INVESTIGATION OF SUPPLY CHAIN GOVERNANCE MECHANISMS AND ASSESSING THEIR EFFECT ON SUPPLY CHAIN PERFORMANCE IN THE MANUFACTURING INDUSTRY

by

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ABSTRACT

INVESTIGATION OF SUPPLY CHAIN GOVERNANCE MECHANISMS AND ASSESSING THEIR EFFECT ON SUPPLY CHAIN PERFORMANCE IN THE MANUFACTURING INDUSTRY

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With the increasing level of globalization in manufacturing, it is becoming increasingly pertinent to monitor the execution of contractual agreements between buyers and suppliers. These monitoring mechanisms are essential to mitigate risks associated with measurement difficulty, behavioral uncertainty, and environmental uncertainty. Drawing from transaction cost theory and resource dependence theory, this study illustrates frequently applied formal and relational governance mechanisms to ensure a successful supply chain partnership and its effects on various performance measures such as supply chain

and innovation performance. Most firms go through three stages of a relationship, namely-*contact, contract, and control* (Greenberg, Greenberg, and Antonucci, 2012). Once the contact and contract stage of the relationship is established, it is crucial to monitor the execution of these contractual obligations. This monitoring is essential to mitigate risks associated with post-contractual opportunistic behavior. We validated formal and relational mechanisms in the supply chain context to propose effective management of contractual obligations. Given the widening focus on environmental sustainability in manufacturing, this study investigated the mediating effect of environmental regulations on formal and relational governance mechanisms and their impact on environmental performance.

Using a sample of 200 North American manufacturing firms, this study found partial support for the effects of formal and relational mechanisms on performance measures. The findings in this study did not find support for a significant relationship between formal governance and supply chain performance measures of the firms. However, there was partial support for the relationship between formal governance mechanisms and innovative capabilities of firms. The results also suggest partial support for the relationship between relational governance mechanisms and supply chain performance, and innovative capabilities of the firm. Environmental governance mediated the relationship between contingency practices and environmental performance of the firm.

Relational norms did not directly impact environmental governance practices. Relational mechanisms like shared values and loyalty improved environmental performance of the firm. This should enable firms to have a better understanding of how suppliers respond differently to formal and informal aspects of a relationship.

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CHAPTER 1

INTRODUCTION

1.1 Background

The manufacturing industry is more closely knit due to globalization and advancement in technology. Outsourcing, offshoring, and subcontracting have become a necessity due to the availability of value added and complementary resources in different parts of the world. Outsourcing provides opportunities for companies to save costs in manufacturing, purchasing, and labor since some of the resources are more economically feasible overseas. Even though the benefits of cost savings and effective resource allocation is an attractive solution, outsourcing of manufacturing functions presents the reality of collaborating cross-culturally, trusting the partner's judgments and paying attention to the finer details of allocation of various responsibilities.

There is an imminent need to document and monitor an alliance relationship for maximum productivity and success of an ongoing buyer-supplier relationship. With this background and the increasing interest in various dimensions of governance, this study will investigate the impact of governance mechanisms on performance measures of a firm. Asher and Nandy (2007) found that in the global offshore market, American companies accounted for

approximately 75% of the outsourcing activities. With such colossal amount of outsourcing activities from the US, firms are recognizing the need to possess a formal governance model to ensure the continuity and success of such initiatives. Corporate governance is defined as *"the determination of the broad uses to which organizational resources will be deployed and the resolution of conflicts among myriad participants in organizations"* (Daily, Dalton, and Cannella, 2003, p. 371).

A lot of literature on governing *'offshoring activities'* is based on corporate governance (Simon, Poston, and Kettinger, 2009). The topic of governance is relevant as several companies face the reality of monitoring outsourcing relationships (Ellram and Billington, 2002). Kakabadse and Kakabadse (2002) indicated that 70% of the companies were displeased with certain aspects of outsourcing relationships. With this background, it becomes imperative to have a governance structure with established processes in place to reduce buyer dissatisfaction.

Outsourcing has attracted the attention of scholars, especially its effects on firm performance. Jiang, Frazier, and Prater (2012) in their study found that outsourcing improves a firm's cost efficiency. Literature has shown that outsourcing of non-core competencies will enable firms to focus on its core competencies and thus improve firm's profitability. This is disputed as most of

these statements were made during the initial stage of a relationship also referred to as the *'honeymoon phase'* (Barthelemy and Adsit, 2003).

The need to monitor outsourcing relationships is becoming very crucial as firms are distributing responsibilities associated with their primary value chain activities like manufacturing to their suppliers. Major competitors within the same industry outsource their manufacturing functions to the same supplier. This could pose discomfort at times to a buyer as the loyalty of the supplier could be questionable. It is essential to trust your supplier and set up basic parameters to ensure that no financial or proprietary losses are incurred in such situations. In outsourcing relationships, it is imperative to guard patented knowledge in order to avoid opportunism from the supplier's end.

When establishing an outsourcing business process relationship, companies will go through three stages of transaction and trust - *contact, contract, and control* (Carmel and Nicholson, 2005; Greenberg et al., 2008; Nooteboom, 1992, 1993, 1996). At the *'contact'* stage, companies form alliances with other suppliers from whom they purchase goods or services to engage in a strategically beneficial relationship. This stage is done either using available information about the supplier or a third party also known as trusted institution that can provide general background information about the supplier. It is known as the contractual alliance stage where firms with complementary resources form alliances with each other to have a competitive advantage in the marketplace. Once contact is

established and the buyer decides to proceed, they move forward toward the *'contract'* stage. This stage encapsulates contractual agreements popularly known as *"service level agreements"* in IT literature (Goo, 2010). This is crucial as both parties rely on trusted systems as transactional nature of the relationship is dependent on finer details written in the contract. The final stage, i.e., *'control stage'* should ideally involve trusted partners as it is at this stage that most interactions take place frequently between boundary spanners of both the firms.

