **We will send you another copy tomorrow. Thank you for your time and we look forward to receiving your completed survey.**
                - **No.** <u>(probe a little bit</u>. *If still no, thank him and hang up. Mark the firm as refusal.)*

Yes – to his/her assistant

Good morning/good afternoon. My name is Ping Tong. I'm calling on behalf of Dr. Jean Johnson from Washington State University. A few days ago, we sent a survey related to Information Technology and Customer Relationship Development. I am calling to see if you have received the survey and if you have any questions or comments regarding this study at this point.

- *Yes*

- go to above conversation

- *No, he is not available now (OR answer machine picks up).* leave a message to the assistant or secretary but not on answering machine.
  - **When would be a better time to call back?**
    - Schedule a time to call back OR ask the assistant to leave a message. Thanks him/her and mark a recall appointment.

No, he/she is no longer with the company / There is no such person in this company.

May I speak with the current (position title here)?

- *Yes – to this person*

  - *Get this person's name and address and use this call as the prenotification letter (?).*

(Good morning/good afternoon. My name is Ping Tong. I am calling on behalf of Dr. Jean Johnson from Washington State University. We are conducting a study related to the use of information technology (IT) in business interactions and we would like your cooperation. We will be sending you a questionnaire in the next few days. Is your current mailing address ….. (read the address to confirm). May I have your name please? Thank you very much for your time and cooperation. Have a nice day. Bye.

- *Yes – to his/her assistant*

  - **May I speak with *(position title here)*?**

    - *Yes* - Get this person's name and address and use this call as the pre-notification letter (as above).

    - *No he is currently not available.*
      - Ask for his name and address, thank him/her and update address list for the first mailing.

APPENDIX E

CODING LIST

CODING LIST

IT Enactment[a]

Coordination

In your interactions with this customer, to what extent does your firm use IT to:	
ECD1	coordinate social activities
ECD2	schedule meetings
ECD3	facilitating virtual meetings

Relationship Management

In your interactions with this customer, to what extent does your firm use IT to:	
ECR1	make initial contacts
ECR2	manage customer relationships
ECR3	learning customer preferences

Sense-making

SMK1	We are reasonably confident that we know how this customer will behave in certain conditions.
SMK2	We know the appropriate ways to respond to this customer.
SMK3	For the most part, we can interpret the situation and respond accordingly.

Reflexivity

In our everyday interactions with this customer,	
REF1	We are able to interpret their unstated messages.
REF2	We pick up on implicit, unstated, or nonverbal cues.
REF3	We can understand what they mean even if they don't say it.
REF4	We can learn a lot based on the implicit cues that are often unstated.

Routinization

RUT1	Our interactions with this customer are mostly composed of routines.
RUT2	Our interactions with this customer mostly involve scheduled activities that repeat periodically.
RUT3	Most activities in our interactions with this customer are pretty much set in an order that we both follow.

[a] Reverse coded items are marked with *(R)*.

IT Infusion

IT Artifact

Relative to an industry average, how sophisticated is the IT infrastructure you use with this customer?	
ITART1	Hardware
ITART2	Software
ITART3	IT personnel skills

IT Embeddedness

ITEMB1	IT is largely integrated in our regular interactions with this customer.
ITEMB2	We rely on IT to make important decisions regarding this customer.
ITEMB3	IT is embedded in many aspects of our interactions with this customer.

Relationship Quality

Trust

TRST1	This customer keeps promises and commitments made to our firm.
TRST2	This customer is always frank and truthful with us.
TRST3	We believe the information this customer provides us.
TRST4	This customer is genuinely concerned that our business succeeds.
TRST5	This customer is trustworthy.
TRST6	When making important decisions, this customer considers our welfare as well as their own.

Commitment

CMT1	This customer has a strong sense of loyalty to us.
CMT2	We expect this customer to be working with us for a long time.
CMT3	We see this relationship as a long-term alliance.
CMT4	This customer is really committed to developing a working relationship with us.

Stability

In general, how would you characterize your firm's current relationship with this customer?	
STBL1	Stable (R)
STBL2	Security
STBL3	Steadiness