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Understanding the Barriers to the Assimilation of Interorganizational Technologies in Channel Relationships

Jennifer L. Fries

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UNDERSTANDING THE BARRIERS TO THE ASSIMILATION OF INTERORGANIZATIONAL TECHNOLOGIES IN CHANNEL RELATIONSHIPS

BY

JENNIFER LEIGH FRIES

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ACCEPTANCE

This dissertation was prepared under the direction of Jennifer Fries' Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctoral of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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ABSTRACT

UNDERSTANDING THE BARRIERS TO THE ASSIMILATION OF INTERORGANIZATIONAL TECHNOLOGIES IN CHANNEL RELATIONSHIPS

BY

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Organizations are increasingly focusing on their value chain activities in an effort to improve their performance, especially in the recent economic times. Improving the effectiveness and efficiency of their channel activities has become a focal point for many organizations. Interorganizational systems (IOS's) have played an important part in this effort. While in theory, IOS's have the ability to enhance the degree of cooperation and coordination between two channel partners, often the results obtained are not what is expected. Hence, it becomes very important to understand the barriers to the assimilation of these technologies. Drawing upon theoretical perspectives of governance, including transaction cost analysis (TCA), control theory and agency theory, we develop an integrative model that examines the factors that influence an organizations assimilation process. The model identifies and examines three stages of assimilation: technological, exploitive and explorative assimilation that add value to an organization. The model features asset specificity, technological uncertainty, performance documentation, agent orientation and bilateral governance mechanisms as antecedents to assimilation. It also examines the moderating effects of bilateral mechanisms.

Our results suggest that theories of governance provide an additional lens to examine assimilation phenomena. In specific, our empirical analysis leads to several key findings: (1) channel partners who are locked in to the relationship with high levels of asset specificity are more likely to assimilate the technology; (2) bilateral governance mechanisms are a key force in the assimilation process, with both direct and moderated effects; (3) organizations that view the channel partner as an agent of the firm are less likely to adopt the technology, especially when the relationship exhibits low levels of bilateral governance mechanisms. Together these findings provide new insights into barriers to the assimilation of IOS's in channel relationships.

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CHAPTER 1: INTRODUCTION

Over the last four decades, interorganizational systems (IOS's) have become increasingly important in channel partner relationships. An IOS can be defined as an information technology system that links two or more organization's business processes together in such a way that information is automatically distributed between channel partners (Grover 1993; Johnston and Vitale 1988; Robey, Im and Wareham 2008). An IOS is designed to support collaboration and cooperation between channel partners (Volkoff, Chan and Newson 1999). These systems include hardware, software, network facilities, procedures, rules, databases and knowledge exchange between two or more organizations (Hausman, Johnston and Oyedel 2005).

IOS's enhance the degree of cooperation and coordination between two channel partners and include such technologies as electronic data interchange (EDI), supply chain management systems, electronic commerce and most recently Radio Frequency Identification (RFID) technologies (Curtin, Kauffman and Riggins 2007). These technologies are often mandated by one channel partner, who makes the adoption of the technology a mandatory requirement for their channel partner to continue the exchange relationship. While power plays a significant role in channel partner IOS, it is not the holy grail, as Wal-Mart, the world's largest retailer, has learned from its faltering RFID-based IOS mandates that began in 2003. Although the RFID mandates have not progressed as originally planned, the importance of these systems is highlighted by Wal-Mart's recent strategy to increase its direct-from-manufacturer purchases from 20% to 80% of all goods purchased (Birchall 2010), which emphasizes the need for efficient supply chain management.

The main reason channel partners are motivated to implement IOS's is their desire to create additional economic value through the creation of more effective and efficient interorganizational interactions (Buvik and John 2000; Kumar and van Dissel 1996; Wilson and Vlosky 1998). Economic value is created through the channel partners' investments in specific assets, increased knowledge exchange, the combining of complementary resources and lowered transaction costs (Dyer and Singh 1998). While economic value is the goal of the IOS implementation process, it is not a guaranteed outcome, mainly due to the interdependencies of performance outcomes that are created by the implementation process (Son, Narasimhan and Riggins 2005).

With an IOS, neither of the channel partners can optimize the benefits of the technology unless both channel partners assimilate the technological components and reengineer business processes. The adoption and assimilation of an IOS is the result of a complex and iterative process of negotiations, commitments and executions of those commitments (Ring and Van de Ven 1994). It begins with one trading partner's decision to adopt the technology; this partner may be the supplier or the retailer, and as such they can be considered the *initiator*. Those channel partners who participate in the adoption are considered *followers*. With the most recent RFID-based IOS projects, in almost all cases the initiator has been the retailer and the supplier has been the follower.

IOS projects carry more risk than internal technology applications for both the initiator and follower because of the reliance on and lack of control over the trading partner's behaviors. In order for the value to be derived from an IOS, both channel partners must adopt and utilize the technology. This becomes problematic for the organization initiating the technological enhancement due to the fact that they often have little control over the adoption behaviors of their partner organization's and hence limited control in realizing benefits from the technology (Bello, Lohtia, and Sangtani 2004).

The need to understand the adoption behavior of follower's is especially crucial as major retailers, including Wal-mart, Macy's and JC Penney, and governments attempt to mandate the adoption and utilization of RFID-based IOS's. Considering that blanketed mandates, where all suppliers are given assimilation deadlines or face penalties, have been ineffective in accelerating the diffusion of the technology, it becomes important to understand what drives the assimilation process. Mandates are an excise of power and give followers no choice in the matter of adoption unless they are willing to terminate the relationship and lose the sales revenue generated from the exchange relationship. Nevertheless, the scalability of the RFID-based IOS allows followers to choose the degree to which they will adopt the physical components of the technology, ranging from low level implementation of solely the tags, to higher level implementations that include the software, hardware and enterprise exchange components that allow the free flow of information between the channel partners. As a result, the degree of assimilation has varied greatly across followers. Considering that neither partner can realize the benefits of the RFID system if the follower doesn't assimilate and utilize the technology, understanding the variation

in the assimilation of followers becomes key to understanding how and why interorganizational systems succeed.

The extant research surrounding IOS adoption and assimilation suggests some rationales for the variation in the assimilation. In particular, three main categories of antecedents have been shown to influence assimilation: characteristics of the technology, organization and exchange. The first stream focuses on the characteristics of the technology, and suggests that the difficulty associated with adopting and assimilating IOS's can be attributed to the perceived relative advantage, compatibility, complexity, trialability and observability (Chwelos, Benbasat and Dexter 2001; Iacovou, Benbasat and Dexter 1995; O'Callaghan, Kaufmann and Konsynski 1992; Rogers 2003). While this has been the predominate paradigm for analyzing IOS adoption and use, researchers suggest that technological characteristics alone are limited in their ability to explain the variance in adoption and assimilation processes (Attewell 1992). The major argument is that innovation theory only considers knowledge about the technology and ignores the implications of knowing how to implement and use the technology (Attewell 1992; Fichman and Kemerer 1997).

A second stream of research, which focuses on the characteristics of the organization, represents the follower's ability to adopt and implement an IOS. This stream of research suggests that each organization has a unique endowment of resources that impact its ability to adopt and implement IOS's (Kim, Cavusgil and Calantone 2006; Fichman and Kemerer 1997; Piccoli and Ives 2005). Researchers rely on various theoretical foundations and several "middle-range" theories to explain the relationship between organizational characteristics and IOS adoption and

implementation behaviors. Although this stream of research is prolific, some authors suggest that the theoretical diversity threatens the legitimacy of the research (Benbasat and Zmud 2003).

The third stream of research utilizes characteristics of the exchange to examine the willingness of a follower to adopt and implement an IOS with the initiator. Considering that an IOS represents a mechanism for two organizations to vertically coordinate, and vertical coordination is a hybrid form of governance, there were very few articles that examined how the characteristics of the exchange influence the extent to which the follower will vertically coordinate through the adoption and implementation of an IOS (Buvik and John 2000). While there were several studies that examine the influence of dependence, trust, and power (Hart and Saunders 1998; Hausman and Stock 2003; Premkumar and Ramamurthy 1995; Wu, Mahajan and Balasubramanian 2003), there were only a few studies that examined how elements of the exchange relationship would influence the follower's willingness to adopt and implement the technology. Additionally, attention has been paid to the positive influence of specific assets (Bala and Venkatesh 2007; Corsten and Kumar 2005; Zaheer, and Venkatraman 1994), but little has been written to explain how technological uncertainty and performance ambiguity impact the assimilation process.

Though researchers have formulated a general understanding of the assimilation of IOS's, there is a need for a richer understanding of the process and its drivers. Traditional models of diffusion suggest that time and technological characteristics are the greatest predictors of adoption behaviors (Rogers 2003). However, in mandated situations followers do not have the

choice to adopt; rather, their choice is whether or not they should retain the business relationship. Their decision becomes one of channel efficiency.

Essentially, the decision the follower is making is one of acquiescing or not acquiescing to the new mode of governance that the technology imposes on the exchange relationship. With RFID-based IOS's, the technology can provide bilateral behavioral monitoring capabilities for both channel partners. The extent of this monitoring capability is highly dependent on the level of RFID component implementation, and while visibility increases with the installation of the readers, middleware, hardware, and enterprise exchange systems, the level of tagging has the greatest impact. Initial mandates required tagging at the case and pallet level; however, item level tagging provides the most granular visibility and has been demonstrated to provide significant improvements in various supply chain activities (Delen, Hardgrave and Sharda 2007). At this level, individual items can be tracked at a distance using radio waves, providing real time tracking of each product as it passes through the supply chain. RFID-based IOS's provide newfound visibility into such activities and tasks as stock rotation, out-of-stock management, reverse logistics management, as well as enhanced visibility for monitoring delivery verifications, chargebacks and promotional activities. The increase in visibility that the technology provides represents a change in the structure of the relationship, and as such the decision to implement the technology becomes more of a governance decision and less of an adoption decision. As such, theories of efficient contracting, with contracting defined in the broad sense provided by Heide (1994), can be applied to the phenomena of the assimilation of IOS's.

Three theories of governance, control theory, agency theory and transaction costs analysis, can provide additional theoretical lenses that might further explain the assimilation of IOS's. It can be argued that the implementation of an IOS represents the "purposive organization of activities and information flows between independent organizations," (Buvik and John 2000), or in simpler terms a mechanism that enables vertical coordination between channel partners (Buvik and John 2000; Grover and Saeed 2007; Kumar and van Dissel 1996; Zaheer and Venkatraman 1994). This suggests that the IOS represents a governance structure. The degree of implementation, which varies across organizations, determines the level of governance that exists within the relationship. Under this logic, the assimilation of an IOS is similar to joint action in that it is a hybrid governance structure (Heide 1994). Following the logic of Jaworski (1988) and Jaworski and MacInnis (1989), the IOS can be seen as a formal control mechanism designed to "increase the probability that specified plans are implemented properly and desired outcomes are achieved". Implementation of the IOS represents a behavior-oriented contract between the channel partners (Eisenhardt 1989). The two complementary theories suggest that the assimilation of the IOS will be dependent on elements of the exchange relationship.

PURPOSE OF STUDY

In the adoption literature, researchers have suggested that acquiring the physical components of the technology does not lead to deployment and use (Fichman and Kemerer 1999), indicating that there is a distinction between the decision to purchase the technology and the assimilation activities (Rogers 2003). This research will examine the deployment and utilization of interorganizational technologies, in the context of RFID systems, which has been referred to as assimilation (Fichman and Kemerer 1997). RFID-based IOS systems were selected as the

context due to relative newness of the technology applications in the retail setting. The overarching objectives of this research are to (1) create a mediated measure of assimilation, (2) understand the relational drivers of assimilation, (3) provide a theoretical framework for examining the influence of the characteristics of the exchange relationship, and (4) determine how bilateral governance mechanisms moderate the relationship between characteristics exchange relationship and assimilation.

CONTRIBUTIONS OF STUDY

The model of interorganizational RFID assimilation within channel relationships provides new insight into the phenomena of IOS assimilation. First, this new perspective on RFID assimilation contributes to the assimilation stream of literature by providing a higher-order measure of IOS assimilation. Second, we provide a theoretical framework for examining the relationship between exchange relationship characteristics and assimilation. Third, we examine how bilateral governance mechanisms differentially influence the relationship between characteristics of the exchange and assimilation.

ORGANIZATION OF STUDY

This manuscript is organized as follows. Chapter 2 provides a comprehensive literature review on the topics of assimilation and governance mechanisms. Chapter 3 presents the conceptual model, conceptualizations of the constructs and corresponding hypothesis. Chapter 4 discusses the research design and methodology, as well as how each construct will be measured and data collection procedures. Chapter 5 summarizes the results of the analyses. Finally, Chapter 6

provides the discussion of key contributions, theoretical implications, study limitations and directions for future research.

CHAPTER 2: LITERATURE REVIEW

This study focuses on specific characteristics that explain the propensity to assimilate a mandated IOS. The objective is to examine several major theories that motivate and substantiate the conceptual model proposed in this study. We review the dominant theories in adoption and assimilation and then examine relevant theories of governance.

A REVIEW OF THE RELEVANT LITERATURE ON ASSIMILATION

Innovation Theory

In a review of empirical research surrounding IOS's, Robey, Im and Wareham (2008), found that the majority of the studies rely upon Rogers' (2003) diffusion of innovation theory. Under this theoretical lens, innovation is defined as an "idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers 2003). Adoption occurs as a sequence of events beginning with awareness of the technology, followed by attitude formation, then a decision to adopt or reject the technology, and followed by the implementation of the technology (Rogers 2003). Five characteristics of the innovation have been identified as the key to understanding the variance observed in adoption behaviors (Rogers 2003). Relative advantage describes the degree to which an adopter perceives that the innovation is better than the idea it will replace (Rogers 2003). Compatibility represents the congruence between the innovation and the existing values, experience and needs of the adopter. Complexity is the difficulty associated with understanding and using the technology. Trialability is the extent to which the innovation can be experimented with on a trial basis (Rogers 2003). And finally, observability is the extent to which the adopter can observe the results that other have had with the innovation.

Of the five characteristics that influence adoption, relative advantage, compatibility and complexity have the most theoretical evidence supporting their role in explaining IOS adoption. Research indicates that the more an organization perceives the IOS as having benefits exceeding the current legacy system, the more likely they are to adopt (Chwelos, Benbasat and Dexter 2001; Iacovou, Benbasat and Dexter 1995; O'Callaghan, Kaufmann and Konsynski 1992). In regards to complexity, research suggests that the harder the IOS is to understand and use, the lower the likelihood that the organization will adopt or implement the IOS (Grover 1993; Grover and Saeed 2007). Research on compatibility suggests that the more consistent the IOS is with existing organization values, experience and needs, the more likely it will be adopted and internally and externally diffused (Grover 1993; O'Callaghan, Kaufmann and Konsynski 1992; Ramamurthy and Premkumar 1995).

Assimilation Framework

Similar to Rogers' diffusion of innovation theory, the assimilation framework is also concerned with the mechanisms that drive adoption, although they suggest a far different rational and the drivers are not as clearly specified. Attewell (1992) introduces the framework and suggests that the classical diffusion models are less applicable when dealing with complex technologies due to the fact that it does not consider the abilities of the adopting organizations. Complex technologies create knowledge barriers for organization that have limited technical knowledge and know-how which impacts their ability to adopt and implement technologies (Attewell 1992). The assimilation framework suggests that knowledge barriers are created when organizational resources are insufficient to the extent that they place burdens on organizational learning

(Attewell 1992; Fichman and Kemerer 1997). Organizations are less susceptible to knowledge barriers when they have resources that encourage organizational learning (Fichman and Kemerer 1997).

Similar to adoption, assimilation of a technology is a process that begins with an organizations awareness of the technology. Once they are aware of the technology and show an interest in its applications, the organization will evaluate the technology, and then decide to deploy the technology within the organization, which is followed by limited then full deployment (Fichman and Kemerer 1997). In regards to IOS's, assimilation has been conceptualized and operationalized in many different manners. Several researchers define assimilation as a process beginning with the awareness of the technology and ending with its deployment (Fichman and Kemerer 1997; Rai, Patnayakuni and Patnayakuni 2008). Bala and Venkatesh (2007) define IOS assimilation as the extent to which the IOS can sustain and facilitate relevant business activities that become widely deployed and routinized in an organization. Another conceptualization focuses on the extent of use and the routinization of the use across the organization (Purvis, Sambamurthy and Zmud 2001).

In the assimilation literature, the driver's of assimilation have been defined in terms of organizational resources. These resources must reach a state where the technology can be used effectively (Fichman and Kemerer 1997). The gap between the current state of resources and the resources necessary for the assimilation of the technology vary across organizations depending on the extent which the resources burden organizational learning (Fichman and Kemerer 1997). The literature identifies several resources that burden organizational learning. Fichman and

Kemerer (1997) find that the less prior knowledge related to the technology and the less diversity of knowledge within an organization the less likely the organization is to initiate and sustain the assimilation of the technology. In this case, when an organization has less prior knowledge it will be harder to acquire new knowledge and more knowledge must be acquired, resulting in a large knowledge burden for the organization. Similarly, diversity of knowledge represents an organization's ability to relate new information to what is already known (Fichman and Kemerer 1997). Research finds that the less diverse the organization's knowledge, the lower their ability to assimilate (Fichman and Kemerer 1997). Several studies have found that IT infrastructure will positively influence assimilation (Armstrong and Sambamurthy 1999; Rai et al. 2006). IT infrastructure capabilities represent the gap between the existing IT infrastructure and the infrastructure changes required for the new technology. A large gap between the existing infrastructure and the new infrastructure places a burden on organization learning in that it requires that the organization understand new technical features and specifications.