During the control stage, trusted partners play a vital role in several activities like conflict negotiation and performance monitoring. Greenberg et al. (2008, p. 604) indicate that at the control stage *"The transactions/activities take place and the parties control whether the activities and output are in accordance with contractual rules."* One of the gaps in supply chain management literature is the identification of effective control mechanisms to ensure that firms are handling outsourcing relationships in a manner that is integral and mutually beneficial.

This study investigates control mechanisms in a supply chain context and explores a relationship between the degree of execution of control mechanisms by firms and its effects on supply chain performance measures. Managing a contract between a supplier and a buyer requires tact, caution and a certain amount of trust. A manager cannot possibly go back to a piece of contractual paper every time a supply chain decision has to be made. Businesses thrive on social relationships

and factors like trust, commitment, and integrity or else it becomes extremely strenuous to have a successful ongoing relationship. This study looks at the formal and informal aspects of these control mechanisms and the degree to which the execution of these mechanisms can impact supply chain performance.

In today's supply chain relationships, factors like environmental preservation, products that are environmentally friendly also factor in when outsourcing manufacturing functions to suppliers. Consumers are more aware of products manufactured in LEED certified facilities, recycling waste and are concerned about aspects of manufacturing like carbon emissions in the manufacturing process. Wu and Pagell (2010, p.578) stated that *"Sustainability means that business activities should also protect natural resources, and serve the common good of society."* Several companies have aligned their processes to make the manufacturing process environmentally safe and have conveyed this emphasis to the supplier. This study examines the impact of this additional dimension where buyer and supplier collaborate to ensure an environmentally conscious manufacturing process and assess its impact on supply chain, innovation, and environmental performance.

1.2 Statement of problem

As discussed earlier, we identified two primary gaps in the operations management literature. In comparison to IT literature, operations management literature has not clearly distinctly identified effective execution mechanisms or practices in place in the manufacturing industry that could help firms determine what works and what does not when engaging in an outsourcing relationship. This is crucial when companies outsource manufacturing of a major component, major sub-assembly part or a finished good item locally and internationally. Finally, does environmental emphasis have an impact on performance for the buyer firms? Consequently, we pose the following research questions:

- In an inter-firm buyer-supplier relationship, does governance within a formal/professional context improve performance (supply chain performance, innovative capabilities of the firm)?
- In an inter-firm buyer-supplier relationship, does governance within a relational/social context improve performance (supply chain performance, innovative capabilities of the firm)?
- Given the increasing emphasis on sustainable manufacturing, does environmental regulations mediate the impact on environmental performance of a buyer firm?

1.3 Conclusion

Based on the proposed research questions, we investigated the theme of governance in the literature review section. We propose and hypothesize our research questions drawing from literature and theory. Then, we presented our analytical results and conclusions. We further discuss managerial and academic implications of this study. Finally, final conclusions and directions for future research are presented.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this section, we will summarize previously researched studies related to our specific research problem. This will give us a broad overview of what has been studied so far and how the proposed study can fill some of the gaps in the current literature and thus make a valuable contribution to the existing body of knowledge. For the purpose of this literature review, we provided a broad overview of interdisciplinary governance studies, and then focused on the literature pertaining to our specific research questions.

The keywords used for the literature review search were: *governance, governance provisions, governance mechanisms, corporate governance, IT governance, human resource governance, supply chain governance, alliance governance, performance monitoring, relationship management, contractual management, relational governance, contractual governance, vendor relationship management, outsourcing management, offshoring management supplier relationship management, supplier monitoring, supply chain monitoring,* and *service level agreements (SLAs).* These terms were searched in the following three places: *article title, author supplied keywords, and author supplied abstract.*

Due to the broad nature of the topic and different associative definitions, we targeted key journals in management, marketing, information systems, human

resources, finance, accounting, and operations management. The key journals that published governance related studies are: *Journal of Operations Management, Journal of Management Studies, Academy of Management Review, Academy of Management Journal, Journal of Marketing, Decision Support Systems, MIS Quarterly, Management Science, Strategic Management Journal, Journal of Business Logistics, Administrative Science Quarterly, Information System Frontier, Information Systems Management, International Journal of Physical Distribution and Logistics Management, Human Resource Management, IEEE Transactions on Engineering Management, Journal of International Business Studies, International Journal of Research in Marketing, The International Journal of Accounting, Business Process Management, Journal of Business Ethics, Journal of Information Technology Case and Application Research, Business Horizons, American Marketing Association, Journal of Corporate Finance, Journal of International Business Studies, Organization Science, Information Systems Research, Administrative Science Quarterly Book review,* and *Journal of International Technology and Information Management.*

2.2. A broad overview of governance literature

2.2.1 Literature review on studies conducted in the 80s and prior

In the 1980s, literature primarily focused on corporate governance which referred to governance in terms of responsibilities of upper-level executives.