A REVIEW OF THE RELEVANT LITERATURE ON GOVERNANCE

As stated by Heide (1994), "governance is a multidimensional phenomenon, encompassing the initiation, termination and ongoing relationship maintenance between sets of parties." It includes the structuring, monitoring and enforcement of exchange relationships and subsumes issues of channel control (Heide 1994). Three theories germane to channel governance are control theory, agency theory and transaction cost analysis because they suggest what elements of the transaction relationship encourage or discourage the implementation and use of RFID-based IOS's. While control and agency theories have been utilized primarily in the examination of

intraorganizational relationships, some researchers have extrapolated the theories to understand independent channel relationships (Celly and Frazier 1996; Gilliland, Bello and Gundlach 2010). In essence, the assimilation of the RFID-based IOS represents a decision on the part of the principal (the supplier) to implement a control system that monitors the agent's (the retailer's) outcomes and behaviors. A high level of assimilation corresponds to a behavioral-control system that monitors the processes of the agent. Assimilation at low levels represents a decision to utilize outcome-based control systems. Each of these theories suggests conditions under which each system is most suitable. Each theory approaches the assimilation problem with different assumptions and different antecedent variables. As such, it is beneficial to examine the phenomena under these three lenses. In the following section we compare and integrate the three theories as they pertain to the assimilation of IOS's.

Control Theory

Control refers to an organization's attempts to influence their channel partners behaviors and activities to achieve desired goals (Anderson and Oliver 1987; Jaworski 1988; Jaworksi and MacInnis 1989; Jaworksi Stathakipoulos and Krishnan 1993). The procedures that the organization uses to monitor, evaluate, manage and influence its channel partner during the lifetime of the exchange are considered the organization's control system (Anderson and Oliver 1987). These controls are vital to the efficiency of the channel because they influence member behavior, ideally in a way that enhances value for both channel partners (Anderson and Oliver 1987; Gilliland, Bello and Gundlach 2010). Formal, or unilateral controls, and informal controls, or bilateral controls, exist within the channel relationship and may operate in solitude or tandem (Jaworski 1988; Jaworski, Stathakopoulos and Krishnan 1993).

Research suggests formal control is executed through two alternative strategies: outcome control and behavior control (Eisenhardt 1985; Jaworski 1988; Jaworksi and MacInnis 1989; Joshi 2009). Outcome controls represent a minimalistic approach to governing the channel. With outcome-based control systems the focus is on the straightforward measure of results, such as sales volume and dollars (Anderson and Oliver 1987; Jaworski 1988). With these systems very little monitoring and direction is provided to the channel partner. Historically, organizations rely on outcome-based control systems when behaviors are difficult to measure (Oliver and Anderson 1994). In contrast, behavior controls utilize extensive performance monitoring to direct channel activities that are expected to achieve channel goals (Anderson and Oliver 1987; Oliver and Anderson 1994). With these strategies, channel processes (e.g., channel activities such as execution of promotions, stock rotation, etc.), are monitored and directed. While the behaviors associated with the channel processes are not direct indicators of the outputs they are expected to have a strong influence on performance (Oliver and Anderson 1994).

To the extent that formal mechanisms cannot specify and manage all contingencies in a relationship, bilateral control, which utilize joint action of the exchange partners, can be enacted (Bello and Gilliland 2002; Heide 1994; Jaworski 1988). Based on the social elements of the relationship, bilateral governance mechanisms rely on the collaborative efforts of both channel partners to achieve mutual goals (Heide 1994). Bilateral mechanisms parallel formal controls, in that they are used to incentivize, monitor and enforce acceptable channel behaviors. However they evince themselves in less formal, more relationally based way. Bilateral incentives are based on expectations of fairness over the long-run, even when faced with short term sacrifices

(Dyer and Singh 1998; Heide 1994). Outcome behaviors are motivated and managed by the expectation that the relationship will continue into the future and equity will prevail (Heide 1994). Under bilateral governance, monitoring processes are self-enforced and based on the each organization's examination of their own investments in light of channel partner expectations (Heide 1994). Enforcement is based on social norms, where aspects of the relationship, such as trust and commitment, are relied upon as mechanisms to impose the informal rules of the relationship (Heide 1994). While there is limited research examining informal controls, it suggests that bilateral mechanisms positively effect coordination and negatively impact conflict (Gilliland, Bello and Gundlach 2010).

While there is a significant amount of research examining the consequences of control strategies (see Baldauf, Cravens and Piercy 2005 for a review), research regarding the antecedents is scarce. Jaworski (1988) suggests that the decision to implement outcome-based control strategies or behavior-based control strategies is dependent on the macro, operating and internal environments. Limited research suggests that the environmental variables of uncertainty as well as the company variables of measurability outcome, and routinization are positively related to the use of behavior-based controls (Krafft 1999). Eisenhardt (1985) extrapolates on the influence of the internal environment and finds that the task characteristics influence the choice of control strategies. In particular she finds that task programmability, which is the degree to which behaviors can be defined and measured, lends itself to output controls when goals can be clearly stated and measured. Additional research examines the concept of task characteristics and finds that procedural knowledge, performance documentation lead to the decision to employ outcome-

controls (Agarwal and Ramaswami 1993; Jaworski and MacInnis 1989; Jaworski, Stathaltopoulos and Krishnan 1993; Ramaswami 2002).

In summary, if RFID-based IOS's are viewed from the perspective of being a mechanism that enables behavioral-based control, then control theory would suggest the rational for the decision to assimilate or not assimilate the technology. The theory suggests that internal and external environmental factors influence the decision to assimilate, with characteristics of the task having the most empirical support.

Agency Theory

Research surrounding agency theory has been vast in the areas of marketing, economics, finance organizational behavior. This is not surprising considering that the agency relationship exists in almost all exchange relationships (Bergen, Dutta and Walker 1992). In specific, agency theory encompasses any relationship where one party (the principal) attempts to control the activities of another party (the agent) to whom the principal has delegated channel activities (Bahli and Rivard 2003; Bergen, Dutta and Walker 1992; Eisenhardt 1985). The theory suggests that execution of these actions represent a contract between the two parties, which may exist as either formal, explicit contracts or informal "social contracts" (Bergen, Dutta and Walker 1992; Eisenhardt 1985). Determining which type of contracting option is most efficient is the focus of the theory. The most efficient contract is the decision of the principal and does not guarantee joint utility maximization for both channel partners.

Two types of agency problems, precontractual and postcontractual, have been identified. Precontractual problems exist during the initiation stage of an exchange relationship and deal

with the hazards associated with selecting an exchange partner (Bergen, Dutta and Walker 1992; Eisenhardt 1989). Postcontractual problems manifest themselves during the relationship and are related to the risks associated with goal incongruency between the principal and agent (Bergen, Dutta and Walker 1992; Eisenhardt 1989). Considering that the decision to participate in an IOS occurs within an existing principal/agent relationship we will focus on the postcontractual problem.

Bergen, Dutta and Walker (1992) refer to postcontractual problems as those of "hidden action" which involve four main assumptions regarding the principal/agent relationship. First, both are motivated by self-interest, which suggests that the relationship has some degree of goal incongruence (Anderson and Oliver 1987). Second, the principal has some degree of ambiguity regarding the actions performed for the principal by the agent (Bergen, Dutta and Walker 1992; Eisenhardt 1989). The third assumption considers that uncontrollable environmental factors make it difficult to contract for all contingencies (Bergen, Dutta and Walker 1992). Finally, the agent and principal are expected to have differing risk preferences (Bergen, Dutta and Walker 1992).

The assumptions suggest that the principal and agent are in conflict. Agency theory indicates that this conflict can be managed with the implementation of an appropriate control system that motivates both parties to achieve the same outcome (Anderson and Oliver 1987). Similar to control theory, the principal has two options, one is to implement a behavior-based control system and the other is to simply measure outcomes (Anderson and Oliver 1987; Challagalla and Shervani 1997). A behavior-based contract is a form of hierarchical governance, whereas the

outcome-based contract represents market governance (Eisenhardt 1989; Krafft 1999). With behavioral-based contracts, the information is in essence purchased and appropriate behaviors are rewarded (Krafft 1999). Outcome contracts simply rewards the agent based on measured outputs.

The decision to employ behavior-based versus outcome-based contracts has been shown to be influenced by several factors. Kraft (1999) found that environmental uncertainty increases the use of behavioral controls. Additionally, Krafft (1999) found that when output measures were complete and an adequate measure of performance, then the use of output-contracts was the most efficient choice. Similarly, Bergen, Dutta and Walker (1992) propose that the more difficult it is to measure the outcomes of an agent's task, the greater the efficiency of behavior-based contracts. They also suggest that as goal conflict increases, outcome-based contracts become the most efficient choice.

In the manufacturer/retailer relationship, the manufacturer must rely on the retailer to perform specific activities and tasks that ensure efficient distribution of its products. These tasks and activities may include promotional, inventory management, and reverse logistic activities to name a few. A decision to assimilate an IOS represents a new way of managing and evaluating the performance of the agent in regards to these tasks. In essence, the manufacturer must decide if the behavioral control afforded by the IOS is the most efficient contract decision.

Transaction Cost Economics

In contrast to agency and control theories, transaction cost analysis (TCA) suggests that the decisions surrounding assimilation of an IOS technology are equivalent to the decision to implement behavioral control system (Anderson and Oliver 1987). This choice is analogous to the vertical integration decision which is a "hybrid governance" option that lies between the make or buy decision and are preferable under certain circumstances (Oliver and Anderson 1994). The lack of assimilation represents the decision to utilize an outcome control, which has been argued to correspond to most closely to market contracting or the decision to "buy" (Anderson and Oliver 1987).

Transaction cost analysis (TCA) suggests "that organizations select the lowest-cost transaction structures that effectively protect against partner opportunism, ensure that partners fulfill contractual obligations and provide a framework for dealing with uncertainties" (Houston and Johnson 2000). According to TCA, specific assets need to be safeguarded from the opportunistic behavior of the channel partners, which can be done through appropriate governance structures (Heide and John 1990). In exchange relationships that have high transaction costs, which are represented by high degrees of asset specificity and performance ambiguity and low levels of technological uncertainty, TCA suggests that vertical integration is the optimal governance structure (Geyskens, Steenkamp and Kumar 2006; Heide and John 1990; Rindfleisch and Heide 1997). However, in cases where vertical integration is cost prohibitive, hybrid forms of governance, such as joint action, alliances and vertical coordination will be employed rather than market governance structures (Buvik and John 2000; Heide and John 1990; Johnson and Houston 2000).

Transaction specific assets represent specialized investments in human and physical assets that are a required to support the exchange relationship but cannot be redeployed outside the focal relationship (Heide and John 1988). Specific assets represent a sunk cost to the organization in that the value of the assets would be lost if the relationship is terminated (Heide and John 1988; Heide and John 1990; Rindfleisch and Heide 1997). Specificity of the assets will vary depending on the extent to which they can be used with other channel partners or other applications within the organization (Heide and John 1988). When the assets are less transferable they create switching costs that expose the follower to exchange hazards. If the follower invests in specific assets the initiator has the potential to exploit these assets and act opportunistically. For example, the initiator may take advantage of the follower's locked-in position by demanding additional concessions from the follower.

TCA suggests that the more the follower has invested in assets specific to the exchange with the initiator, the more the follower will try to safeguard those assets by vertically integrating with their channel partner (Heide and John 1990). In the case of IOS's, vertical integration is cost prohibitive, however, increasing the extent to which the two organizations are tied together through the assimilation of the technology would safeguard their investments. Son, Narasimhan and Riggins (2005) found in their study of EDI usage that higher levels of asset specificity increased cooperation between channel members which lead to increased EDI usage in the relationship. Zaheer and Venkatram (1994) found that business process asset specificity, defined as the investments in resources that enable the exploitation of an IOS system for business competencies, increases the degree of electronic integration achieved through the deployment of

dedicated IOS systems. Additionally, Corsten and Kumar (2005) found that greater levels of transaction specific investments increased the level of efficient consumer response adoption.

Technological uncertainty is the extent to which the technological requirements of the relationship are unstable (Geyskens, Steenkamp and Kumar 2006). Technological uncertainty represents the unpredictable changes in standards or specifications of the technological components necessary for the exchange relationship (Geyskens, Steenkamp and Kumar 2006). Contrary to asset specificity and performance ambiguity, relationships that are faced with high levels of technological uncertainty are best governed by market governance (Geyskens, Steenkamp and Kumar 2006). Market governance protects organizations from being locked into obsolete technologies (Heide and John 1990).

While there has been little work in the IOS literature examining the relationship between technological uncertainty and governance structure, the channels literature provides some guidance. Balakrishnan and Wernerfelt (1986) found that the higher the threat of technological obsolescence the less likely an organization was to vertically integrate. In a meta-analysis of transaction cost theory, Geyskens, Steenkamp and Kumar (2006) support the assertion that technological uncertainty is best managed with market governance. These studies suggest that when technological uncertainty is high, followers will be less willing to vertically coordinate and as such their degree of assimilation will be low.

CHAPTER 3: THE CONCEPTUAL MODEL

In this chapter a conceptual model is developed that examines the control problems that influence the assimilation of IOS's. Additionally, we test for the moderating effects of bilateral governance mechanism (see Figure 1). IOS researchers suggest that due to the multitude of explanatory variables that influence assimilation a complete model would be unmanageable (Grover 1993). Additionally, there is no single theory that can be used to examine the relationship (Robey, Im and Wareham 2008). As recommended by Robey, Im and Wareham (2008), we examine assimilation from several theoretical lenses that complement each other.

ASSIMILATION

While most researchers would agree that assimilation refers to the process spanning from awareness to commitment to widespread deployment, the terminology utilized to examine the process or subprocesses has limited consistency. Terms such as adoption, implementation, diffusion, infusion, IT usage and integration all refer to assimilation in some degree. Adoption and assimilation are in some degree interchangeable terminology that represents the process of becoming aware, committing to and implementing technological innovations (Fichman and Kemerer 1997; Rogers 2003). While IOS research has utilized both adoption and assimilation terminology, it appears that the key differentiating factor between these two distinct terms lies in the fact that assimilation research focuses predominately in the factors that lead to higher levels of deployment whereas the majority of adoption research focuses on the factors that influence the decision to adopt. Terms such as implementation, integration, infusion and diffusion all converge around the subprocesses of deployment. As our research is an attempt to understand

what factors influence the extent to which an organization deploys and utilizes an IOS, we employ the assimilation terminology.

Assimilation has been conceptualized in a multitude of ways. Meyer and Goes (1988) define assimilation as an "organizational process that is set in motion when (1) individual organization members first hear of an innovation's development, (2) can lead to the acquisition of the innovation and (3) sometimes comes to fruition in the innovations full acceptance, utilization and institutionalization." Fichman and Kemerer (1997) conceptualize assimilation in a similar manner; however they define the assimilation stage as a "combined measure of earliness of initiation of assimilation activities, speed of assimilation activities and an absence of rejection, stalling or discontinuance." They suggest that there are six stages of assimilation awareness, interest, evaluation/trial, commitment, limited deployment and general deployment. Armstrong and Sambamurthy (1999) define assimilation as "the success achieved by organizations utilizing the capabilities of IT effectively in their business activities." In their examination of the assimilation of interorganizational business process standards, Bala and Venkatesh (2007) define assimilation as the "degree to which the IPBS support and enable relevant business activities in the value chain and become widely deployed and routinized in the organization." Purvis, Sambamurthy and Zmud (2001) define assimilation as "the extent to which the use of the technology diffuses across the organizational projects or work processes and becomes routinized in the activities of those projects and processes."

In terms of IOS research, the conceptualizations are limited in several ways. First, the current conceptualizations are limited in that they assume that deployment of technology automatically

results in business process changes that are necessary before the technology can be effectively utilized. As Clark and Stoddard (1996) point out, technology and process innovations are often interdependent, however they can each be adopted independently. Damanpour (1991) in his meta-analysis of innovation, made a distinction between technological innovations, described as the technological products, and administrative innovations, which are the administrative processes. Others consider integration as the process of altering business practices (Kim, Cavusgil and Calantone 2005).

Another limitation that must be addressed is in the conceptualization of deployment within the assimilation framework. Fichman and Kemerer (1997) distinguish between limited deployment and general deployment. Limited deployment refers to the establishment of a program within the organization that has been applied to a few uses (Fichman and Kemerer 1997). With general deployment the program has diffused through the organization and is used on a substantial basis (Fichman and Kemerer 1997). Rai et al. (2006) further elaborate on this framework by adding partial deployment which differentiates between minimal and substantial use. While the stage approach provides a richer measure of assimilation than other measures (e.g., time since adoption), it is limited in that it does not differentiate the use of the technology from the use of the information created from the technology. For example, with RFID based IOS's, one organization could have 100% usage of the tags, where all product lines utilize the technology and the application of the tags are routinized across the organization. However, they might not utilize the readers, middleware or enterprise software components that are necessary to capture and disseminate the information. In contrast, another organization could have 20% usage of tags, but also utilize readers, middleware and enterprise software systems that capture and

disseminate the information. Classifying these organizations into deployment stages would prove to be difficult.

As such, we suggest that there is a need to reconceptualize assimilation. In line with other researchers, we suggest that IOS assimilation is multifaceted and includes both the physical adoption of the technological components and the utilization of the information obtained from the technology (Clark and Stoddard 1996; Rai et al. 2006). Most IOS technologies are scalable and the deployment levels vary from a minimalistic approach that may meet a mandate but not enable information exchange to a full deployment that enables information exchange. The minimalistic approach represents a decision to use a market or outcome-control mechanism to govern the relationship. In contrast, a full deployment and utilization represents a highly sophisticated behavioral monitoring system that provides visibility into the channel activities that surround new product introductions, the execution of product promotions, responses to out-of-stock situations, stock rotations, charge-back management, order reconciliation, inventory optimization and reverse logistics. We define IOS assimilation as the degree to which the organization intends to adopt the IOS technologies that will support and enable relevant business activities that create value for the organization. We suggest that it is comprised of three dimensions, technological assimilation, exploitive assimilation and exploritive assimilation. Additionally, we suggest that exploitive and exploritive assimilation are advanced assimilation processes that are dependent on the adoption of the technological components of the technology.

Technological Assimilation

Iacovou, Benbasat and Dexter (1995) and Clark and Stoddard (1996) suggest that there is a distinction between technological and process assimilation. With IOS's there are specific components of the technology that enable information exchange with channel partners. In the case of RFID-based systems, these include such components as the EPC global subscription, EPC-IS service, RFID tags, readers, middleware, enterprise exchange software and other technological components that enable information exchange across organizational boundaries (Curtin, Kauffman and Riggins 2007; Armenio et al. 2007). Therefore, we define *technological assimilation* as the degree to which the organization plans to deploy the physical components of the technology within the organization (Ramamurthy and Premkumar 1995). This is similar to the concept of technological connectivity discussed by Fawcett et al. (2007) and the concept of interfirm system integration presented by Kim, Cavusgil and Calantone (2006).

Exploitive and Exploritive Assimilation

Theories of organizational learning suggest that organizations make resource trade-offs between gaining new information about alternatives to improve their future standing and using current information to improve their current situation (March 1991). This trade-off between "the exploration of new possibilities and the exploitation of old certainties (March 1991), has been examined under the contexts of organizational adaptation, competitive advantage, knowledge sharing, technological innovation and supply chain relationships (Gutpa, Smith and Shalley 2006; Im and Rai 2008; Subramani 2004). Benner and Tushman (2002) examine exploitive and exploratory innovation as they relate to process management. They define exploitive innovations as those innovations that "involve improvements in existing components and build

on the existing technological trajectory, whereas exploratory innovation involves a shift to a different technological trajectory." Im and Rai (2008) examine the antecedents and outcomes of exploratory and exploitative knowledge sharing in interorganizational relationships. They define exploratory knowledge sharing as the "exchange of knowledge between firms in a long-term relationship to seek long-run rewards, focusing on the survival of the system as a whole, and pursuing risk-taking behaviors." Exploitative knowledge sharing is defined as the "exchange of knowledge between firms in a long-term relationship to seek short-run rewards, focusing on the survival of the components of the system and pursuing risk-averse behaviors." Subramani (2004) examines supply chain relationships and defines IT use for exploitation as the execution of structures interfirm processes and IT use for exploration as the execution of unstructured interfirm processes. The argument is that the IT technology can be used to either improve existing processes for organizational benefits (cost reduction, process quality improvements, etc.) or it can be used to create new solutions to current problems that create soft benefits for the organization (Subramani 2004). Similarly, He and Wong (2004) examine exploitive and exploitative innovations. They define exploitive innovation as "technological innovation activities aimed at improving existing product-market domains and exploratory innovation as technological innovation aimed at entering new product-market domains." March (1991) states that "the essence of exploitation is the refinement and extension of existing competencies, technologies and paradigm…The essence of exploration is experimentation with new alternative." Researchers suggest that the value of assimilation is in its effective utilization (Armstrong and Sambamurthy 1999; Seggie, Kim and Cavusgil 2006).

Following this logic, the value of an IOS can be obtained through exploitive and exploritive use of the technology. We suggest that once the technological components have been purchased and installed, an organization can use the technology to "exploit old certainties" by employing the technology to make current processes and activities more effective. In addition, an organization can "explore new possibilities" by finding new and innovative ways to utilize the technology, in essence creating new processes that add value to the organization. As such, we define *exploitive assimilation* as the degree to which the organization plans to utilize the IOS technology to redesign its business activities and tasks to achieve drastic improvements in performance and *exploritive assimilation* as the degree to which the organization plans to utilize the IOS to facilitate and support process innovation and transformations that create value for the organization. Eisenhardt (1985) suggests that the implementation of information systems makes behavior based control more likely. This suggests that as technological assimilation increases, their likelihood of using it increases. As such we posit:

H1: The higher the technological assimilation, the higher the exploitive assimilation

H2: The higher the technological assimilation, the higher the exploritive assimilation.

EXCHANGE PROBLEMS

Asset Specificity

Asset specificity is defined as the extent to which the follower has invested in assets that are specific to the relationship with the initiating partner. The more entrenched a follower is in its investment in its relationship with the initiator, the more costly it becomes to switch customers.

The higher switching costs motivate the follower to maintain the relationship by increasing the extent to which it coordinates with the initiator (Son, Narasimhan and Riggins 2005). The basic tenet of this argument is that a follower attempts to safeguard their investments by engaging in collaborative efforts that strengthen the bond between the two organizations. In essence, the assimilation of the technology represents a degree of off-setting investments aimed at reducing the dependence asymmetry between the channel partners by locking the initiator into the relationship through the IOS (Heide and John 1988). Son, Narasimhan and Riggins (2005) found that the more a supplier invested in the specific assets for the relationship as a whole, the more likely they were to intensify their cooperation with their customer, leading to higher levels of EDI usage. Corsten and Kumar (2005) found that suppliers will safeguard their previously unprotected specific investments by increasing their collaborative conduct, such as adopting efficient consumer response programs, with the retailer. As such, we posit the following:

H3: The higher the asset specificity associated with the exchange relationship, the higher technological assimilation.

Technological Uncertainty

Prior research indicates that uncertainty in an exchange relationship will influence the choice of governance structure (Eisenhardt 1989; Rindfleish and Heide 1997). Both TCA and agency theories posit the influence of uncertainty, however they propose conflicting hypotheses. Agency theory indicates that high levels of environmental uncertainty reduce a principal's ability to preplan and increases the risk within the relationship (Eisenhardt 1989). This risk must be managed by either transferring it to the agent or managing it within the organization. Outcome-based controls transfers the risk to the agent, whereas behavior controls internalizes the risk and

is managed by more diligent control mechanisms (Eisenhardt 1989). Anderson and Oliver (1987) and Celly and Frazier (1996) found that when environmental uncertainty was high, behavior-based control was the most appropriate choice. In contrast, TCA suggests that technological uncertainty is best managed with outcome-based controls, or market governance (Geyskens, Steenkamp and Kumar 2006; Rindfleisch and Heide 1997). Adaptation and information asymmetry problems are created by uncertainty (Heide and John 1990). It has been argued that the divergence between these two theories lies in the distinct aspects of uncertainty and that the conflicting results are a result of broad definitions of the construct (Balakrishnan and Wernerfelt 1986). We follow the logic of TCA and focus on the technological uncertainty that exists within a channel relationship. As such, we define technological uncertainty as the extent to which the initiator is unable to accurately forecast the technological requirements of the relationship (Geyskens, Steenkamp and Kumar 2006). The argument posited suggests that when the technological requirements of the relationship are in a state of flux, the choice of outcome controls protects the organization from getting locked-in to an obsolete technology (Balakrishnan and Wernerfelt 1986). As such we hypothesize the following:

H4: The higher the technological uncertainty associated with the exchange relationship the lower the technological assimilation.

AGENCY PROBLEMS

Performance Documentation

In congruence with agency and control theories, the degree of uncertainty, or incomplete information, is determined by the characteristics of the task. We examine the concept of

performance documentation, which we define as the extent to which the supplier has available forms of documentation to assess the retailer's performance. When accurate measures of performance exist within the agency relationship, the most efficient contract is based on outcome-control mechanisms (Jaworksi 1988). In contrast, when the activities and tasks are difficult to evaluate, behavior-based controls are a more efficient form of governance (Bergan, Dutta and Walker 1992; Oliver and Anderson 1994). Agarwal and Ramaswami (1993) and Ramaswami (2002) both find support for this proposition. In their studies, they find that outcome-based control strategies are more frequently employed when performance documentation is high. Additionally, Krafft (1999) found that when output measures were complete and an adequate measure of performance, then the use of output-contracts was the most efficient choice. In relation to IOS assimilation, it is expected that when an organization has high levels of performance documentation, they will be less likely to assimilate the technology. The rational is that the costs of assimilation outweigh the benefits associated with the evaluation tasks (Eisenhardt 1985).

H5: The more performance documentation that exists to assess the relationship outcomes, the less likely they are to assimilate the technology

Agent Orientation

Agency theory assumes that goal conflict and information asymmetry exists within the relationship and the degree to which they occur will influence the choice of governance (Eisenhardt 1989; Bergen, Dutta and Walker 1992). Agent orientation encompasses both of these concepts. Agent orientation is defined as the extent to which the follower views the initiator as

an agent of the organization rather than a customer. High agent orientation indicates that the follower views the initiator as an agent of the organization. In these cases, the follower expects that the initiator will execute on specific activities and tasks that result in specific outcomes for the follower. Considering that both parties are motivated by self-interest and performance ambiguity exists within the relationship, the follower will select a governance mechanism that is most efficient for the relationship at hand. In contrast, low agent orientation suggests that the follower views the initiator as a customer of organization. In these cases, the follower will acquiesce to requests from initiator. In regards to IOS assimilation, organizations with low agent orientation will have higher levels of technological assimilation as they acquiesce to the initiator. As such, we posit:

H6: The lower the agent orientation the more likely they are to assimilate the technology.

BILATERAL GOVERNANCE

Control and TCA theories address the role of informal controls. In specific, it has been argued that informal controls operate in tandem with formal controls and may in fact have an interactive role (Heide 1994; Jaworski 1988; Jaworski, Stathaltopoulos and Krishnan 1993). Informal controls, also conceptualized as bilateral governance mechanisms, are more relational in nature in that they rely on the participation of both channel members to collaboratively work together to achieve mutual goals (Heide 1994). The bilateral governance processes are utilized in the ongoing maintenance of the interfirm relationship. Gilliland, Bello and Gundlach (2010) identify three bilateral mechanisms that operate within and exchange relationship.

Based on Heide's (1994) conceptual work, bilateral mechanisms operate in the maintenance phase and include monitoring, incentive and enforcement mechanisms. Bilateral incentives reflect the extent to which the expectations that fairness will prevail in the long-run (Heide 1994). Fairness is an incentive in that it represents the expectation that equity will pervade the relationship (Ring and Van de Ven 1994). Behaviors are managed by the expectation that the relationship will continue into the future (Heide 1994). Bilateral monitoring is defined as each organization's evaluation of its own investments in the relationship to ensure they meet the expectation of the partner (Gilliland, Bello and Gundlach 2010; Heide 1994). Each organization will self-monitor to ensure that it will achieve the goals share with the channel partner. Bilateral enforcement refers to the channel partner's reliance on social norms to maintain compliance with prior expectations (Gilliland and Bello 2002). When invoked, the enforcement mechanism utilizes internal elements such as trust and commitment to incite compliance (Heide 1994).

When bilateral mechanisms exist within the exchange relationship, channel partners work together to achieve common goals. The expectation of joint value creation, rather than self-satisficing, works to motivate the channel partner collaboration. Researchers contend that the more bilateral mechanisms that exist within a relationship, the more closely aligned are the channel members' goals (Uzzi 1997). Short term inequities are overlooked because of the expectations that fairness will occur over time (Black 1998; Gilliland, Bello and Gundlach 2010). Additionally, coordination is increased as each party self-monitors its own activities so as they are in line with channel partner expectations (Ellickson 1987). Strong bonds create social ties that "impose normative obligations, pressuring organizations to honor agreements and keep promises" (Gilliland, Bello and Gundlach 2010). Research indicates that assimilation of IOS's

are influenced by relational depth, specificity and extendibility (Bala and Venkatesh 2007). As such we posit the following:

H7: The higher the bilateral mechanisms the more likely they are to assimilate the technology.

H8: The higher the bilateral mechanisms the more likely they are to exploitively assimilate.

H9: The higher the bilateral mechanisms the more likely they are to exploritively assimilate.

Bilateral governance mechanisms work within a relationship to manage interorganizational activities and tasks (Black 1998). The strength of the social mechanism enhances the exchange relationships ability to accomplish joint goals both directly and indirectly. Bilateral governance mechanisms work to align the goals of the channel members. Bilateral mechanisms motivate partners to take positions of inequity in the short term due to the expectations of fairness and the belief that equity will prevail in the long run (Gibbons 2005). Exchange relationships that are high in relational norms are better able to manage conflict and reduces opportunism (Brown, Crosno and Dev 2009; Heide and John 1992; Rokkan, Heide and Wathne 2003). Customer-supplier relationships that are high in trust are more likely to utilize interorganizational technologies to much higher degrees (Hart and Saunders 1998). Thus we expect that bilateral mechanisms will work to align channel partner goals and enhance the organization's willingness to assimilate the technology. As such we propose the following:

H10: Greater bilateral governance strengthens the positive relationship between asset specificity and technological assimilation.

H11: Greater bilateral governance decreases the negative relationship between technological uncertainty and technological assimilation.

H12: Greater bilateral governance decreases the negative relationship between performance documentation and technological assimilation.

H13: Greater bilateral governance decreases the negative relationship between agent orientation and technological assimilation.

H14: Greater bilateral governance strengthens the positive relationship between technological assimilation and exploitive assimilation

H15: Greater bilateral governance strengthens the positive relationship between technological assimilation and exploritive assimilation.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

In this chapter, we present the research design and methodology that was used to test the conceptual model. We begin with a description of the measures of this study. Next, we discuss the sampling and data collection procedures. Finally, we identify the analytical procedures used to test the conceptual model.

OPERATIONALIZATION OF EXOGENOUS CONSTRUCTS

Exchange Problems

Asset Specificity

Asset specificity is the extent to which the follower has invested in assets that are specific to the relationship with the initiator. Asset specificity is operationalized as the degree of investments in equipment, people and processes that are exclusive to and cannot be deployed outside of the focal relationship. Items are based on the scales from Heide and John (1992) and Joshi and Stump (1999), and can be seen in Table 2.

Technological Uncertainty

Technological uncertainty is defined as the inability to accurately forecast the technical requirements of the relationship (Geyskens, Steenkamp and Kumar 2006). Technological uncertainty is operationalized as the extent to which the technological requirements of the relationship are unstable. The items are adapted from Narver and Slater (1990) and measure the degree to which the follower has difficulty predicting and understanding the technology.

Agency Problems

Performance Documentation

Performance documentation is the extent to which the follower has available forms of documentation to assess the initiator's performance of tasks and activities required by the follower (Jaworski and MacInnis 1989; Jap 2001). Items, adapted by Jap (2001), represent the degree to which documented information exists that enables the follower to evaluate the initiator on required activities and tasks.

Agent Orientation

Agent Orientation is defined as the degree to which the follower views the initiator as an agent of the organization rather than a just a customer. Modified from Narver and Slater's (1990) customer orientation scales, agent orientation is operationalized as the degree to which the follower focuses its business efforts on satisfying the needs of the end-customer rather than the initiator. These items measure the degree to which the follower's business objectives, resources and focus are on the satisfaction of either the follower or the end-customer.

OPERATIONALIZATION OF ENDOGENOUS CONSTRUCTS

Assimilation

Based on the relevant literature we define assimilation as the degree to which the organization intends to adopt the collaborative technologies that will support and enable relevant business activities that create value for the organization. We dimensionalize the construct in terms of technological, exploitive and exploritive assimilation. Considering that our context is RFID

collaborative technologies and the early stage of adoption of the technology, we measure assimilation as the propensity to assimilate rather than the actual behavior.

Technological Assimilation

Technological assimilation, modified from Srinivasan, Lilien and Rangaswamy (2002), represents the extent to which the follower agrees to purchase and deploy the technological components of the collaborative technology within their organization. Before an organization can deploy and utilize the technology they must first purchase the components. With RFID technologies these components are scalable, with the adoption of the tags being the most minimal degree of adoption. These components include the tags, readers, middleware and enterprise systems that enable the collection of information between organizations.

Exploitive Assimilation

Utilizing the logic of March (1991), RFID technology represents a learning mechanism that can be used to improve existing organizational activities and tasks. As such, we can define assimilation as the degree to which the follower plans to utilize the collaborative RFID technology to redesign its business activities and tasks to achieve drastic improvements in performance. This conceptualization is similar to Subramani's (2004) definition of IT use for exploitation, which is described as the use of IT to improve current structured interfirm processes that lead to discernable cost reduction and quality increasing benefits. Following McGrath, (2001) we assess exploitive assimilation by asking respondents the degree to which their organization would use RFID technologies to monitor their channel partner in the execution of eight supply chain management tasks: (a) management of new product introductions, (b)

execution of product promotions, (c) management of out-of-stock situations, (d) rotation of stock, (e) chargeback management, (f) order reconciliation, (g) inventory optimization, and (c) reverse logistics management. These items were derived from the literature and field work and validated by the pilot tests (Boeck and Wamba 2008; Delen, Hardgrave and Sharda 2007; Hingley, Taylor and Ellis 2007; Lee and Ozer 2007). An index of the construct was created based on the average of the eight items.

Explorative Assimilation

Exploratative assimilation is defined as the degree to which the organization plans to utilize RFID to facilitate and support process innovation and transformations that create value for the organization. Similar to exploitive assimilation, however, rather than focusing on the improvement of existing processes and activities, the end goal of exploritive assimilation is to experiment with the technology to create entirely new processes that add value to the organization (March 1991). The scales were adapted from those used by Auh and Menguc (2005) and indicate the degree to which the respondent's organization would use RFID in new and novel ways to improve the relationship with the initiator.

OPERATIONALIZATION OF MODERATORS AND CONTROL VARIABLE

Bilateral Governance

Bilateral governance represents the bilateral socially-based governing mechanisms that exert control over the relationship (Gilliland, Bello and Gundlach 2010; Heide 1994). These are less formal governance patterns that utilize social ties as the conduits of behaviors that support the interorganizational relationship. Following Gilliland, Bello and Gundlach (2010) and Heide

(1994), bilateral governance is operationalized as the control mechanisms within the relationship that are manifested as bilateral incentives, bilateral monitoring and bilateral enforcement.

Bilateral incentives

Bilateral incentives reflect the extent to which the expectations that fairness will prevail in the long-run (Heide 1994). With bilateral incentives, both exchange members work together to motivate assimilation behaviors. Based on the expectation of fairness, bilateral incentives work to motivate the follower through the expectation of future gains. Adapted from scales from Gilliland, Bello and Gundlach (2010), bilateral incentives are measured in terms of the confidence that both organizations have in the relationship in terms of the distribution of equity.