"Organizational governance are the firm (or the hierarchy) and the market (Coase 1937; Williamson, 1975) -*where a firm is defined in terms of those assets that it owns or over which it has control* (Grossman and Hart, 1986; Pfeffer and Salancik, 1978) *and is engaged in transactions with other firms in the market"* as cited by Zaheer and Venkatraman (1994, p.550). Drawing from transaction cost theory, Coase (1937) and Williamson (1975) were the early pioneers of governance literature. They extensively discussed the two polar governance mechanisms namely: *firm/hierarchical governance* and *market governance*. The former mode of governance focuses on processes recognized within a hierarchy (Coase, 1937; Williamson, 1975) whereas latter mode of governance highlights the importance of the market in the coordination of flow of materials (Coase, 1937; Williamson, 1975).

Currently, most hybrid organizations have both non-firm and non-market influence on the flow of materials. More so, most companies are forming social networks which are more complex in nature. Today, in a more complex globalized environment companies have several brands and many suppliers. Therefore, organizations are more hybrid in nature. Therefore, we argue that hierarchical mechanisms, market mechanisms and networks between partners can have concurrent effects when determining governance mechanisms for outsourcing relationships.

Chaganti, Mahajan, and Sharma (1985) conducted a study on retail firms to assess whether corporate governance measures like board size and composition would be determinants of good governance for non-failed firms in comparison to failed firms. The results suggested that non-failed retail firms with larger corporate board size and larger percentage of outside board members tend to have better governance in comparison to failed retail firms. Drawing from Coase (1937) and Williamson's (1975) theoretical rationale, several scholastic studies began to determine corporate governance by board composition, external audit committees, and external board members (Gordon, Hrazdil, and Shapiro, 2012; Klapper and Love, 2004).

Based on transaction cost analysis, Bowen and Jones (1986) developed a typology of different governance mechanisms between a service organization and a customer. The two dimensions they used to evaluate governance mechanisms were performance ambiguity and goal incongruence. Performance ambiguity arises when it is difficult to measure each other's performance under any market conditions whereas goal incongruence arises when the financial returns from expending competitive behavior exceed the financial returns from expending mutually cooperative behavior (Bowen and Jones, 1986). Based on these two dimensions, they proposed the four governance mechanisms in their conceptual paper namely- *impersonal market mechanisms, impersonal hierarchy mechanisms, relational market mechanisms* and *relational hierarchy mechanisms.*

After interviewing a sample of CEOs, Worthy and Neuschel (1984) discovered a lack of consensus in the literature about how governance should be measured. They also observed that CEOs focused on short term financial goals, and were hesitant to invest in innovative projects, and proposed an incentive program for promoting innovative performance at the board level.

2.2.2 Literature review on studies conducted in the 1990s

The 90s saw a transition in governance literature where the term *'governance'* was not solely determined by corporate board size or external audit committees. In the 1990s, the issue of governance affected middle level managers- for example the boundary spanners of firms. Also, literature demonstrated a shift from looking at this governance concept not just from an intra-firm perspective but also from an inter-firm perspective. Not only is a company required to govern its employees, policies and regulations, but also its various functions that are outsourced to third parties.

With the internet becoming ubiquitous in the mid and late 1990s, companies began venturing into outsourcing relationships in different sectors. Larson (1992) conducted a field study on dyadic relationships between entrepreneurial firms and their partners belonging to telecommunications, clothing, and IT sectors that were experiencing a steep growth. The authors discussed the theory of network governance based on social control mechanisms

like trust, reciprocity, and moral obligations which lowered misconduct and opportunistic behavior. Larson (1992) also found that the success of the relationship was based on strategic and operational integration between the dyads. The findings in this study challenged Williamson's (1975) traditional market and hierarchical approach as more firms were becoming non-hierarchy, non-market based and more social network oriented in its organizational structure.

Zaheer and Venkatraman (1994) found empirical evidence for the importance of trust and asset specificity in electronic integration between insurance agencies in the property and casualty industry. The findings in their study suggested that the level of trust and asset specificity positively impacted the level of electronic integration between firms. Transaction cost analysis was used to test these aspects in inter-organizational relationships which were quasi-vertically integrated. In this decade, literature began discussing the importance of social factors that could come into play in any alliance relationship. The extant literature further emphasized the importance of social norms, which could reduce risks associated with opportunism, malfeasance, and ambiguity in inter-firm relationships.

Zaheer and Venkatraman (1995) conducted another empirical study to shed light on the importance of trust in economic exchange. Trust was assessed based on partner's ability to keep their word, level of mutual trust and fairness in dealings (Anderson and Narus, 1990; Heide and John, 1990; Zaheer and

Venkatraman, 1995). Using survey data, they indicated that trust played a huge role in quasi-integration. Blois (1972, p.267) defined quasi-integration as a *"close relationship which is based primarily upon the firm's dependence for a significant proportion of its total business upon a particular* [firm]."

Zaheer, McEvily, and Perrone (1998) further proposed that increased interpersonal trust between the boundary spanners of two firms (purchasing manager and the supplier) would result in increased inter-organizational trust. The authors found a negative relationship between the extent of inter organizational trust and costs of negotiation. Their evidence was consistent with former research supported by transaction cost theory (Williamson, 1975), suggesting that increased trust can reduce the opportunistic behavior. They also found that increased trust leads to increased economic benefit which can cause conflict on who should have the bigger piece of the pie. The authors demonstrated the conjunctive effect of interpersonal trust and inter organizational trust on exchange outcomes.

Interpersonal trust is built by individual boundary spanners. When the process of information exchange becomes institutionalized, it will lead to improved inter organizational trust. This inter organizational trust has a positive impact on different types of exchanges. Suffice to say, we can assuredly draw from literature that trust plays a vital role in inter-organizational exchanges and inter-personal trust shared between boundary spanners can have a positive impact

on inter-organizational trust even after the boundary spanners leave the organization (Zaheer et al., 1998).