Bilateral monitoring

Bilateral monitoring, adapted from the scale of Gilliland, Bello and Gundlach (2010), represents each organization's evaluation of its own investments in the relationship to ensure they meet the expectation of their partner (Gilliland, Bello and Gundlach 2010; Heide 1994). Bilateral monitoring is operationalized as the extent to which each party monitor's its own behavior in an attempt to appease the other. Items measure the degree to which both organizations assess their own investments in relationship specific investments, as well as their own intention to continue the relationship.

Bilateral enforcement

Bilateral enforcement refers to the channel partner's reliance on social norms to maintain compliance with prior expectations (Gilliland, Bello and Gundlach 2010; Gilliland and Bello

2002). Bilateral enforcement is operationalized as the expectation that the shared expectations and strength of the relationship motivate the enforcement of both formal and informal agreements. The items, adapted from Gilliland, Bello and Gundlach (2010), include items that measure the reliance upon relationship strength, collaboration and promise keeping.

Relative Supplier Dependence

Relative supplier dependence, adapted from the scales of Gilliland, Bello and Gundlach (2010), assesses the degree of comparative reliance of the supplier on the retailer. These items measure the degree of switching costs, replaceability and dependence of the supplier on the retailer and the supplier's perception of the retailer's dependence on the supplier. The values are derived by subtracting the supplier's dependence on the retailer from the retailer's dependence on the supplier.

SAMPLING AND DATA COLLECTON PROCEDURES

Sampling Plan

The retail industry was selected as an appropriate setting to test the proposed model. In particular, this study focuses on the suppliers (followers) of retailer's who are implementing RFID based collaborative technologies. This industry was selected for the study because it is characterized by: (1) mandates that require the adoption of the technology as a condition of future exchanges, and (2) the availability of multiple followers who are most likely to vary in their assimilation of the technology.

The sampling frame was derived from two sources. The first source was a customized list purchased from a top organization specializing in lead generation. The list was web-based and provided e-mail as well as phone contact information, so we were able to hand-select 3,500 contacts based on the organization they worked for (a manufacturer that sold goods through retailers) and job titles (marketing managers, key account managers, V.P. of Sales, etc.). The usable list size was reduced to 3,226 after accounting for insufficient and duplicate contact information. The following procedure was used to contact each respondent for the final data collection. Each contact was e-mailed (Appendix A) a request to participate in the study. They were instructed to respond to the email if they were willing to participate. If they agreed to participate, an e-mail was sent with the link to the survey (Appendix B).

The second source was a "pay-for-input" online panel managed by a respected market research organization that specializes in the management and maintenance of online customer panels. Respondents were limited to marketing and sales managers and executives who worked for manufacturing organizations. The respondents completed the survey in exchange for a monetary payment.

Both sample sources were directed to complete the survey via a hyperlink. Screener questions were then used to filter out inappropriate respondents. These questions included: (1) Does your organization sell products directly to any retailers (chain drug stores, supermarkets, mass merchandisers, etc.); (2) Do you have working knowledge of a relationship that your organization has with any retailer (i.e., do you interact on behalf of your organization with any retailer). An answer of "no" to either of the questions ended the survey for the respondent.

After the screener questions, the respondent was asked to respond to the survey based on their organization's relationship with a single focal retailer. Following Jap (2001), the focal retailer was defined as an independent U.S. organization that resells your product. They were told that the retailer should be one that they interact with on a regular basis; however it does not necessarily have to be their "most important" or "most favored" retailer, although it can be. This approach helps ensure that the sample includes varying ranges of values for the antecedents (Cohen et al. 2002). Additionally, we referred to the focal retailer as "ALPHA" so as to protect the anonymity of the respondent. The survey began with the assessment of various relational variables, and then a scenario was introduced. The scenario represented a letter from "ALPHA" that required the respondents firm to adopt RFID technology. Then they were asked the degree to which they would participate in the mandate. The survey ended with several demographic questions. A copy of the final survey can be seen in Appendix C.

CHAPTER 5: DATA COLLECTION AND ANALYSIS

In this chapter, we describe the data collection procedures, analyses and results of the tests of the conceptual model. First we describe the questionnaire development and the sample. Then we discuss the measurement model and its results. Finally, we specify the structural model and evaluate the hypotheses.

QUESTIONNAIRE DEVELOPMENT

Field Study

We conducted in-depth interviews with 11 practitioners who were participating in the assimilation decision making process for their organization. The interviews were conducted at a well known RFID conference and lasted about thirty to sixty minutes. These individuals represented a variety of industries (e.g., battery and gift wrap), companies and roles (e.g., VP of Sales, Marketing Manager, and IT Director). The objective of this stage was to obtain real world insights into the obstacles that organizations were facing with the assimilation of RFID as well as identifying the key informant.

The interviews provided several key insights that were used to formulate the research plan. First, it validated the use of marketing and sales executives as our key informants. These individuals had extensive interaction with the retailer and were part of the decision making process to adopt and assimilate collaborative technologies. Second, we realized that there was a problem with how we were having the respondent identify the focal retailer. The largest or even fourth largest

retailer would limit the variance we needed in terms our antecedent constructs. Third, we were better able to understand the assimilation process. Fourth, we were able to identify the relational variables that were influencing their decision to assimilate the technology. Several informants spoke of protecting the investments that they had already made in the relationship as well as technological uncertainty based on past experience with the retailer. To the extent possible, we integrated the key findings into the research instrument and utilized them to construct the first version of the questionnaire.

Pre-Test

The primary objectives of the pretest were to purify the measures and validate our key informant selection. We randomly selected 1,000 contacts from a mailing list of 3,226 that was generated from Jigsaw.com. Jigsaw.com is a lead generation company that has over 24 million business contacts. The mailing list was customized and each contact was individually selected based on their title and the organization they worked for. Specifically, we selected contacts that were in sales and marketing and worked for organizations which offered products that were available in retail stores.

An email requesting participation with a link to the study was sent to the contacts from the survey administrator's website (Qualtrics.com). Of the 1,000 e-mails sent, 126 respondents agreed to participate. Of those, 47 were disqualified and 79 were qualified to participate in the study based on the two screener questions that verified that they (1) worked for manufacturer that sold directly to retailers and (2) interacted with the retailer on a daily basis. Participation dropped off to 40 when we asked them to provide the initials of their focal retailer. Due to the

length and complexity of the survey, missing data was prevalent and only 13 surveys were competed without missing data.

Several key insights were provided by the pre-test. First, e-mailing directly from our survey administrator (Qualtrics), provided us with little control and insight as to the true response rate. We had no way to validate that the e-mail addresses were correct or if they were viewed. From this we learned that we needed a two step approach to contacting potential respondents. The first step included sending an e-mail requesting participation. This would allow us to keep track of bounce backs and allow potential respondents to opt-out of the study all together. In the second step, we e-mailed those who wished to participate from our Qualtrics account with a link to the survey. The second insight relates to the dropout rate of almost 50% after asking for the focal retailer's initials. This behavior suggests that the respondents did not feel secure in their anonymity. Going forward we requested that they think of a focal retailer when answering their questions, however we would refer to this retailer as "ALPHA" in order to protect their anonymity. Throughout the survey we reminded them that "ALPHA" was the focal retailer that they originally thought of in the beginning of the survey. Finally, based on the number of respondents that dropped out in the middle of the survey, we determined that the survey length was a problem. We utilized the pre-test data to streamline the constructs and reduce the length of the survey to less than thirty minutes. The final survey can be seen in Appendix B.

The Final Sample

Data for the final study was collected from two sources. The first was derived from the same customized mailing list used in the pre-test. The list provided e-mail and contact information for

3,226 hand-selected contacts based on two criteria: (1) the organization they worked for was a manufacturer that sold goods through a retailer and (2) job titles that included managers and executives of the sales and marketing departments. 1000 contacts were used for the pre-test, which left 2,226 remaining contacts. A systematic sampling technique was utilized to select 1,388 contacts from the list. The potential respondents were contacted via e-mail and requested to participate in the study. For those who wished to participate, an e-mail was sent with a link to the survey. In order to further qualify the respondents they were asked two questions that determined whether or not their organization sold products directly through a retailer and if they had working knowledge of the relationship with any retailers. An answer of "no" to either question disqualified them from taking the survey.

As seen in Table 3, we were able to get some form of response from 48% of the mailing list. The response breakdown of the 1,388 contacts includes the following: 687 were non-responders, 338 were non-deliverable due to bounce backs, 166 opted out, 24 were disqualified with the screener questions, and 173 agreed to participate. The high non-response rate may be attributed to SPAM filters or job turn-over, however we cannot be sure.

We sent follow up e-mails to those who agreed to participate with a link to the survey. Of the 173 who agreed to participate, 123 completed the survey. Considering the respondents that opted-out, there were a total of 339 potential respondents, this is a response rate of 36%. We created a composite score for informant quality by summing the responses. Following Stump and Heide (1996), respondents who scored less than 12 were discarded (See Table 4). Our final sample from this source consisted of 120 respondents.

The second source was a "pay-for-input" online panel managed by a respected market research organization that specializes in the management and maintenance of online customer panels. Respondents were limited to marketing and sales managers and executives who worked for manufacturing organizations. Respondents were further qualified through two questions asking whether the organization they worked for sold goods directly to any retailer and if they interact with a retailer on behalf of their organization. The respondents completed the survey in exchange for a monetary payment.

We received 249 completed questionnaires. 24 surveys were discarded due to insufficient knowledge. Additionally, we restricted the final sample to include only those who had completed the survey in above the 25th percentile (approximately 9 minutes). The data was also reviewed for false open-ended answers and pattern responses. We identified 9 surveys with false information and 14 with pattern responses, however they all fell below the 25th percentile and were previously considered for elimination. A total of 190 surveys were retained.

Before combining the data sources, they were examined for statistical differences between the two groups. Independent sample T-tests indicated that the group's means did not vary, and thus we pooled the two data sets together. Between the two sources, there was a total of 310 completed surveys. In order to maximize the quality of the data set, we imposed further restrictions. Of the 310 completed surveys were removed an additional 51 respondents. We discarded those respondents which had a survey time in the bottom 25th percentile, or approximately less than 10 minutes, thus eliminating an additional 21 respondents. Additionally, we had a 1 page scenario representing a letter from the respondent's focal retailer. We

eliminated 30 surveys that were in the bottom 25th percentile in terms of time taken to read the letter (approximately 15 seconds). A total of 259 usable surveys were obtained for the final sample. Demographic statistics of the sample can be seen in Table 5.

MEASUREMENT MODEL VALIDATION PROCEDURES

All variables were pre-tested prior to the development of our final survey instrument. Once the scales were validated the pre-test, the final data was collected. The hypotheses were then tested using Structural Equation Modeling (SEM) in LISREL 8.8 (Joreskog and Sorbom 1993). Anderson and Gerbing's (1988) two-step process was followed. We first created a measurement model of all the constructs, then after achieving acceptable fit statistics, the structural model was tested.

Considering that the responses to the independent and dependent variables are obtained through the same source, common methods bias is of concern. In order to remedy common methods bias, we followed Podsakoff et al.'s (2003) recommendations. First, we separated our predictor and criterion variables within the survey instrument. Second, we carefully constructed our scale items. Additionally, we tested for common methods bias by utilizing Harmon's one factor test.

We utilized confirmatory factor analysis to verify unidimensionality of the constructs. This was done by specifying the observed item to latent variable relationships and allowing the latent variable constructs to correlate with one another (Anderson and Gerbing 1988). Decisions to drop or retain items were based on Anderson and Gerbing's (1988) recommendations. Several items were initially dropped based on their inter-item correlations. Three items were used to

indicate the constructs of asset specificity, technological uncertainty, performance documentation, agent orientation, bilateral mechanism, supplier relative dependence, and exploratative assimilation. Four items were used for the construct of technological assimilation. A single summed index time was used for exploitive assimilation. A total of 26 items and 11 latent constructs were utilized to test the model. The final items used for the measurement model, along with their means, standard deviations and reliabilities can be found in Table 6.

Specifying the matrix to be used in the estimation of the model is an important issue. We utilized the covariance matrix, which was calculated by the LISREL 8.8 program after we provided the correlation matrix and standard deviations, which can be seen in Table 7. Maximum likelihood estimation (MLE) technique was used to analyze the covariance matrix.

Due to the nature of our research questions and the complexity of the model, we followed the direction of Bagozzi and Edwards (1998) and partially aggregated the three bilateral mechanism constructs (bilateral incentives, bilateral monitoring, and bilateral enforcement) by averaging the corresponding items used to measure each construct. The composite items were then used as items for the latent construct "bilateral mechanisms". We conceptualized bilateral mechanisms as a higher-order factor comprised of bilateral incentives, bilateral monitoring and bilateral enforcement. This corresponds with a second-order confirmatory factor model, which the items are posited to originate from the three first-order factors and the first-order factors originate from a second-order factor (see Table 8).

We ran the model with 11 first order constructs and corresponding 26 item measures. For the single item construct of exploitive assimilation, the path was set to .95 and the error term was set to .05 (Anderson and Gerbing 1988). For bilateral mechanisms, we followed Bagozzi and Edwards (1998) and used the composite scores for each of the three higher-order constructs as individual items.

The model performed well and overall fit statistics suggest that the model is a good fit for the data. While the χ^2 test is significant ($\chi^2_{(410)} = 589.74$, p=.00), this is an often a consequence of samples larger than 200 (Kline 2005). Other measures of overall fit, indicate an acceptable fit (RMSEA = 0.044; NFI = .95; CFI = .98; SRMR = .045) (Hu and Bentler 1999). The results of the measurement model can be seen in Table 9.

MAIN EFFECTS: STRUCTURAL MODEL VALIDATON PROCEDURES

We utilized LISREL 8.8 to test our hypothesized structural model. First, we tested the main effects model at a disaggregated level, utilizing the same 11 constructs and 26 corresponding items as we did with the measurement model.

The results of the disaggregated main effects model suggest that the hypothesized model is a relatively good fit for the data (see Table 10). The χ^2 is significant ($\chi^2_{(274)} = 418.44$, p=.00), however the other measures indicate an acceptable fit (RMSEA = 0.045; NFI = .95; CFI = .98; SRMR = .050) and meet Hu and Bentler's (1999) combination rule for acceptable fit. Parameter estimates were somewhat consistent with the hypotheses, with seven of the ten main effects hypotheses supported. Alternative models were examined to determine if the paths

hypothesized were fully or partially mediated. After examining alternative models to determine full or partial mediation, a better fitting model was identified. Surprisingly, the best fitting model freed the path between technological uncertainty and exploritive assimilation, which was not originally hypothesized. While the χ^2 was different ($\chi^2_{(273)} = 406.71$, p=.00), the other measures are similar to the original model (RMSEA = 0.044; NFI = .95; CFI = .98; SRMR = .047). A χ^2 difference test indicates that the models are significantly different and favors the model with the path freed between technological uncertainty and exploritive assimilation ($\Delta\chi^2_{(1)} = 11.73$, p = .00). Freeing additional paths did not improve fit statistics, suggesting that technological assimilation fully mediates the relationship between the antecedents and outcomes. The fit statistics and parameter estimates for this model can be seen in Table 11. As such, we test our hypothesized main effects with the alternative model.

We found support for H1, which contends that the more specific assets the supplier has deployed in the relationship, the more likely they will be to purchase the collaborative technology ($\beta = .20$, t=1.95, p = .05). Regarding H2, there was no support for the effect that technological uncertainty has on technology assimilation ($\beta = .09$, t=1.16, p = .24). However, we did find that technological uncertainty has a positive direct effect on exploritive assimilation ($\beta = .16$, t=3.45, p = .00). For H3, there was no support and the sign was contrary to our expectations. While we expected to find that performance documentation would decrease technological assimilation, the sign was positive and insignificant ($\beta = .11$, t=1.53, p = .13). While not significant, the unexpected sign suggests that the more documentation that exists to assess the initiator's performance, the more likely they are to purchase the technological components of the collaborative technology. We found no support for H4, which focuses on agent orientation

decreasing technological assimilation, however the sign is in the appropriate direction (β = -.06, t= -1.09, p = .28). There is strong support for H5, H6 and H7, which indicates that the more bilateral mechanisms that exist within the relationship, the more likely the supplier is to assimilate the collaborative technology (H5: β = .50, t=5.42, p = .00; H6: β = .17, t=2.41, p = .00; H7: β = .27, t=3.95, p = .00). Hypotheses 8 and 9 suggest that the more a technological assimilation occurs the higher the exploitive and exploritive assimilation. Both hypotheses are supported, which indicate that the more technological components are purchased the more likely the supplier is to utilize the technology to improve efficiency of current processes (H6: β = .55, t=8.31, p = .00) as well as facilitating innovations that create value for the organization (H7: β = .57, t=8.66, p = .00).

MODERATING EFFECTS OF BILATERAL MECHANISMS

Due to the complexity and size of the model and sample, as well as our desire to perform tests of moderation, we utilized a total aggregation model and retested the structural model. We followed Bagozzi and Edwards (1998) and aggregated the model by creating composites of each of the constructs. Specifically, the three or four items for each construct were averaged to create one composite indicator per construct. In this model, 11 constructs were tested with 11 corresponding consolidated items. We then used this aggregated model to test for moderation.

We set the λ paths equal to the square root of the reliability and the error variance to one minus the reliability and multiplied it by the variance of the scale item. The results of the totally aggregated model suggest an improved fit, compared with the partially disaggregated model, but

have similar path estimates. The χ^2 is insignificant ($\chi^2_{(9)} = 11.76$, p=.22), and the other measures indicate good fit (RMSEA = 0.034; NFI = .99; CFI = 1.00; SRMR = .024). Parameter estimates can be seen in Table 12 were consistent with the partially disaggregated model. Both models account for a substantial portion of the variance in technological assimilation (SMC = .42), exploitive assimilation (SMC = .44) and exploritive assimilation (SMC = .59). Due to the good fit statistics and parsimonious nature of the aggregated model, we continue our analysis by testing for moderating effects.