As additional research about the importance of trust between boundary spanners began to emerge, several scholars began looking for more clear answers concerning measurement of corporate governance. One such meta-analytic study was conducted by Dalton, Daily, Ellstrand, and Johnson (1998), where they conducted meta-analysis using fifty-four empirical studies. They could not find conclusive results for relationships between board composition and financial performance of the firm. In another meta-analytic study, they found a positive association between the number of directors and firm performance (Dalton, Daily, Johnson and Ellstrand, 1999). This straightforward explanation was critiqued by other scholars who argued that several other external factors like environment, firm strategy, and prior performance could also impact firm performance (Pearce and Zahra, 1992).

2.2.3 Literature review on studies conducted in the 2000s

The most recent decade saw an emergence in IT governance literature. Weill (2004) in his study introduced six types of relationship management in an outsourcing relationship namely: *business monarchy, IT monarchy, feudal, federal, IT duopoly,* and *anarchy*. Based on Weill's theoretical framework, Simon et al. (2009) further proposed a workable outsourcing governance model for

future practitioners. Simon et al. (2009) summarized past studies mainly from a practitioner's perspective to examine the different types of relationships that exist between a client and a vendor. They identified *'relationship management'* and *'performance monitoring'* as two main aspects of IT governance. They discussed the nine attributes of client-vendor relationships and the migratory governance path the client-vendor relationship follows from the beginning toward the later stages of the relationship (Simon et al., 2009).

These nine attributes are the type of relationship, type of contract, communication methods, vendor staff location, trust-building methods, work coordination methods, information flow, communication challenges experienced, and value delivered (Simon et al., 2009). Concerning performance monitoring, mature relationships experienced higher trust, transparency, and they exhibited IT duopoly.

Goo (2010) developed service level agreements (SLAs) for IT companies engaged in outsourcing relationships. Findings in their study identified service level agreements composed of three reflective latent constructs namely: *foundation characteristics, change management characteristics,* and *governance characteristics*. This is the first empirically tested service level agreement model in IT outsourcing. Chakrabarty and Whitten (2010) identified the antecedents for governance decision-making power in IT firms as *'prior firm performance'* and *'number of IT employees.'* They found that when IT employees made the

governance decisions, the outsourced product quality was much higher in comparison to when business executives made the governance decisions. They proposed that business executives would make governing decisions primarily under the pressure of being profitable especially if prior firm performance was low (Chakrabarty and Whitten, 2011). This study was conducted within the context of IT outsourcing.

In this decade, the need to have a stratified view on the governance topic has become very apparent. While corporate leadership of the company can develop broad governance strategies, there is still need to monitor the upper and middle-level executives in different functions like supply chain, purchasing, human resources, and information technology as these functions operate differently depending on the activity that is outsourced.

The 2000s also saw the emergence of governance topics in supply chain exchange relationships as globalization became an imminent reality for many firms. Fawcett, Ogden, Magnan, and Cooper (2006) explored the state of governance structures in their qualitative study and investigated the kind of governance structures which can ensure commitment and collaboration for effective supply chain success. Lazzarini, Miller, and Zenger (2008) examined the role of contract enforcement and trust in exchange uncertainty and its effects on willingness to switch to new partners. Even when exchange uncertainty is high, contractual safeguards will enable firms to switch to new partners and partners

with higher knowledge-based trust will adapt newer relationships for competitive advantage (Lazzarini et al., 2008).

Liu, Luo, and Liu (2009) in their survey study of manufacturer-distributer dyads in China found that the use of transaction specific assets and explicit contracts had a negative impact on opportunistic behavior. Contracts had a stronger effect on reducing opportunism in comparison to relational norms and trust. Further, trust and relational norms improved relationship performance in buyer-supplier dyads. Farndale, Paauwe, and Boselie (2010) discussed three types of inter-firm supply chain governance namely: *market governance, vertical governance* and *relational governance.* Market governance is based on external price mechanisms and rules where the buyers influence the suppliers in the contractual aspects of the relationship. Vertical governance is where the buyer has a hierarchical relationship with the supplier. Relational governance is based on the informal aspects of the relationships between the buyer and the supplier.

In their qualitative exploratory study on inter-firm human resource supply chain in financial services, chemical sector, IT, pharmaceuticals and transportation, Farndale et al. (2010) found that centralized standard governance mechanisms provided a higher opportunity for governance. They also discussed the need to research pitfalls of not considering risk management and not having proper delivery channels in a supply chain relationship.

Table 2.1 Summary of different definitions of governance discussed in literature

Key Topics	Definitions
Governance	*"The determination of the broad uses to which organizational resources will be deployed and the resolution of conflicts among the myriad participants in organizations"* (Daily et al., 2003, p. 371). *"Governance is defined as "the structuring of rights and responsibilities of a firm's different stakeholders"* (Lubatkin, Lane, Collin, and Very, 2007, p. 43). *"Governance is defined as a managerial process at the upper echelons whereby certain top executives of a customer firm exercise formal authority over decisions on IT spending"*(Chakrabarty and Whitten, 2011, p. 799).
Governance Structure	*"Governance structure describes the monitoring, control, and incentive arrangements surrounding the members of a TMT"* (Williamson, 1984).
Governance Characteristics	*"Governance characteristics harmonize the relationship through a clear statement of measurements, communication channels and methods, conflict arbitration, and penalty and rewards"*(Goo and Huang, 2008, p.218). *"The governance characteristics of SLAs aim to maintain relationships through a clear statement of the performance measurements, conflict arbitration, penalty and rewards, exit policy, and communication plan"*(Goo and Huang, 2008, p.221).
Governance capability	*"A governance capability is therefore a firm's aggregate collection of knowledge, routines, and organizational structures associated with a particular collaborative mode"* (Aggarwal and Hsu, 2009, p. 843).
Corporate Governance	Corporate governance is defined as *"the system by which companies are directed and controlled"* (Gordon et al., 2012, p.583).
IT Governance	IT governance is defined as *"specifying the framework for decision rights and accountabilities to encourage desirable behavior in the use of IT"* (Weill, 2004, p. 2).
HR Governance	HR governance is defined to include three foci: *"the delivery channels structure, the HRM practices themselves, and the monitoring and metrics established to manage uncertainty"* (Farndale et al., 2010, p.851).
Contractual Commitment	Contractual Commitment is defined as *"an agreement between two or more parties that is binding on those parties, to the degree that to renege on the agreement will be costly"*(Argyres and Liebeskind, 1999, p.51).
	"Organizational governance are the firm (or the hierarchy) and the market (Coase 1937, Williamson 1975) -where a firm is defined in terms of those assets that it

Organizational Governance	*owns or over which it has control (Grossman and Hart 1986, Pfeffer and Salancik 1978) and is engaged in transactions with other firms in the market"* as cited by (Zaheer and Venkatraman, 1994, p. 550).
Contractual Governance	*"Formal controls are the written contractual and management-initiated mechanisms designed to guide behavior toward desired objectives"* (Macneil, 1980).
Relational Governance	*"Relational governance occurs primarily through a set of relational norms that govern acceptable behavior between the exchange partners"* (Lusch and Brown, 1996, p.19).

2.3 Summary of literature review

Based on the literature review, this research study concluded that governance is a very broad inter disciplinary topic. The main streams of research in governance are *corporate governance, IT governance, HR governance, alliance governance, formal and relational governance.* Corporate governance encompasses governance of upper-level management like the board of directors, CEOs, and upper level executives. Formal governance primarily addresses *apriori* matters like the level of complexity associated with the contract and what it entails which is essentially the 'contract' stage of the relationship.

Most studies focus on how this contract can affect the performance of firms. At this point, we distinctly narrow our research study to formal and relational governance in a supply chain context focusing on the outsourcing relationships between buyers and suppliers in the manufacturing industry. The formal governance mechanisms are post hoc in nature, and it addresses the control

stage of the relationship. Based on the literature review, we define supply chain governance practices as *"the processes or mechanisms involved in overseeing a contractually binding relationship and monitoring whether required standard relational expectations are met with a goal to reap a mutually beneficial relationship."*

CHAPTER 3

Theoretical Background

In this chapter, we firstly present theoretical background to this study. Then, the paper discusses the construct development of formal and relational governance. Finally, the summary of most widely used theories in literature related to governance are outlined.

3.1 Transaction Cost Theory

Formal governance study draws its theoretical basis from transaction cost theory which is based on the following assumptions, i.e., *bounded rationality, opportunism* and *risk neutrality*. Williamson (1975, p.26) defines opportunism *'as involving "self-interest seeking with guile" and it occurs when parties make "self-disbelieved' promises (cheat) in order to maximize their returns at the expense of each other.''* Bounded rationality indicates that *"all contingencies regarding a transactional relationship cannot be foreseen"* (Greenberg et al., 2006, p.597). The performance of governance structure is dependent on the synchronization between the kind of governance structure implemented and the underlying dimensions in the supply chain partnership (Williamson, 1979; Williamson, 1985).

Drawing from transaction cost theory, Williamson (1979) categorizes three kinds of dimensions in a governance relationship, namely *asset specificity,*

uncertainty (behavioral uncertainty, environmental uncertainty, and performance measurement ambiguity), and *frequency of transactions* (Williamson, 1985, 1991, 1996; Poppo and Zenger, 2002; Poppo, Zhou, and Zenger, 2008; Greenberg et al., 2008). Asset specificity is determined by transaction-specific investment (Williamson, 1979). For example, some buyers invest in a larger amount of capital with one particular supplier to meet their design specifications for an outsourced product.

In some cases, a buyer dependence on a supplier is high due to the unique or niche product design while in other cases the unique manufacturing process implemented by a particular supplier makes the cost of switching from one supplier to another supplier high. Also, over a period, a supplier could possess valuable information about the buyer's product thus giving the supplier an additional undue advantage. This could lead to potential opportunistic behavior from the supplier's end regarding keeping the promises, delivering on time, and pricing. On the other hand, if a supplier's dependence on one particular buyer is relatively high in terms of their annual gross sales, this can also give the buyer a higher negotiating power and opportunism regarding pricing the supplier service and making demands on product delivery, quality, and cost.

Certain manufacturing industries like computers and laptops face a lot more volatility due to the larger number of competitors entering the market. Also, in an outsourcing relationship the dimensions to capture performance can be

ambiguous in certain partnerships as different companies have different standards for assessing performance. The ability to measure performance is affected by limitations such as geographical location, product type, and legal policies if the supplier is located in another country. Therefore, environmental uncertainty, behavioral uncertainty and performance measurement ambiguity in an exchange can pose a threat in a supply chain partnership depending on the degree of prevalence of these dimensions. Therefore, they are also viewed as exchange hazards as their intensity will determine the level of risk associated in an exchange relationship (Sheng, Brown, Nicholson, and Poppo, 2006).