To test for the moderating effects of bilateral mechanisms we followed the recommendations of Wen, Marsh and Hau (2010) and modeled the latent interactions. This strategy requires the creation of double mean centered interaction terms, which is a three step process (Wen, Marsh and Hau 2010). First, we mean centered the independent and moderating variables. Next, we created a product term by multiplying the mean centered independent and moderator variables. The last step requires that the product term is mean centered to create the final interaction term that is used for the analysis. Since we used the totally aggregated model to test moderation, we had to set the λ paths equal to the square root of the reliability and the error variance to one minus the reliability and multiplied it by the variance of the scale item. With the interaction terms the reliability was considered to be the product term of the reliabilities of the independent and moderator variables used to create the interaction term. We utilized the alternative model derived from our main effects models to test the hypotheses.

The results of the moderated model suggest that the hypothesized structural model is a relatively good fit for the data (see Table 13). The χ^2 is insignificant ($\chi^2_{(18)} = 21.12$, p=.27), and the other

measures indicate an acceptable fit (RMSEA = 0.026; NFI = .98; CFI = 1.00; SRMR = .02) and meet Hu and Bentler's (1999) combination rule for acceptable fit. Parameter estimates for the main effects were similar to the main effects models and can be seen in Table 13 along with the standard errors, t-values and significance. Additionally, the parameter estimates for the interaction variables were somewhat consistent with the hypotheses, with support for four of the six moderation hypotheses.

We found support for H10, which contends that bilateral mechanisms will strengthen the relationship between asset specificity and technological assimilation (β = .18, t=2.01, p = .06). A simple slope analysis indicates that the technological assimilation and asset specificity relationship increases as bilateral mechanisms increase (δTech/δAsset = .27+.18BM).

Regarding H11 and H12, there was no support for the hypothesis that that bilateral mechanisms weakens the relationship between both technological uncertainty and performance documentation and technology assimilation (H11: β = -.07, t=-.78, p = .44; H12: β = -.01, t=-.21, p = .84).

We found support for H13, which suggests that bilateral mechanisms weakens the negative relationship between agent orientation and technological assimilation (β = .16, t= 2.37, p = .03). A simple slope analysis indicates that as bilateral mechanisms increase the slope of the technological assimilation and agent orientation relationship quickly becomes positive (δTech/δAgent = -0.08+.16BM).

Additionally we find strong support for H14 and H15, which indicates the bilateral mechanisms strengthens the relationship between technology assimilation and both exploitive and explorative assimilation (H14: $\beta = .15$, $t=2.71$, $p = .01$; H15: $\beta = .12$, $t=2.36$, $p = .03$). A simple slope analysis indicates that the positive relationship between exploitive assimilation and technological assimilation is strengthened by bilateral mechanisms ($\delta Exploit/\delta Tech = 0.57+.15BM$). A similar relationship exists between exploritive assimilation and technological assimilation ($\delta Explore/\delta Tech = 0.57+.15BM$).

In order to further understand the interactions, we followed Aiken and West (1991) and further probed and graphed the interactions. For each interaction, we split the independent variable and the interaction term into high and low groups, then used general linear modeling to acquire the means. We then graphed the mean differences to examine the moderating effect. For H10, the interaction was positive and significant. The analysis (see Figure 2) indicates that the original positive effect between asset specificity and technological uncertainty is strengthened by bilateral mechanisms. The main effects indicate that low asset specificity results in lower levels of assimilation of the technological components. The positive interaction indicates relationships that exhibit higher levels of bilateral mechanisms, the higher the technological assimilation at both low and high levels of asset specificity. For H13, the interaction was significant and positive. However, the main effects model indicated that the relationship between agent orientation and technological assimilation was negative, albeit insignificant. In this case, the more the supplier viewed the retailer as an agent for their organization, the less likely they were to adopt the technology. The analysis (see Figure 3) suggests that when bilateral mechanisms are high, this effect is diminished and technological assimilation is increased. For H14, the main

effects relationship between technological assimilation and exploitive assimilation was positive and significant, as was the interaction. This suggests that the more technological components the supplier purchases the more likely they were to utilize the technology to improve current business processes. As seen in Figure 4, with relationships that exhibit high levels of bilateral mechanisms this effect is intensified, especially when technology assimilation is high. For H15, the main effects relationship was positive and significant. This indicates that the more technological assimilation that occurs, the more likely they are to use the technology in innovative and new ways that add value to the organization. The interaction terms was also positive and significant and the analysis (see Figure 5) suggests that relationships that exhibit high levels of bilateral mechanisms are more likely to exploritively assimilate the technology than those with low levels of bilateral mechanism, this is especially so when high levels of technological assimilation exist.

SUMMARY OF FINDINGS

Our analysis revealed several key insights. First, the mediated model of assimilation appears to be a good representation of the key relationships involving assimilation in channel relationships. Results of the structural equation models indicate a consistency between the hypothesized model and the data. The confirmatory factor provides evidence for sound measures. The goodness-of-fit statistics and significant proportions of explained variance both provide support for the hypothesized structure.

The results signify that variables in the channel relationship influence the assimilation behaviors of the channel partner who was mandated to adopt the technology. While theory and extant

literature has demonstrated that the transaction cost and agency theory variables effect decisions to pursue joint action and behavioral monitoring, these relationships have not been explored in the context of collaborative technology assimilation. We find that several of these variables are predictive of assimilation. In particular we found that channel partners who have invested significant amounts of resources specific to focal relationship are more likely to adopt the technology. Interestingly, we found the performance documentation relationship to be positive, which was contrary to expectations. Additionally, the positive relationship between technological uncertainty and exploritive assimilation was not hypothesized. The positive moderating effects of bilateral mechanisms indicate the importance of relationalism in the assimilation process.

CHAPTER 6: DISCUSSION, IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

In Chapter 5, the results of the study were described, examining the effects of asset specificity, technological uncertainty, performance documentation and agent orientation on IOS assimilation. In this chapter we discuss the theoretical and managerial implications from the findings. Limitations for the research is examined. Finally, we discuss additional research questions which may be addressed in future research.

DISCUSSION OF RESULTS

The purpose of this study was to understand the mechanisms of IOS assimilation (i.e., the extent to which firms deployed and utilized the technology) within channel relationships. A conceptual model was developed and tested that posits the conditions that are likely to increase or decrease an organization's assimilation of an IOS in mandated situations. We theorized that five key constructs would differentially effect the assimilation of the IOS. It is significant in that it is an empirically rigorous study of assimilation as it combines the theories surrounding governance. Additionally, it makes several key contributions to academic literature and managerial practice. Our results suggest that the relational factors of asset specificity and agent orientation influence the decision to assimilate an IOS and that existing governance structures (bilateral governance) play a significant role in accelerating this process.

Our results indicate that the higher the level of technological component assimilation the more likely the firm is to utilize the technology to improve current business processes and use it in innovative ways that add value to the firm. While this seems intuitive, the current streams of research tend to examine deployment as either a dichotomous decision variable, where you have either adopted or not adopted the technology (Chwelos, Benbasat and Dexter 2001; Grover 2003; O'Callaghan, Kaufman and Konsynski 1992). Or as assimilation, which combines the use of the technology with the implementation of the physical components (Bala and Ventakesh 2007; Fichman and Kemerer 1997; Rai et al. 2006). Examining assimilation in terms of technological, exploitive and exploritive provides a richer understanding of the assimilation process.

Our results indicate that exchange relationships that have higher levels of asset specificity have higher levels of technological assimilation. The assimilation process represents a form of vertical integration that channel partners use to safeguard these assets (Heide and John 1990). Firms will assimilate the technology in an attempt to protect the investments that they have already made in the relationship (Heide and John 1988; Rindfleisch and Heide 1997). These findings are in line with previous research which found that higher levels of asset specificity increased the deployment and usage of IOS technologies (Corsten and Kumar 2005; Son, Narasimhan and Riggins 2005; Zaheer and Venkatram 1994).

We did not find support for the relationship between technological uncertainty and technological assimilation. Additionally, the sign was not as we expected, we had hypothesized a negative relationship between technological uncertainty and technological assimilation, but the sign, while insignificant, is positive ($\beta = .09$, $t=1.16$, $p = .24$). Interestingly, in our alternative model

analysis, we found that that relationship between technological uncertainty and exploritive assimilation was significant and positive ($\beta = .16$, $t=3.45$, $p = .00$). This suggests that relationships that exhibit more technological uncertainty, where the technological requirements of the relationship tend to be unstable and quickly become obsolete, the more likely the following channel partner is to use the technology to improve current business processes. This is contrary to TCA theories, which would suggest that the following partner would be less likely to adopt the technology due to the risk associated with the purchase.

We did not find any main effects support for the two agency theory variables, performance documentation and agent orientation, we proposed. We had expected to find that the more documentation that existed to measure performance the less likely they were to assimilate the technology. However, performance documentation was not only insignificant, but the sign was positive, which is contrary to our hypothesis. This is similar to the findings of Jaworksi, Stathakopoulos and Krishnan (1993), who had hypothesized that the more complete the evaluation system, the greater the likelihood that output controls would be utilized, but their results indicate that the greater the completeness the more likely they were to utilize behavioral controls. Agent orientation was insignificant, however in the correct direction.

Bilateral mechanisms play an important part in the assimilation of interorganizational technologies. Bilateral mechanisms represent the informal social controls that exist within the relationship and serve to align goals and create joint value (Heide 1994; Uzzi 1997). The results indicate that relationships operate with high levels of bilateral mechanisms are more likely to assimilate the technology as well as finding ways to explore and exploit its utility. This is an

important implication, as the value derived from an IOS is highly dependent on the usage of the technology. Utilizing the technology to improve current business processes or innovate new businesses processes is crucial to creating value for the system.

Bilateral mechanisms not only directly impact the three assimilation variables, but they also play a key moderating role. The findings indicate that bilateral mechanisms interact with asset specificity, agent orientation and technological assimilation. Bilateral mechanisms strengthen the relationship between asset specificity and technological uncertainty. Channel relationships that are higher in bilateral mechanisms are more likely to adopt the technology, even when asset specificity is low. In regards to agent orientation, bilateral mechanisms weaken the negative relationship between agent orientation and technological assimilation. Firms that view their channel partner as an agent of their firm rather than just a customer and were in relationships with low bilateral mechanisms, were less likely to assimilate the technology than those that were in relationships with high levels of bilateral mechanisms. Bilateral mechanisms also play an important part in the utilization of the technology. The interaction between bilateral mechanisms and technological assimilation influences both exploitive and exploritive assimilation. The results indicate that at low levels of technological assimilation bilateral mechanisms will minimally increase exploitation and exploration assimilation. However, when technology assimilation is high, channel relationships high in bilateral mechanisms were much more likely to exploit and explore the technology.

This study provides empirical evidence that supports the use of governance theories in the examination of assimilation. It suggests that firms in relationships that are high in asset

specificity and bilateral mechanisms will be more likely to assimilate the technology as well as exploit and explore the uses of the technology.

THEORETICAL IMPLICATIONS

This study provides empirical support for the importance of studying IOS assimilation under the lens of governance. The results indicate that factors surrounding the exchange relationship will influence a follower's degree of assimilation of an IOS. The three complementary theories of control theory, agency theory and transaction cost analysis provided a strong theoretical foundation for the research.

We found that the constructs of asset specificity and technological uncertainty played important roles in the assimilation process. Asset specificity was a key determinant of technological assimilation. Technological uncertainty provided interesting findings, insignificant in relation to technological assimilation, but significant in relation to exploritive assimilation. While this finding was unexpected, and contrary to theory, it suggests that the higher the risk associated with the technology the more likely they are to use it to improve current business processes. This finding tends to be more in line with the agency perspective, as Celly and Frazier (1996) found, environmental uncertainty was strongly related to the use of behavior-based controls. The rationale behind this argument is that an emphasis on agent behaviors my reduce riskiness associated with the relationship. The information that is obtained through exploitive assimilation of the technology may guard against opportunism, reducing uncertainty for the principal (Celly and Frazier 1996).

While the constructs of performance documentation and agent orientation were not significant, there theoretical justification was strong. Support for task characteristics influencing control choice is empirically validated through other studies (Agarwal and Ramaswami 1993; Bergan, Dutta and Walker 1992; Krafft 1999; Oliver and Anderson 1994; Ramaswami 2002). The findings are rather puzzling and suggest that further investigation into the relationship between performance documentation and technological assimilation is needed. The level of significance, (p=.12) suggests that it might be a sample size issue.

Agent orientation did not have a significant main effect, but was shown to interact with bilateral mechanisms. This construct is similar to customer orientation; however it looks at the degree to which the firm views the channel partner as an agent of the firm, or a customer. It represents a type of goal orientation. The findings are significant in that followers that are not socially tied to their channel partners are less likely to adopt the technology when they view their partner as an agent of the firm. This finding is noteworthy in that it emphasizes the importance of the informal controls in agent relationships.

Bilateral mechanisms were the most significant indicator of assimilation. They had a strong influence on all three aspects of assimilation, technological, exploitive and exploritive, as well as interactive effects. Agency theory, control theory and TCA all discuss the role of the informal controls that exist within an exchange relationship. However, there is limited research that examines what effect they have on the choice of outcome versus behavior-based controls (Gilliland, Bello and Gundlach 2010; Heide 1994). This research provides further support for the importance of bilateral governance mechanisms that operate within exchange relationships.

MANAGERIAL IMPLICATIONS

Our study provides several important implications for industry leaders, executives and members of standards-development consortia. First, firms that are mandated to participate in an IOS with a channel partner should be aware that the decision they are making is one of governance more so than adoption. The decision to continue the relationship and assimilate the technology should be based on efficient contracts. As such, the benefits of the IOS need to be evaluated in terms of the efficiency of the behavioral controls that are enabled by the IOS. Rather than focusing on the technological demands of the initiator, a following firm would be better suited to evaluate the activities and tasks that the initiator undertakes on their behalf. In almost all retailer-supplier relationships, there are some channel activities that could possibly benefit from the visibility provided by an IOS technology. For example, Gillette utilized an RFID-based IOS to track product replenishment during promotional periods and found that those stores that moved product from the back room to the store floor prior to the promotion had a 48% increase in average dollars per point of sale than those who did not. It also identified that 38% of stores were not executing promotions correctly (Murphy 2005).

Second, with major retailers, such as Wal-mart, moving towards direct-from-manufacturer relationships and away from middlemen, efficient management of channel activities and tasks becomes crucial. IOS's provide bilateral behavioral-control and monitoring for both channel partners, which increases the efficiency of the channel system. However, this only occurs when both channel partners assimilate the technology. Therefore understanding the assimilation is critical to both firm and channel performance. Identifying channel partners who will reap the most benefits from the new governance system that the IOS creates, has the potential to increase

the success rate of the IOS system mandated by an initiator. As evidenced by Wal-Mart's ever changing RFID-mandate, blanketed mandates are ineffectual at best. This research suggests that initiating firms would be more successful if they were to identify the channel partners with whom they have the highest levels of bilateral mechanisms and asset specificity. Those firms with high levels of relationship specific assets are motivated to participate in IOS's due to the sunk costs already invested. Following firms that were in channel relationship with high expectations of fairness, self-monitoring and social control were much more likely to adopt the technology than those who weren't. Additionally, the existence of bilateral mechanisms also encourages higher levels of utilization of the technology for both current business practices and innovative uses of the technology.

It is rather intuitive that technological assimilation would lead to higher rates of exploitive and exploritive assimilation. Interestingly, most of the emphasis from industry leaders and standards-development consortia focuses on the constructs of compatibility, complexity and trialability, all derived from the theory of innovation (Rogers 2003). While, the diffusion of innovations are dependent on the communication of the benefits of a new technology, these constructs influence the decision to adopt the technology rather than the decision to assimilate the technology. Our research suggests that with collaborative IOS's it is also important to focus on the benefits that the visibility will provide in terms of reducing performance ambiguity and improving channel efficiency.

LIMITATIONS

While this study makes some promising contributions to the literature we must note some limitations. Several trade-offs had to be made over the course of the study, first, we conducted the research under the setting of retailers and suppliers and focused on one particular IOS technology—RFID technology. This raises questions of generalizability to other IOS applications as well as the assimilation of RFID-based IOS's in other industries. However, restricting the sample to this context allows us to control for external sources of variation.

The respondents were asked to select a particular retailer that their company sells through. While this had to be a retailer that the respondent interacted with on a regular basis, it did not have to be the "most important" or "most favored" retailer. We assumed that the choice of relationship was randomly distributed across the population and this may have minimal effects on the results of the study. Additionally, we referred to this retailer as "ALPHA" in order to maintain the anonymity of the respondent. While we consistently reminded them that "ALPHA" was the focal firm that they first thought of in the beginning of the survey, we assumed that this was indeed the case.

Another limitation is that power is not explicitly incorporated into the model, although the literature indicates its importance in dyadic relationships. We included supplier relative dependence as a control variable to account for any asymmetry in dependence.

A fourth possible limitation is that we relied on a single key informant. This leads to issues of key informant competency and differing perspectives among parties in the relationship. The first

issue was managed through informant quality checks, which revealed that respondents were knowledgeable and capable to participate. The second issue surrounds common methods bias. In order to remedy common methods bias, we followed Podsakoff et al.'s (2003) recommendations. First, we separated our predictor and criterion variables within the survey instrument. Second, we carefully constructed our scale items. Additionally, we tested for common methods bias by utilizing Harmon's one factor test.

Finally, the survey was designed so that respondents were asked to react to a specific scenario that addressed a mandate to adopt RFID technology. RFID was selected due to the relative newness of the technology as well as the early adoption stage, where very few firms had actually adopted the technology. While, all respondents were familiar with the technology, one might argue that it might have been better to create a fictitious IOS technology in the scenario.

FUTURE RESEARCH

This research examines the assimilation of collaborative IOS's in channel relationships. It frames the assimilation decision process in terms of a governance issue, which allows for several important research directions. First, assimilation is assessed in terms of purchasing the physical components, as well as assimilating it to improve current business processes and innovate new business processes. While the technology is necessary for the exploitive and exploritive assimilation, there might be additional antecedents that differentially influence these assimilation outcomes. Considering that the value of IOS's are derived from the capture and dissemination of information, it is important to understand what encourages exploitive and exploritive assimilation.