Originally, Williamson (1981) postulated two discrete governance structures in his study namely *'market'* and *'hierarchies.'* Other scholars postulated governance structures to be positioned on a continuum of 'relationalism' where market and hierarchies are located at the extreme polar ends of this array (Macneil, 1978; Stinchcombe, 1985). Market-based mechanisms are discrete in nature. Goldberg (1976) explains that before a relationship is established, either party is not expected to comply with any duties or obligations, however, once the relationship is formed, duties from each party are established completely. When all the duties of either party are specified upfront, the expectations from the buyer-supplier relationship remain clear. Hierarchical mechanisms that are relational in nature make the exchange partnership rather more complex as all contingencies cannot be specified upfront.

Palay (1984) and Kaufman & Stern (1988) were among the first scholars to operationalize relational aspects of an inter-firm exchange. In a supply chain context, the degree of risks associated with each of the exchange hazards would directly influence the implementation of governance mechanisms in a relationship. As we observe the supply chain partnerships in an outsourcing relationship in the manufacturing industries, our study leans more toward relational (hierarchical) continuum. The current business world scenario calls for a more relational approach as not all duties can be pre-determined at contract development stage. In an agile manufacturing environment, most manufacturing firms figure out what works and what will not work in a supply chain partnership as the relationship progresses from initial 'know-how' to more frequent interactions and makes the necessary changes accordingly. To do so, it is essential to have effective post hoc governance mechanisms in place to ensure an effective exchange relationship and also an improved performance.

Poppo and Zenger (2002) postulated that there would be increasing contractual governance when exchange hazards are higher based on transaction cost economies (Williamson, 1985). Goo, Kishore, Rao, and Nam (2009) further extended this study on complementary features of contractual and relational governance by postulating that contractual governance precedes relational governance in an outsourcing relationship. When a client keeps his word

regarding written contractual agreement, the quality of relationship is expected to improve (Goo et al., 2009).

When asset specificity is high, there is a higher likelihood of opportunistic behavior in terms of pricing (Heide and John, 1990). This happens as the supplier is aware of the fact that there are higher switching costs in terms of financial investments. Switching suppliers could result in loss of time as there is a learning curve associated in a new relationship. This may encourage the supplier to take advantage of the buyer and negotiate higher prices. If supplier is involved in high asset specific investments, there is also a higher likelihood that the relationship will continue from the supplier's end (Heide and John, 1990). When asset specificity is low, one might have multiple suppliers with a given resource or technology, so there are fewer incentives for acting opportunistically as the buyer can switch to another supplier.

Thouin, Hoffman, and Ford (2009) found empirical evidence for the positive relationship between low asset specificity and firm performance in IT outsourcing. Literature suggests that it is important to match the type of governance mechanisms based on the level of investment made in outsourced assets to improve firm performance (Hoetker and Mellewigt, 2009). Buyers tend to have more explicit contracts to mitigate risks associated with high asset specificity especially when perceived legal enforceability in the supplier's country is high. Buyers depend on relational mechanisms when perceived legal

enforceability in the supplier's country is low (Zhou and Poppo, 2010). This demonstrates asset specificity can impact contracts and relational mechanisms based on the legal enforceability in the host country. In summary, transaction cost theory serves as a background for this study where post hoc formal control mechanisms mitigate the risks associated with asset specificity, environmental and behavioral uncertainty, and performance measurement ambiguity.

3.1.1 Formal governance

Formal governance mechanisms are in place to mitigate exchange risks associated with asset specificity and environmental uncertainty as identified by transaction cost theory. This study focuses on the processes and outcomes involved in a buyer-supplier relationship to assess how a buyer is formally governing its supplier. Formal mechanisms can facilitate explicit knowledge transfer which keeps the process transparent and baseline expectations clear (Li, Poppo, and Zhou, 2010). Contracts could represent codified information on what is acceptable behavior in the course of a relationship to achieve desired outcomes (Jaworski, 1988).

Liu et al. (2009) conducted their study on paired manufacturers and distributors belonging to the Chinese household appliance industry to evaluate whether transactional and relational mechanisms impacted relationship performance and opportunism. Transaction mechanisms were measured assessing

whether a formal contract existed between the pairs and the degree of transaction specific investment between the manufacturer and distributor. Even though the term ‘mechanisms’ were used, in reality, they measured the existence of contracts and level of asset specificity in the exchange relationship.

Li et al. (2010) evaluated the effect of formal contracts and relational mechanisms on explicit and tacit knowledge transfer. They operationalized the formal contract measure using Cannon and Perreault’s (1990) scales which measures using the specificity, customization, and descriptiveness of the contracts. Zhou and Poppo (2010) discussed two dimensions in an exchange relationship- explicit contracts and relational reliability. In their study on buyer-supplier relationships in China (Beijing and Shanghai), they found that when perceived legal enforceability was high, buyers relied on explicit contracts, and when perceived legal enforceability was low, buyers rely on relational reliability (Zhou and Poppo, 2010).

Almost all these measures discussed in literature primarily focused on what a contract should ‘entail.’ One of the gaps in the supply chain literature is even though the term *‘formal mechanisms’*, *‘transactional mechanisms’*, and *‘explicit contracts’* are mentioned several times and used interchangeably, these terms indicate what a contract entails and not really how the contractual obligations are implemented in a buyer-supplier relationship. The question remains as to how these companies are actually managing their contracts.

According to Farndale et al. (2010, p.855), "*A contract-based governance system requires close monitoring of outcomes, keeping an arm's length relationship between buyer and supplier."* Even if a contract is in place, the degree are they executing the agreements listed in a long-term or short-term contract is yet not researched thoroughly. Even though the term *"formal mechanisms"* were used, these papers were assessing whether an explicit contractual plan is in place between the supply chain partners.

The goal of this study is to identify efficient formal governance mechanisms that can ensure effective implementation of what is written in formal contracts and assess its impact on supply chain performance and innovative capability of firms. This study propose that such practices could be in place to mitigate the risks associated with a transaction (Williamson, 1989). Before effective contract management practices or formal governance mechanisms are proposed; a brief summarization the existing scales on formal governance in supply chain literature are discussed (see Table 3.1.1). Although, this is not a complete exhaustive list, we present these to emphasize the need to establish contract management practices for supply chain relationships in literature and practice.

Table 3.1.1 Summary of key studies in literature to measure contractual aspect of an exchange relationship

Term related to formal governance used in literature	Key studies related to formal contracts
Contracting Processes	• Klein, Crawford, and Alchian (1978) discussed the need to establish different contracting processes in order to reduce post-contractual opportunistic behavior. They proposed the use of quasi-rental techniques for equipment contracting
Control mechanisms	• Ouchi (1979) conducted a qualitative study on parts supply division to assess what kind of control mechanisms should be in place to foster commitment and performance • Using case study analysis, they proposed that market, bureaucratic, and clan mechanisms that should be in place to reward output and reduce measurement ambiguity. They also found that market control mechanisms would lead to internalization, clan mechanisms would foster identification, and bureaucracy would foster compliance (Ouchi, 1979)
Contractual elements	• Macneil (1978, 1980) discussed a framework for contractual elements under the context of situational characteristics and process characteristics
Service level agreements	• In this case study, Singleton, McLean, and Altman (1988) illustrated a simple service level agreement developed by an automation company to assess system performance • Goo (2010) developed service level agreements using MacNeil's framework (1980) for developing plans for process and situational characteristics
Transactional mechanisms	• Liu et al. (2009) in their study measured transactional mechanisms using two measures: *Contract* and *transaction specific investment.* The first measure looked at the existence of a contract while the second measure looked at the level of investment in terms of resources, and training made by the buyer on the supplier for a given transaction

Formal contracts	• Li, Poppo and Zhou (2010) investigated the complementarity between formal and relational governance mechanisms in their study. When measuring formal governance, they assessed the existence of well-customized agreements between both parties
Explicit Contracts	• Zhou and Poppo (2010) measured explicit contracts in their study using Lusch and Brown's (1996) measures where they assessed the role, responsibility, performance of each party in the transaction and preparation in case of any contingencies

Overall, the term 'formal governance' suggested the nature of a contract representing it to be very much plan-oriented rather than activity-oriented in an inter-firm partnership. This study proposes to highlight the essential activities that are implemented in a formal governance context. Thus, the buyer can govern supplier's operations to ensure improved performance at different levels.

Goo (2010) developed and empirically tested a structure of service level agreements in IT literature that primarily consisted of three reflective constructs namely-*foundation characteristics, change management characteristics,* and *governance characteristics.* The governance characteristics were characterized by four second order reflective constructs such as *communication plan, measurement charter, conflict arbitration charter* and *enforcement charter.* Lusch and Brown (1998) examined the effects of explicit and normative contracting in a wholesaler and supplier relationship. The former type of contracting is synonymous with hard contracting while latter is represented as soft contracting. Brown, Cobb, and

Lusch (2006) segregated contracting as explicit and normative contracting where explicit contracting focused on written definition of each party while normative contracting was based on mutual understanding between wholesalers and suppliers.

Lusch and Brown (1996) examined whether each party's roles, responsibilities, and performance expectations are explicitly written in a contract between supplier and wholesaler. They examined the effects of these contracting techniques on mutual satisfaction and manifest conflict between partners (Brown, Cobb, and Lusch, 2006). In this study, the construct social communication practices evaluate how these roles, responsibilities, goals, and future of the relationship defined in an explicit contract are communicated periodically between partners in a buyer a supplier context (Sheng et al., 2006). This is to ensure an effective implementation of an explicit contract between partners.

Performance monitoring involves identifying whether the supplier has met the required expectations on a consistent basis. Some suppliers respond to incentives while some buyers enforce a penalty plan in their contract (Goo, 2008). In this study, performance monitoring evaluates how performance is monitored regarding meeting required expectations, enforcing both penalties and incentives to ensure elimination of opportunistic behavior, and thus decreasing the effect of performance ambiguity in a transaction. Zaheer, McEvily, and Perrone (1998) developed negotiation scales to comprehend its impact on supplier performance.

This study adapts the scales for unexpected costs in a transaction for both manufacturing and engineering changes in an outsourced product (Zaheer et al., 1998).

Finally, Lusch and Brown (1996) postulated in their study on wholesaler supplier relationships that normative contracts which are also known as soft contracts exist between partners where it is mutually understood by both partners on how to handle unplanned events, resolve conflicts, and further what remedial actions must be taken if performance is not satisfactory. These measures are based on soft written contracts between partners. This study postulates that both at process and outcome level, supply chain partners will execute contingency practices such as bringing an external arbitrator and explicitly specifying and implementing a set of resolution mechanisms instead of purely depending on a soft contract. Drawing from Goo (2010) and Macneil (1978) where they specify the situational and process characteristics of a typical contract and further expanding Lusch and Brown's (1996) measures, this study proposes that formal governance mechanisms should be composed of the four reflective second order constructs (see Figure 3.1).