The results of this research indicate that bilateral mechanisms play an important role in the assimilation process. However, there are other relational variables that may influence the process as well. Further research might involve looking at other informal control variables, such as social norms or relationalism. Additionally, Heide (1994) suggests that unilateral mechanisms work in tandem with bilateral mechanisms. Future research might include both the bilateral and unilateral mechanism.

The focus of the study was on the assimilation process and it was outside of our scope to examine potential outcomes for exploitive and explorative assimilation. While research suggests that assimilation of IOS's lead to organizational change, increased firm performance, strategic benefits and operational benefits, further research might examine how exploitive and exploritive assimilation influence these benefits.

This research was limited in that it only looked at RFID assimilation in retailer-supplier relationships. It would be beneficial to see if the conceptual model is generalizable to other types of relationships, such as manufacturer-supplier, or dealer-manufacturer relationships. Additionally, IOS's differ in the extent to which they are scalable and the degree to which they change the governance structure of the exchange relationship, so research examining additional IOS's in channel relationship would be useful.

TABLES AND FIGURES

TABLE 1

Hypothesized Direct and Moderator Effects on Assimilation

Hypotheses		Proposed Effect on Assimilation		
		Technological Assimilation	**Exploitive Assimilation**	**Explorative Assimilation**
	Mediation Variable			
H1/2	Technological Assimilation		+	+
	Exchange Problem Variables			
H3	Asset Specificity	+		
H4	Technological Uncertainty	-		
	Agency Problem Variables			
H5	Performance Documentation	-		
H6	Agent Orientation	-		
	Governance Variables			
H7/8/9	Bilateral Mechanisms	+	+	+
	Moderating Variable			
H10	Asset SpecificityXBilateral Mechanisms	Strengthen		
H11	Technological UncertaintyXBilateral Mechanisms	Weaken		
H12	Performance DocumentationXBilateral Mechanisms	Weaken		
H13	Agent OrientationXBilateral Mechanisms	Weaken		
H14/15	Technological AssimilationXBilateral Mechanisms		Strengthen	Strengthen

TABLE 2

Response Formats and Items

Scale	Response Anchor	Sample Items
Asset Specificity (AS)	7-point scale: Strongly disagree/Strongly agree	1. We have made significant investment in equipment dedicated to our relationship with ALPHA . 2. We have many people that are dedicated exclusively to our relationship with ALPHA. 3. Our operating process has been tailored to meet the requirements of dealing with ALPHA.
Technological Uncertainty (TU)	7-point scale: Strongly disagree/Strongly agree	1. It is difficult for us to predict what technological requirements ALPHA will have for us in the future. 2. ALPHA often expects us to use technologies that are not well understood. 3. When ALPHA requires our firm to purchase new technology, it quickly becomes obsolete.
Performance Documentation (PD)	7-point scale: Strongly disagree/Strongly agree	1. We have the necessary documented information to measure ALPHA's performance on completed activities. 2. Enough documented information exists to enable us to evaluate ALPHA's activities. 3. We are confident that the documented information we have is sufficient to evaluate ALPHA's performance.
Agent Orientation (AO)	7-point scale: The Retailer/Then End Consumer	1. Our business objectives are driven primarily by the satisfaction of … 2. Most of our efforts and resources are dedicated to… 3. We are more focused on satisfying the needs of…
Bilateral Mechanisms (BM)	7-point scale: Strongly disagree/Strongly agree	*Bilateral Incentives:* 1. The confidence that any short term financial inequities will be made up over time serves as a strong incentive for both firms to cooperate. 2. The confidence that the financial benefits will be fair over the long run serves as a strong incentive for both firms to cooperate.

		3. The confidence that the investments made in the relationship today will pay off over the long run serves as a strong incentive for both firms to cooperate. *Bilateral Monitoring:* 1. Each firm monitors its own investment of financial resources into the relationship, to ensure it meets the expectations of its partner. 2. Each firm monitors the level of personnel resources it invests into the relationship, to ensure it meets the expectations of its partner. 3. Each firm measures its own intention to make future investments in the relationship, to ensure it meets the expectations of its partner. *Bilateral Enforcement:* 1. The strength of our relationship will keep the parties honest in dealing with each other. 2. We will work together to resolve any discrepancies that may arise. 3. We will keep our promises to each other because we value our partnership.
Supplier Relative Dependence (SRD)	7-point scale: Strongly disagree/Strongly agree	*Supplier Dependence:* 1. There are other retailers that could provide us with comparable distribution. 2. Our total costs of switching to a competing retailer would be prohibitive. 3. It would be difficult for us to replace the sales and profits ALPHA generates. (R) *Retailer Dependence:* 1. There are other suppliers who could provide the retailer with comparable product lines 2. ALPHA would incur minimal costs in replacing our firm with another supplier. 3. It would be difficult for ALPHA to replace the sales and profits generated from our firm's product line. (R)
Technological Assimilation (TECH)	7-point scale: Strongly disagree/Strongly agree	1. My organization would purchase all of the hardware and software (tags and

		readers) necessary to meet the requirements of ALPHA. 2. My organization would purchase the technological equipment that would allow us to filter, manage and store the data collected. 3. My organization would purchase RFID components that allow us to share data with ALPHA. *4.* My organization would purchase the equipment necessary to share the data across the functional units of my firm.
Exploitive Assimilation (PLOIT)	7-point scale: No RFID use/Significant RFID use (Summed Index)	*Indicate the extent to which your org would use RFID techno to monitor ALPHA on the following tasks:* 1. Manages our new product introductions 2. Executes our product promotions 3. Responds to out-of-stock situations 4. Rotates our stock 5. Manages chargebacks to our firm 6. Reconciles our orders 7. Optimizes inventory levels for our products 8. Manages reverse logistics for our product.
Explorative Assimilation (PLORE)	7-point scale: Strongly disagree/Strongly agree	1. My organization would find new applications of RFID for process innovation with ALPHA. 2. My organization would find new ways to use RFID in working with ALPHA. 3. My organization would utilize RFID to find new ways to manage our relationship with ALPHA.

TABLE 3
Response Rates

Non-response	687	49%
Non-deliverable (bounce-backs)	338	24%
Opted-out	166	12%
Disqualified	24	2%
Agreed to Participate	173	12%
Total	1388	

TABLE 4
Informant Quality Items

Scale	Response Anchor	Sample Items
Informant Quality	7-point scale: 1 = Not very knowledgeable to 7= Very knowledgeable	*How knowledgeable are you about the following in your organization's relationship with ALPHA?* The nature of unique investments and assets that are used in the relationship The tasks and activities that ALPHA performs for your organization The quality of the relationship with ALPHA The technological requirements of the relationship.

TABLE 5

Descriptive Statistics of Final Sample

Firm Size based on Annual Revenue	Number	% of Sample
Less than $100,000	5	1.9
$100,000 to $500,000	4	1.5
$500,001 to $1,000,000	14	5.4
$1,000,001 to $5,000,000	24	9.3
$5,000,001 to $10,000,000	29	11.2
$10,000,001 to $50,000,000	41	15.8
$50,000,001 to $100,000,000	28	10.8
>$100,000,001	114	44

Descriptive Category	Mean
Length of Relationship with Focal Retailer (months)	23.8
Percent of Sales Accounted for by Retailer	23.1%
Months in Current Position	58.3
Age	47

TABLE 6

Main Study Measurement Item Properties: Descriptive Statistics and Cronbach's Alpha

Construct/Items	Mean	Standard Deviation	Alpha
Asset Specificity	**5.17***	**1.38***	
1. We have made significant investment in equipment dedicated to our relationship with ALPHA .	5.08	1.67	.794
2. We have many people that are dedicated exclusively to our relationship with ALPHA.	5.06	1.79	
3. Our operating process has been tailored to meet the requirements of dealing with ALPHA.	5.37	1.43	
Technological Uncertainty	**3.30***	**1.35***	
1. It is difficult for us to predict what technological requirements ALPHA will have for us in the future.	3.85	1.61	.832
2. ALPHA often expects us to use technologies that are not well understood.	3.17	1.61	
3. When ALPHA requires our firm to purchase new technology, it quickly becomes obsolete.	2.88	1.45	
Performance Documentation	**5.67***	**1.09***	
1. We have the necessary documented information to measure ALPHA's performance on completed activities.	5.78	1.13	.890
2. Enough documented information exists to enable us to evaluate ALPHA's activities.	5.65	1.21	
3. We are confident that the documented information we have is sufficient to evaluate ALPHA's performance.	5.57	1.27	
Agent Orientation	**4.33***	**1.58***	.859
1. Our business objectives are driven primarily by the satisfaction of …	4.49	1.85	
2. Most of our efforts and resources are dedicated to…	4.10	1.72	
3. We are more focused on satisfying the needs of…	4.42	1.81	
Bilateral Mechanisms	**5.47***	**.99***	

Bilateral Incentives *(average of three items)*	*5.22*	*1.41*	.927
1. The confidence that any short term financial inequities will be made up over time serves as a strong incentive for both firms to cooperate.	5.16	1.52	
2. The confidence that the financial benefits will be fair over the long run serves as a strong incentive for both firms to cooperate.	5.14	1.53	
3. The confidence that the investments made in the relationship today will pay off over the long run serves as a strong incentive for both firms to cooperate.	5.37	1.50	
	5.42*	***1.41****	.929
Bilateral Monitoring *(average of three items)*	5.49	1.24	
1. Each firm monitors its own investment of financial resources into the relationship, to ensure it meets the expectations of its partner.	5.31	1.32	
2. Each firm monitors the level of personnel resources it invests into the relationship, to ensure it meets the expectations of its partner.	5.47	1.26	
3. Each firm measures its own intention to make future investments in the relationship, to ensure it meets the expectations of its partner.	***5.78****	***1.01****	.859
Bilateral Enforcement*(average of three items)*	5.60	1.23	
1. The strength of our relationship will keep the parties honest in dealing with each other.	5.87	1.07	
2. We will work together to resolve any discrepancies that may arise.	5.87	1.13	
3. We will keep our promises to each other because we value our partnership.			
Supplier Relative Dependence			
Supplier Dependence – Retailer Dependence	**.30***	**1.56***	
1. There are other retailers (suppliers) that could provide us with comparable distribution (product lines).	-0.23	1.88	.770
2. Our total costs of switching to a competing retailer (supplier) would be prohibitive.	0.55	1.89	
3. It would be difficult for us (ALPHA) to replace the sales and profits ALPHA (we) generates. (R)	0.57	1.87	
Technological Assimilation	**4.53***	**1.62***	.954
1. My organization would purchase all of the hardware and software (tags and readers) necessary to meet the requirements of ALPHA.	4.55	1.76	
2. My organization would purchase the technological equipment that would	4.50	1.71	

allow us to filter, manage and store the data collected.			
3. My organization would purchase RFID components that allow us to share data with ALPHA.	4.59	1.69	
4. My organization would purchase the equipment necessary to share the data across the functional units of my firm.	4.49	1.74	
Exploitive Assimilation	**23.10****	**14.51****	--
Indicate the extent to which your org would use RFID techno to monitor ALPHA on the following tasks:			
1. Manages our new product introductions	4.30	2.10	
2. Executes our product promotions	4.49	2.11	
3. Responds to out-of-stock situations	4.92	2.09	
4. Rotates our stock	4.24	2.07	
5. Manages chargebacks to our firm	4.20	2.20	
6. Reconciles our orders	4.47	2.09	
7. Optimizes inventory levels for our products	4.79	2.03	
8. Manages reverse logistics for our product.	4.22	2.00	
Explorative Assimilation	**4.69***	**1.59***	
1. My organization would find new applications of RFID for process innovation with ALPHA.	4.66	1.68	.951
2. My organization would find new ways to use RFID in working with ALPHA.	4.64	1.67	
3. My organization would utilize RFID to find new ways to manage our relationship with ALPHA.	4.78	1.66	

*Means for the Consolidated Scales

**Mean of Summed Scale

TABLE 7

Item Measures Correlation Matrix with Standard Deviations

Items	AS1	AS2	AS3	TU1	TU2	TU3	PD1	PD2	PD3	AO1	AO2	AO3
AS1	1.00											
AS2	0.60	1.00										
AS3	0.50	0.60	1.00									
TU1	0.22	0.23	0.29	1.00								
TU2	0.16	0.21	0.28	0.64	1.00							
TU3	0.25	0.28	0.23	0.57	0.66	1.00						
PD1	0.32	0.27	0.21	0.02	-0.04	-0.01	1.00					
PD2	0.24	0.18	0.12	-0.06	-0.09	-0.11	0.72	1.00				
PD3	0.24	0.22	0.15	-0.08	-0.05	-0.10	0.67	0.80	1.00			
AO1	-0.10	-0.15	-0.15	-0.10	-0.15	0.01	0.04	-0.02	-0.02	1.00		
AO2	-0.14	-0.17	-0.22	-0.10	-0.14	-0.04	0.02	0.00	-0.04	0.58	1.00	
AO3	-0.12	-0.19	-0.18	-0.11	-0.18	-0.04	0.10	0.07	-0.01	0.70	0.73	1.00
SRD1	0.02	0.03	0.19	-0.01	0.03	0.09	-0.14	-0.25	-0.22	-0.07	-0.09	-0.06
SRD2	0.03	0.05	0.15	0.10	0.04	0.05	-0.03	-0.15	-0.12	-0.18	-0.16	-0.12
SRD3	0.05	0.06	0.18	0.16	0.13	0.11	-0.08	-0.15	-0.11	-0.25	-0.17	-0.19
BINC1	0.24	0.23	0.27	0.01	-0.09	0.10	0.13	0.19	0.14	0.01	0.04	0.09
BINC2	0.24	0.21	0.24	-0.05	-0.11	0.11	0.14	0.25	0.19	0.01	0.05	0.08
BINC3	0.25	0.24	0.28	-0.02	-0.08	0.05	0.13	0.21	0.18	-0.05	-0.03	-0.03
BMON1	0.26	0.21	0.20	-0.05	-0.14	0.02	0.21	0.20	0.21	0.07	0.02	0.01
BMON2	0.35	0.27	0.27	0.01	-0.11	0.01	0.23	0.25	0.25	0.08	0.04	0.03
BMON3	0.35	0.30	0.24	0.03	-0.04	0.06	0.29	0.23	0.24	0.08	0.01	0.04
BENF1	0.21	0.14	0.21	-0.14	-0.14	0.01	0.16	0.23	0.17	0.01	0.00	0.01
BENF2	0.18	0.13	0.14	-0.15	-0.18	-0.07	0.20	0.24	0.16	0.02	0.05	0.05
BENF3	0.23	0.15	0.17	-0.09	-0.19	-0.08	0.22	0.24	0.20	-0.02	-0.03	-0.03
GTECH1	0.37	0.35	0.40	0.06	0.00	0.14	0.18	0.20	0.21	-0.08	-0.17	-0.16
GTECH2	0.34	0.32	0.37	0.09	0.03	0.20	0.25	0.27	0.21	-0.06	-0.10	-0.09
GTECH3	0.37	0.35	0.41	0.07	0.05	0.17	0.22	0.23	0.20	-0.10	-0.13	-0.15
GTECH4	0.35	0.35	0.39	0.09	0.04	0.19	0.25	0.29	0.23	-0.05	-0.12	-0.07
PLORE1	0.29	0.29	0.33	0.10	0.09	0.23	0.23	0.24	0.20	0.04	-0.07	0.01
PLORE2	0.35	0.34	0.38	0.11	0.09	0.27	0.22	0.21	0.18	-0.03	-0.11	-0.05
PLORE3	0.34	0.34	0.35	0.08	0.08	0.21	0.23	0.22	0.19	-0.02	-0.12	-0.10
St. Devs	1.67	1.79	1.46	1.61	1.61	1.45	1.12	1.21	1.27	1.85	1.71	1.81

Items	SRD1	SRD2	SRD3	BINC1	BINC2	BINC3	BMON1	BMON2	BMON3	BENF1	BENF2	BENF3
SRD1	1.00											
SRD2	0.48	1.00										
SRD3	0.42	0.68	1.00									
BINC1	0.02	0.00	-0.14	1.00								
BINC2	-0.03	-0.04	-0.18	0.85	1.00							
BINC3	0.01	0.06	-0.07	0.75	0.83	1.00						
BMON1	-0.05	-0.05	-0.06	0.43	0.43	0.41	1.00					
BMON2	-0.09	-0.09	-0.11	0.41	0.45	0.39	0.81	1.00				
BMON3	-0.09	-0.07	-0.11	0.43	0.45	0.44	0.80	0.83	1.00			
BENF1	-0.07	-0.07	-0.12	0.48	0.51	0.54	0.40	0.43	0.38	1.00		
BENF2	-0.13	-0.12	-0.18	0.37	0.45	0.43	0.42	0.41	0.44	0.64	1.00	
BENF3	-0.14	-0.10	-0.13	0.39	0.46	0.46	0.44	0.48	0.44	0.65	0.73	1.00
GTECH1	0.11	0.14	0.11	0.36	0.34	0.39	0.36	0.39	0.35	0.33	0.31	0.31
GTECH2	0.09	0.10	0.07	0.40	0.39	0.43	0.33	0.38	0.36	0.31	0.31	0.29
GTECH3	0.08	0.12	0.06	0.41	0.40	0.43	0.31	0.34	0.36	0.33	0.30	0.28
GTECH4	0.05	0.02	-0.04	0.40	0.43	0.42	0.33	0.41	0.39	0.32	0.31	0.28
PLORE1	-0.02	-0.04	-0.11	0.39	0.37	0.38	0.28	0.35	0.34	0.34	0.31	0.32
PLORE2	0.02	-0.04	-0.09	0.44	0.43	0.43	0.27	0.31	0.32	0.35	0.31	0.30
PLORE3	0.00	-0.04	-0.10	0.40	0.38	0.41	0.31	0.32	0.34	0.38	0.32	0.33
St. Devs	1.88	1.89	1.87	1.52	1.53	1.50	1.24	1.32	1.26	1.23	1.07	1.13

Items	GTECH1	GTECH2	GTECH3	GTECH4	PLORE1	PLORE2	PLORE3
GTECH1	1.00						
GTECH2	0.84	1.00					
GTECH3	0.83	0.87	1.00				
GTECH4	0.76	0.88	0.86	1.00			
PLORE1	0.56	0.63	0.61	0.63	1.00		
PLORE2	0.58	0.67	0.65	0.69	0.86	1.00	
PLORE3	0.62	0.64	0.67	0.67	0.83	0.90	1.00

TABLE 8

Bilateral Mechanisms as a Second-Order Factor

Standardized Estimates

A: First-Order Loadings			
Indicator	Bilateral Incentives	Bilateral Monitoring	Bilateral Enforcement
BI1	.88[a]		
BI2	.97 (23.38)[b]		
BI3	.86 (19.33)		
BM1		.88[a]	
BM2		.92 (21.43)	
BM3		.91 (20.97)	
BE1			.77[a]
BE2			.84 (13.53)
BE3			.86 (13.79)
B: Second-Order Loadings			
Bilateral Incentives	.73[a]		
Bilateral Monitoring	.67 (8.40)		
Bilateral Enforcement	.76 (8.46)		

[a]Fixed Parameters

[b]t-values are in parentheses

TABLE 9

Main Study Measurement Item Properties: Parameter Estimates, t-values and SMC's

Construct/Items	Standardized Loading	t-value	SMC
Asset Specificity			
1. We have made significant investment in equipment dedicated to our relationship with ALPHA .	.73	--	.53
2. We have many people that are dedicated exclusively to our relationship with ALPHA.	.79	10.86	.63
3. Our operating process has been tailored to meet the requirements of dealing with ALPHA.	.74	10.46	.56
Technological Uncertainty			
1. It is difficult for us to predict what technological requirements ALPHA will have for us in the future.	.75	--	.56
2. ALPHA often expects us to use technologies that are not well understood.	.85	11.97	.73
3. When ALPHA requires our firm to purchase new technology, it quickly becomes obsolete.	.77	11.48	.59
Performance Documentation			
1. We have the necessary documented information to measure ALPHA's performance on completed activities.	.78	--	.61
2. Enough documented information exists to enable us to evaluate ALPHA's activities.	.93	15.58	.86
3. We are confident that the documented information we have is sufficient to evaluate ALPHA's performance.	.86	14.94	.74
Agent Orientation			
1. Our business objectives are driven primarily by the satisfaction of …	.75	--	.56
2. Most of our efforts and resources are dedicated to…	.78	12.62	.61
3. We are more focused on satisfying the needs of…	.93	13.28	.87
Bilateral Mechanisms			

Bilateral Incentives (consolidated)	.74	--	.55
Bilateral Monitoring (consolidated)	.68	9.47	.47
Bilateral Enforcement(consolidated)	.73	9.94	.53
Supplier Relative Dependence			
Supplier Dependence – Retailer Dependence			
1. There are other retailers (suppliers) that could provide us with comparable distribution (product lines).	.56	--	.31
2. Our total costs of switching to a competing retailer (supplier) would be prohibitive.	.84	8.21	.69
3. It would be difficult for us (ALPHA) to replace the sales and profits ALPHA (we) generates. (R)	.81	8.23	.67
Technological Assimilation			
1. My organization would purchase all of the hardware and software (tags and readers) necessary to meet the requirements of ALPHA.	.87	--	.76
2. My organization would purchase the technological equipment that would allow us to filter, manage and store the data collected.	.95	23.81	.90
3. My organization would purchase RFID components that allow us to share data with ALPHA.	.93	22.70	.86
4. My organization would purchase the equipment necessary to share the data across the functional units of my firm.	.92	22.17	.85
Exploitive Assimilation	1.00	--	1.00
Explorative Assimilation			
1. My organization would find new applications of RFID for process innovation with ALPHA.	.89	--	.80
2. My organization would find new ways to use RFID in working with ALPHA.	.96	26.48	.93
3. My organization would utilize RFID to find new ways to manage our relationship with ALPHA.	.93	24.54	.87

TABLE 10

Structural Model: Partially Disaggregated Main Effects Model

Model Parameters	Estimate	S.E.	T-value	Sig.
Asset Specificity → Technological Assimilation	.20	0.12	2.06	**
Technological Uncertainty → Technological Assimilation	.08	0.09	1.07	ns
Performance Documentation → Technological Assimilation	.10	0.11	1.52	ns
Agent Orientation → Technological Assimilation	-.06	0.07	-1.08	ns
Bilateral Mechanisms → Technological Assimilation	.49	0.13	5.40	***
Bilateral Mechanisms → Exploitive Assimilation	.17	1.03	2.40	***
Bilateral Mechanisms → Explorative Assimilation	.21	0.09	3.21	***
Technological Assimilation → Exploitive Assimilation	.55	0.09	8.32	***
Technological Assimilation → Explorative Assimilation	.62	0.06	9.57	***
Control Variable:				
Supplier Relative Dependence → Technological Assimilation	.14	0.10	2.06	**

Variance Explained	SMC	Fit Indices	
Technological Assimilation	.44	Chi-squared	418.44
Exploitive Assimilation	.44	Degrees of freedom	274
Explorative Assimilation	.58	p-value	0.00
		SRMR	.050
		CFI	.98
		RMSEA	.045

*p<.10
**p<.05
***p<.01

TABLE 11

Structural Model: Partial Disaggregated Alternative Main Effects Model

Model Parameters	Estimate	S.E.	T-value	Sig.
Asset Specificity → Technological Assimilation	.19	0.12	1.95	**
Technological Uncertainty → Technological Assimilation	.09	0.09	1.16	ns
Technological Uncertainty → Explorative Assimilation	.16	0.06	3.45	***
Performance Documentation → Technological Assimilation	.10	0.11	1.53	ns
Agent Orientation → Technological Assimilation	-.06	0.07	-1.09	ns
Bilateral Mechanisms → Technological Assimilation	.50	0.14	5.42	***
Bilateral Mechanisms → Exploitive Assimilation	.17	1.03	2.41	**
Bilateral Mechanisms → Explorative Assimilation	.27	0.10	3.95	***
Technological Assimilation → Exploitive Assimilation	.55	0.53	8.31	***
Technological Assimilation → Explorative Assimilation	.57	0.05	8.66	***
Control Variable:				
Supplier Relative Dependence → Technological Assimilation	.15	0.10	2.26	**

Variance Explained	SMC	Fit Indices	
Technological Assimilation	.45	Chi-squared	406.71
Exploitive Assimilation	.44	Degrees of freedom	273
Explorative Assimilation	.61	p-value	0.00
		SRMR	.047
		CFI	.98
		RMSEA	.044

*p<.10
**p<.05
***p<.01

TABLE 12

Structural Model: Total Aggregation Model

Model Parameters	Estimate	S.E.	T-value	Sig.
Asset Specificity → Technological Assimilation	.28	0.11	3.03	***
Technological Uncertainty → Technological Assimilation	.02	0.09	0.31	ns
Technological Uncertainty → Explorative Assimilation	.15	0.05	3.41	***
Performance Documentation → Technological Assimilation	.11	0.10	1.64	ns
Agent Orientation → Technological Assimilation	-.05	0.06	-0.79	ns
Bilateral Mechanisms → Technological Assimilation	.40	0.11	5.87	***
Bilateral Mechanisms → Exploitive Assimilation	.13	0.91	2.12	*
Bilateral Mechanisms → Explorative Assimilation	.21	0.09	3.83	***
Technological Assimilation → Exploitive Assimilation	.59	0.55	10.02	***
Technological Assimilation → Explorative Assimilation	.61	0.05	11.22	***
Control Variable:				
Supplier Relative Dependence → Technological Assimilation	.14	0.07	2.09	*

Variance Explained	SMC	Fit Indices	
Technological Assimilation	.42	Chi-squared	11.76
Exploitive Assimilation	.44	Degrees of freedom	9
Explorative Assimilation	.59	p-value	0.23
		SRMR	.024
		CFI	1.00
		RMSEA	.034

*p<.10
**p<.05
***p<.01

TABLE 13

Structural Model: Total Aggregation Moderated Model

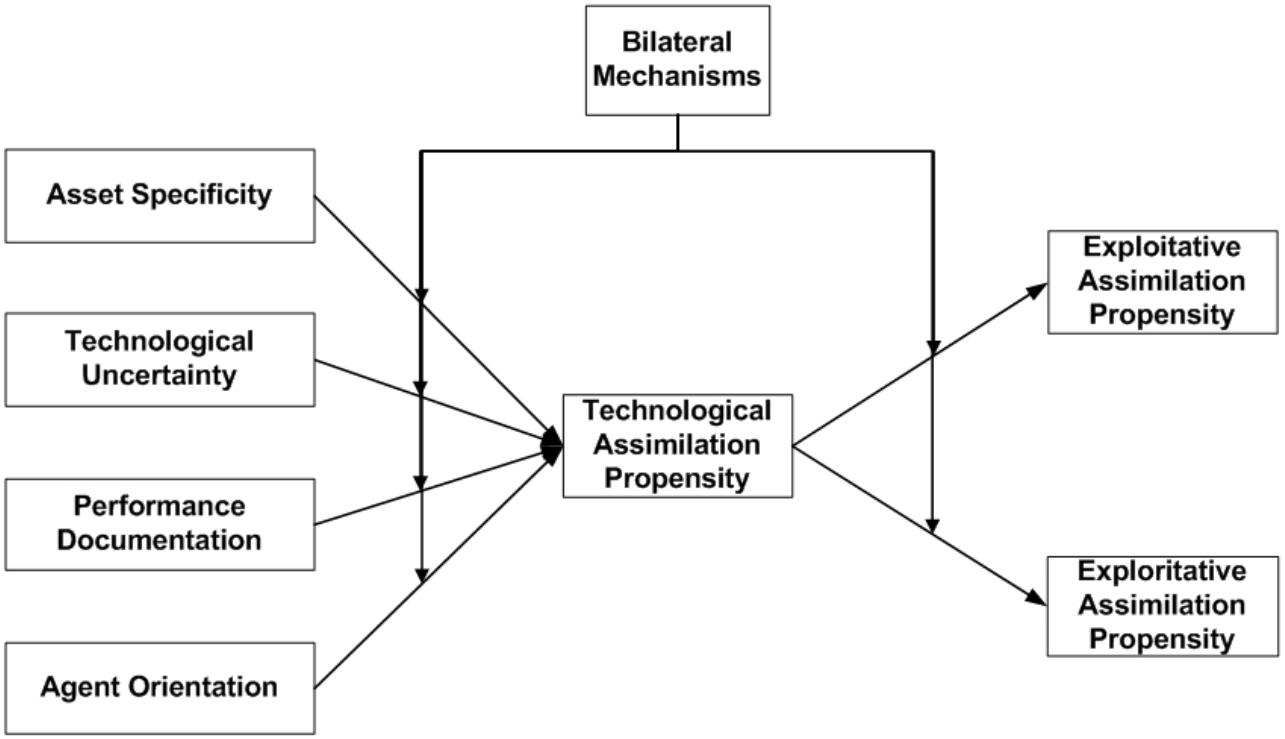
Model Parameters	Estimate	S.E.	T-value	Sig.
Asset Specificity → Technological Assimilation	.27	.12	2.53	**
Technological Uncertainty → Technological Assimilation	.05	.10	.62	ns
Technological Uncertainty → Explorative Assimilation	.16	.05	3.50	***
Performance Documentation → Technological Assimilation	.10	.10	1.49	ns
Agent Orientation → Technological Assimilation	-.08	.06	-1.27	ns
Bilateral Mechanisms → Technological Assimilation	.44	.13	5.58	***
Bilateral Mechanisms → Exploitive Assimilation	.18	.97	2.86	***
Bilateral Mechanisms → Explorative Assimilation	.25	.09	4.32	***
Technological Assimilation → Exploitive Assimilation	.57	.55	9.83	***
Technological Assimilation → Explorative Assimilation	.60	.05	11.02	***
Control Variable:				
Supplier Relative Dependence → Technological Assimilation	.11	.07	1.72	*
Moderator Variables:				
Asset SpecificityXBilateral Mechanisms→ Technological Assimilation	.18	.10	2.01	*
Technological UncertaintyXBilateral Mechanisms→ Technological Assimilation	-.07	.10	-.78	ns
Performance DocumentationXBilateral Mechanisms→ Technological Assimilation	-.01	.10	-.21	ns
Agent OrientationXBilateral Mechanisms→ Technological Assimilation	.16	.07	2.37	**
Technological AssimilationXBilateral Mechanisms→ Exploitive Assimilation	.15	.49	2.71	***
Technological AssimilationXBilateral Mechanisms→ Explorative Assimilation	.12	.05	2.36	**

Variance Explained	SMC	Fit Indices	
Technological Assimilation	.45	Chi-squared	21.12
Exploitive Assimilation	.46	df	18
Explorative Assimilation	.61	p-value	.27
		SRMR	.02
		CFI	1.00
		RMSEA	.026

*p<.10
**p<.05
***p<.01

FIGURE 1

Conceptual Model of the Supplier's RFID Assimilation



Control Variable: Supplier Relative Dependence

FIGURE 2

Asset Specificity X Bilateral Mechanisms Interaction

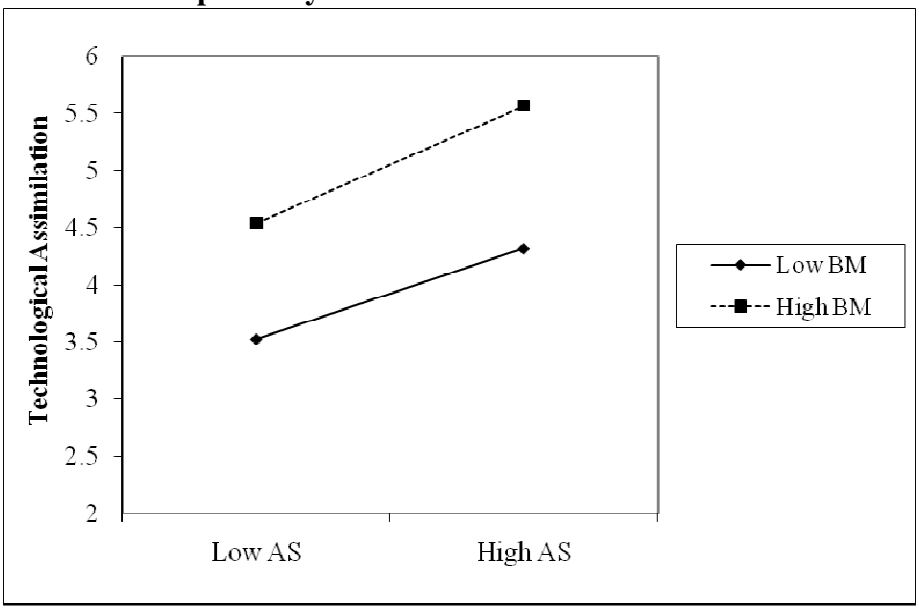


FIGURE 3

Agent Orientation X Bilateral Mechanisms Interaction

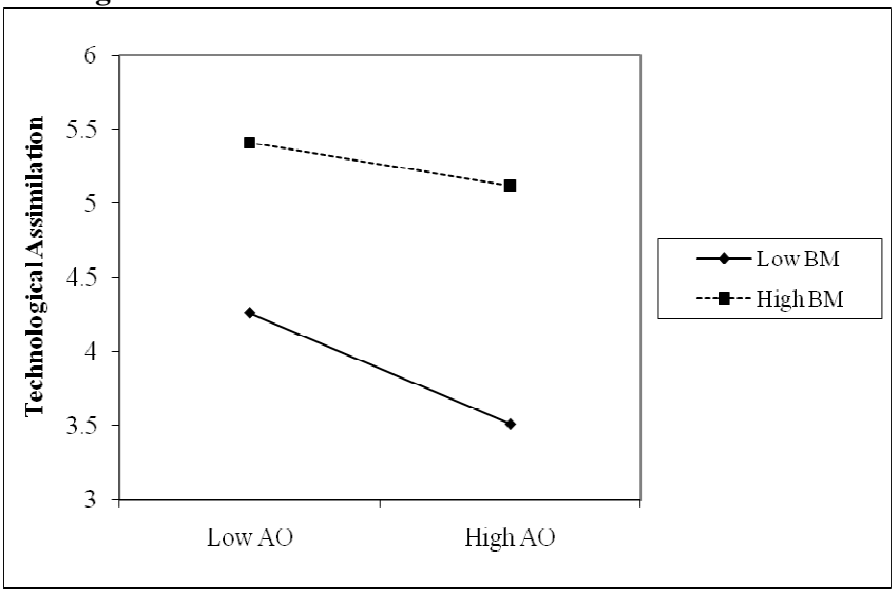
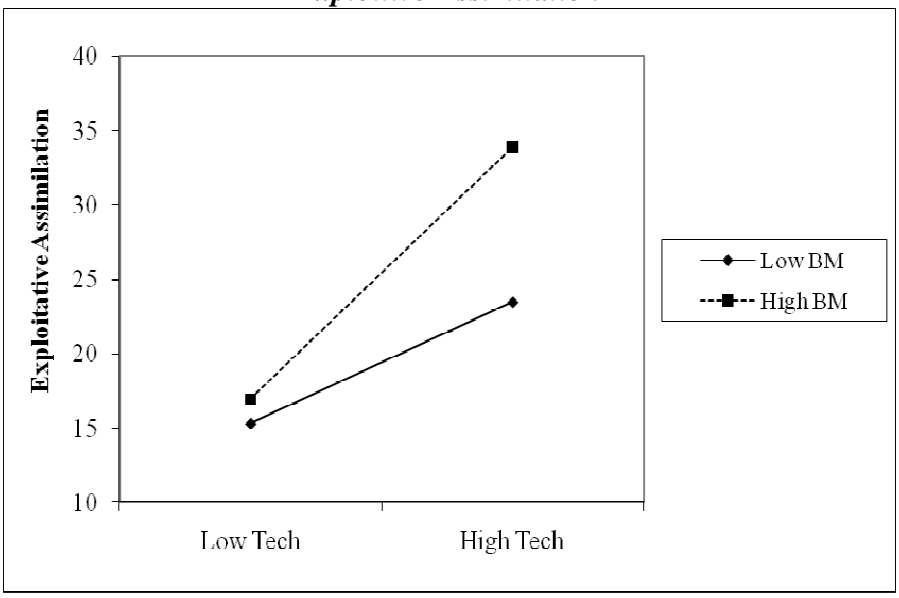


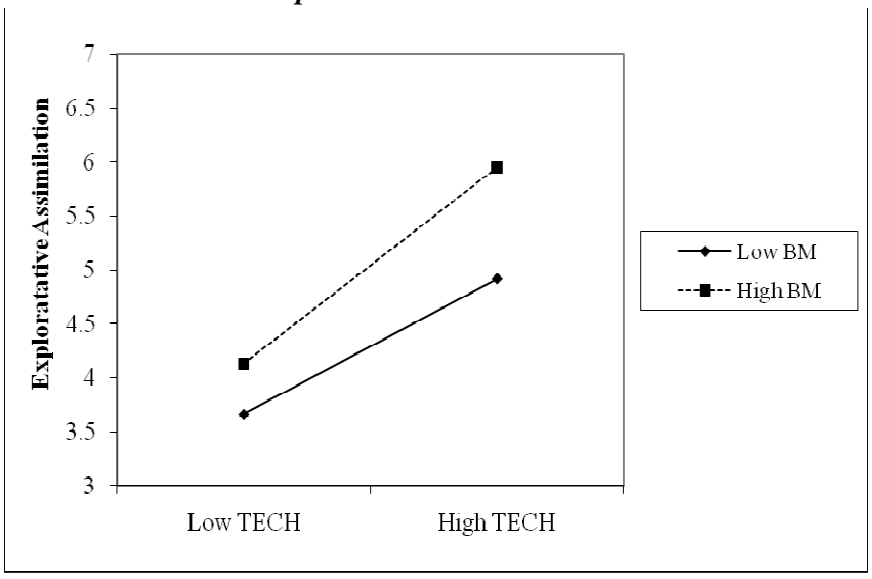
FIGURE 4

Technological Assimilation X Bilateral Mechanisms Interaction

Exploitive Assimilation



Exploratative Assimilation



APPENDICES

APPENDIX A

Introduction E-mail

SUBJECT: Question from a Doctoral Student from Georgia State University

Hello, from Georgia State University! My name is Jennifer Fries and I am a doctoral student in the Marketing Department at GSU. I am currently trying to complete my dissertation which examines the relationship between suppliers and retailers and the effects of collaborative technologies.

Based on your credentials, I believe that you might be an excellent candidate for participation in this study. It will only require 20 minutes of your time and I will share a summary of the results once the study is complete.

The study is being conducted online, so if you would like to participate, please reply to this email and I will send you a link to the study.

If you would prefer not to participate, then simply respond to this email and I will remove you from my database.

I hope you will participate. If you have any questions or comments please feel free to contact me by phone at (404) 413-7685 or via email at jfries@gsu.edu.

Thank you for your time and have a wonderful day!

Jennifer

APPENDIX B
Study Participation E-mail

Dear XXX,

Thank you for agreeing to participate in my study. Your opinions are greatly appreciated. It will only require approximately 20 minutes of your time and in return I will provide you an executive summary of the findings once the study is complete.

The survey will close on July 15, 2010.

You can participate in the study by accessing the questionnaire online in the following ways:

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Follow the link to opt out of future emails:
${l://OptOutLink}

If you have any questions about this research you can contact me at 678-360-4856 (jfries@gsu.edu). For additional verification, please feel free to contact my Advisor, Dr. Dan Bello at 404-413-7658 (dbello@gsu.edu) or Susan Vogtner in the Office of Research Integrity at 404-413-3513 (svogtner1@gsu.edu).

Thank you for your time and have a wonderful day!

APPENDIX C

Final Survey Instrument

Thank you for your willingness to share your opinions with us. Your participation in this study is completely voluntary. If you have any questions at any time regarding this survey you may contact Jennifer Fries by phone at (404) 413-7685 or by email at mktjlfx@langate.gsu.edu. The survey should take approximately 20 minutes of your time. Please be aware that you cannot use the BACK button on your browser. You may start the survey now by clicking on the button below.

Georgia State University
Department of Marketing
Informed Consent

Principal Investigators: Pam Ellen (PI) Jennifer Fries (Student PI)

I. Purpose:
You are invited to participate in a research study. The purpose of the study is to examine how the relationship between suppliers and retailers influences a supplier's decision to adopt collaborative technologies. You are invited to participate because your firm has a direct relationship with one or more retailers. A total of 300 participants will be recruited for this study. Participation will require approximately 20 minutes of your time.
II. Procedures:
If you decide to participate in this study, you will be asked to complete a questionnaire that asks questions about your organization's relationship with the retailer. Additionally, you will be presented with a decision scenario and asked how you expect your organization to respond. The questionnaire will be online and provided to you via email. No monetary payment will be provided for participation in this study.
III. Risks:
In this study, you will not have any more risks than you would in a normal day of life.
IV. Benefits:
Participation in this study qualifies you for a free executive summary of the results. Overall, we hope to gain information regarding how the interorganizational relationship influences a supplier's decision to adopt technology with a retailer.
V. Voluntary Participation and Withdrawal:
Participation in research is voluntary. You have the right not to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, you will not lose any benefits to which you are otherwise entitled.
VI. Confidentiality:
We will keep your records private to the extent allowed by law. Pamela Ellen and Jennifer Fries will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board and the Office for Human Research Protection (OHRP). We will not use any identifying information on study

records. The information you provide will be stored on a password-protected computer. Your name and other facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.
VII. Contact Persons:
Contact Jennifer Fries at mktjlfx@langate.gsu.edu or 770-413-7685 if you have questions about this study. If you have questions or concerns about your rights as a participant in this research study, you may contact Susan Vogtner in the Office of Research Integrity at 404.413.3513 or svogtner1@gsu.edu.
VIII. Copy of Consent Form to Subject:
You can print a copy of this consent form to keep.

Does your organization sell products directly to any retailers (chain drug stores, supermarkets, mass merchandisers, etc)?

- ❍ Yes
- ❍ No

Do you have working knowledge of a relationship that your firm has with any retailer (i.e., do you interact on behalf of your firm with any retailer)?

- ❍ Yes
- ❍ No

Please think of a particular retailer (an independent U.S. organization that resells your product) that your company sells through. This should be a retailer that you interact with on a regular basis. The retailer does not necessarily have to be your "most important" or "most favored" retailer, although it can be. Please answer the following questions, specifically as they relate to this focal retail customer and your organization's relationship with them. We will refer to this retailer as "ALPHA." From this point forward when we mention a retailer named “ALPHA”, please think of the real retailer that you identified here.

How many years has your organization been selling through ALPHA?
_____ Number of Years

What percentage of your organization's overall annual sales volume is accounted for by ALPHA?
_____ Percentage of Overall Annual Sales Volume

How knowledgeable are you about the following in your organization's relationship with ALPHA?

The nature of unique investments and assets that are used in the relationship	❍	❍	❍	❍	❍	❍	❍
The tasks and activities that ALPHA performs for your organization	❍	❍	❍	❍	❍	❍	❍
The quality of the relationship with ALPHA	❍	❍	❍	❍	❍	❍	❍
The technological requirements of the relationship	❍	❍	❍	❍	❍	❍	❍

Regarding your organization's relationship with ALPHA, to what extent do you agree with the following statements?

We have made significant investments in equipment dedicated to our relationship with ALPHA.	❍	❍	❍	❍	❍	❍	❍
We have developed procedures and routines that are tailored to ALPHA.	❍	❍	❍	❍	❍	❍	❍
We have many people that are dedicated exclusively to our relationship with ALPHA.	❍	❍	❍	❍	❍	❍	❍
Our operating process has been tailored to meet the requirements of dealing with ALPHA.	❍	❍	❍	❍	❍	❍	❍

Thinking about the technological requirements that ALPHA has for your organization, please indicate the extent to which you agree with the following statements:

ALPHA changes the technology requirements for the relationship quite often.	❍	❍	❍	❍	❍	❍	❍
It is difficult for us to predict what technological requirements ALPHA will have for us in the future.	❍	❍	❍	❍	❍	❍	❍
ALPHA often expects us to use technologies that are not well understood.	❍	❍	❍	❍	❍	❍	❍
We never know what type of technological changes to expect from ALPHA.	❍	❍	❍	❍	❍	❍	❍
When ALPHA requires our firm to purchase a new technology, it quickly becomes obsolete.	❍	❍	❍	❍	❍	❍	❍
Often the new technological requirements from ALPHA do not perform as promised.	❍	❍	❍	❍	❍	❍	❍

Thinking about the documented information that your organization has to evaluate ALPHA's performance, indicate the extent to which you agree with the following statements:

We have the necessary documented information to measure ALPHA’s performance on completed activities.	❍	❍	❍	❍	❍	❍	❍
Enough documented information exists that we can evaluate ALPHA’s activities.	❍	❍	❍	❍	❍	❍	❍
Documents exist to assess the performance of most of ALPHA's activities.	❍	❍	❍	❍	❍	❍	❍
We are confident that the documented information we have is sufficient to evaluate ALPHA’s performance.	❍	❍	❍	❍	❍	❍	❍

Please indicate the extent to which ALPHA or the end-consumer is the focus for your organization for the following statements:

We mostly monitor and assess our level of commitment to serving the needs of…	❍	❍	❍	❍	❍	❍	❍
Our business objectives are driven primarily by the satisfaction of …	❍	❍	❍	❍	❍	❍	❍
Our strategy for competitive advantage is based primarily on our understanding of the needs of….	❍	❍	❍	❍	❍	❍	❍
Most of our efforts and resources are dedicated to…	❍	❍	❍	❍	❍	❍	❍
We are more focused on satisfying the needs of….	❍	❍	❍	❍	❍	❍	❍

On the next page we will show you a letter. For the purpose of this exercise, assume that the letter is from your focal retailer that we are referring to as ALPHA. Please read the letter, then answer the subsequent questions in terms of how you believe your firm would react.

TO: Valued Supplier
FROM: John Doe
EVP Merchandising
ALPHA Stores
SUBJECT: RFID Tagging of Merchandise

Over the past few months ALPHA has communicated the success of our initial pilot studies using Radio Frequency Identification (RFID) technology. After much consideration, we have decided that full implementation and use of RFID will lead to increased value for our mutual businesses. As such, we are making RFID a strategic initiative for our organization and are requiring the participation of all ALPHA suppliers.

While the ALPHA RFID initiative only requires your firm to acquire and apply RFID tags to your products at the sellable unit, case and pallet levels, our studies indicate that suppliers benefit most when they fully integrate RFID into their supply chain. Full implementation involves the deployment and integration of the RFID based software and hardware (tags, readers, middleware and enterprise systems). Full implementation will create a 2-way information flow, allowing us to receive information from your organization and for you to receive pertinent information from us.

Full RFID Integration Benefits
When properly implemented, a fully integrated RFID system can improve the efficiency of our interorganizational processes. Tracking when and where the tags are read in the supply chain can provide your firm with many benefits. Sample benefits include:

- ***Improve Product Promotions:*** Verify that promotional displays are promptly deployed in each store to synchronize with your advertising and marketing campaigns.
- ***Manage New Product Introductions:*** Confirm that new products are in each store and on the shelves the day they are launched.
- ***Monitor Charge-backs:*** Corroborate conformity with vendor compliance manual

RFID Initiative Timeline
Meeting our RFID initiative will require three levels of tagging (pallet, case and sellable unit) and will occur over three phases. The first phase of implementation requires you to affix RFID tags to all inbound ***pallets*** beginning ***July 1, 2010***. Phase two requires that all ***cases*** have RFID tags by ***February 1, 2011***. Phase three extends the RFID tag requirement to all ***sellable units*** by ***July 1, 2011***.

Thank you for your effort to support our RFID initiative.

Assuming the letter represents a real initiative from your focal retailer, ALPHA, please indicate the extent to which you agree or disagree with the following statements:

My organization would purchase all of the hardware and software (tags and readers) necessary to meet the requirements of ALPHA.	❍	❍	❍	❍	❍	❍	❍
My organization would purchase the technological equipment that would allow us to filter, manage and store the data collected.	❍	❍	❍	❍	❍	❍	❍
My organization would purchase RFID components that allow us to share data with ALPHA.	❍	❍	❍	❍	❍	❍	❍
My organization would purchase the equipment necessary to share the data across the functional units of my firm.	❍	❍	❍	❍	❍	❍	❍

Assuming that the letter represents a real initiative from ALPHA, indicate the extent to which your organization would use RFID technology to monitor ALPHA on the following tasks. We would use RFID technology to monitor how ALPHA:

Manages our new product introductions	❍	❍	❍	❍	❍	❍	❍
Executes our product promotions	❍	❍	❍	❍	❍	❍	❍
Responds to out-of-stock situations	❍	❍	❍	❍	❍	❍	❍
Rotates our stock	❍	❍	❍	❍	❍	❍	❍
Manages chargebacks to our firm	❍	❍	❍	❍	❍	❍	❍
Reconciles our orders	❍	❍	❍	❍	❍	❍	❍
Optimizes inventory levels for our products	❍	❍	❍	❍	❍	❍	❍
Manages reverse logistics for our products	❍	❍	❍	❍	❍	❍	❍

Assuming that the letter represents a real initiative from ALPHA, please indicate the extent to which you agree or disagree with the following statements:

My organization would use RFID in new ways that add value to the relationship with ALPHA.	❍	❍	❍	❍	❍	❍	❍
My organization would find new applications of RFID for process innovation with ALPHA.	❍	❍	❍	❍	❍	❍	❍
My organization would spend considerable time and effort exploring the potential applications of RFID in our relationship with ALPHA.	❍	❍	❍	❍	❍	❍	❍
My organization would leverage RFID to create completely new business processes with ALPHA.	❍	❍	❍	❍	❍	❍	❍
My organization would find new ways to use RFID in working with ALPHA.	❍	❍	❍	❍	❍	❍	❍
My organization would utilize RFID to find new ways to manage our relationship with ALPHA.	❍	❍	❍	❍	❍	❍	❍

The next set of questions will ask you about your organization's relationship with your focal retailer that we are referring to as ALPHA. Please answer all questions as they pertain to your actual relationship with this real retailer.

For both my firm and ALPHA...

The confidence that any short term financial inequities will be made up over time serves as a strong incentive for both firms to cooperate.	❍	❍	❍	❍	❍	❍	❍
The confidence that the financial benefits will be fair over the long run serves as a strong incentive for both firms to cooperate.	❍	❍	❍	❍	❍	❍	❍
The confidence that the investments made in the relationship today will pay off over the long run serves as a strong incentive for both firms to cooperate.	❍	❍	❍	❍	❍	❍	❍

In the relationship with ALPHA, both organizations have...Each organization...

Each organization monitors its own investment of financial resources into the relationship, to ensure it meets the expectations of its partner.	❍	❍	❍	❍	❍	❍	❍
Each organization monitors the level of personnel resources it invests into the relationship, to ensure it meets the expectations of its partner.	❍	❍	❍	❍	❍	❍	❍
Each organization measures its own intention to make future investments in the relationship, to ensure it meets the expectations of its partner.	❍	❍	❍	❍	❍	❍	❍

In this relationship, it is expected that...

Our shared expectations serve to enforce our business agreements.	❍	❍	❍	❍	❍	❍	❍
The strength of our relationship will keep the parties honest in dealing with each other.	❍	❍	❍	❍	❍	❍	❍
We will work together to resolve any discrepancies that may arise.	❍	❍	❍	❍	❍	❍	❍
We will keep our promises to each other because we value our partnership.	❍	❍	❍	❍	❍	❍	❍

Regarding your relationship with the ALPHA, to what extent do you agree with the following statements.

There are other retailers that could provide us with comparable distribution.	❍	❍	❍	❍	❍	❍	❍
Our total costs of switching to a competing retailer would be prohibitive.	❍	❍	❍	❍	❍	❍	❍
It would be difficult for us to replace the sales and profits ALPHA generates.	❍	❍	❍	❍	❍	❍	❍
We are very dependent on ALPHA.	❍	❍	❍	❍	❍	❍	❍
There are other suppliers who could provide ALPHA with product lines comparable to ours.	❍	❍	❍	❍	❍	❍	❍
ALPHA would incur prohibitive costs in replacing our firm with another supplier.	❍	❍	❍	❍	❍	❍	❍
It would be difficult for ALPHA to replace the sales and profits generated from our firm's product line.	❍	❍	❍	❍	❍	❍	❍
ALPHA is very dependent on us.	❍	❍	❍	❍	❍	❍	❍

Think back to when you FIRST read the letter from your focal retailer, ALPHA. How believable is it that ALPHA would propose such an initiative?

- ❍ Very Believable 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Unbelievable 7

How many months have you personally interacted with the retailer that we are referring to as ALPHA?

Approximately, what is the total annual sales revenue of your entire company/organization?

- ❍ <$100,000
- ❍ $100,000 to $500,000
- ❍ $500,001 to $1,000,000
- ❍ $1,000,001 to $5,000,000
- ❍ $5,000,001 to $10,000,000
- ❍ $10,000,001 to $50,000,000
- ❍ $50,000,001 to $100,000,000
- ❍ >$100,000,001

What is your current title?

How many MONTHS have you been in your current position?

What is your gender?

- ❍ Male
- ❍ Female

What year were you born?

That completes our study. Thank you very much for your time. If you would like to receive a free executive summary of this study, please provide your email address in the space below.

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