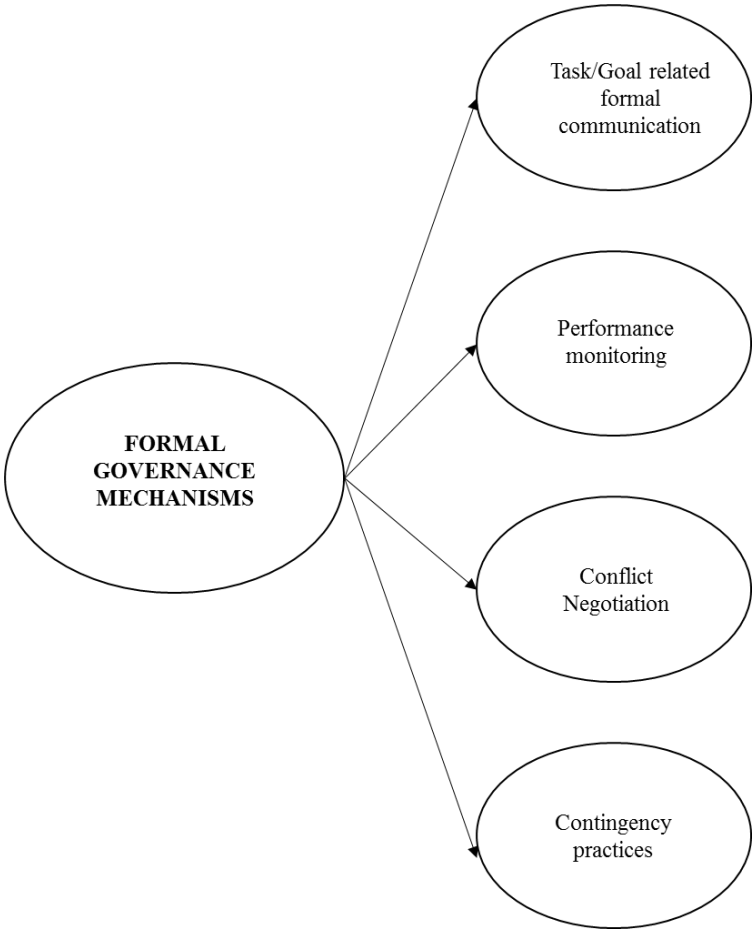


Figure 3.1 Formal governance construct

Table 3.1.2 Definition of second order constructs of formal mechanisms

Formal governance constructs	Definitions
Task or Goal related communication practices	• Task or goal related communication practices can be defined as *"practices of disseminating contract and company related information to all parties involved regarding day-to-day activities and long-term goals."* This is done through scheduled interactions and communication methods such as formal meetings and reports.
Performance monitoring	• *Performance monitoring would include "methods for assessing if agreed on goals have been met." This involves rewarding good behavior and imposing penalties when expectations are not met.* • *Macneil (1980) proposes a need to reckon and measure the exchange to achieve performance and relational benefits.*
Conflict management practices	• Conflict management practices can be defined as *"methods through which disagreements and conflicts are resolved in a manner that is mutually beneficial and fair."* • Macneil (1980) indicates the need to develop mechanisms to deal with change.
Contingency practices	• Contingency practices can be defined as *"practices in place for sharing of benefits and burdens in case of unplanned events."* This would include acts of God and contract termination. • Macneil (1980) proposes a need to share benefits and burdens in an exchange relationship and therefore, formal control mechanisms that address this aspect would be important.

3.2 Resource dependence theory and social capital theory

Pfeffer and Salancik's (1978, 2003) seminal work on resource dependence theory (RDT) proposes that firms can undertake key actions to minimize

uncertainties in the external environment and reduce power asymmetry between two firms in a relationship. Katila, Rosenberger, and Eisenhardt (2008) proposed the new application of RDT theory in inter-organizational relationships which involves establishing relationships with each other. When two firms are jointly dependent on each other's resources, it reduces the likelihood of power asymmetry (Gulati, 1998; Gulati and Sytch, 2007; Hillman, Withers, and Collins, 2009). In an inter-firm relationship, one firm is more likely to collaborate and network with another firm when they share complementary resources (Tsai, 2000). This kind of collaborative relationship fostered through social communication, mutual trust, shared values, and loyalty enables firms to access each other's invaluable and intangible resources. The collaboration at formal and semi-formal levels become inevitable especially when a firm is experiencing resource dependence and uncertainty (Heide, 1994). Thus, firm interdependence predicates social construction (Ozcan and Eisenhardt, 2009). Larson (1992) postulated that growth of an alliance relationship included resource dependence at a deeper level and encouraged further research on network governance.

Social capital is defined as a valuable asset that originates from accessibility to intangible resources through social relationships (Coleman, 1988). It consists of three dimensions: cognitive, relational, and structural (Coleman, 1988; Adler and Kwon, 2002). Even though studies have postulated the unique capability of social capital to access each other's resources (Nahapiet and

Ghoshal, 1998; Tsai and Ghoshal, 1998), very few studies have looked at the need to establish relational governance mechanisms when evaluating the effects of social capital on inter-firm relationships. Relational governance also draws its premises from social capital theory in that in any inter-firm relationship, the boundary spanners will essentially develop ties based on relational governance mechanisms such as socialization activities, trust, loyalty, and shared values to access resources like intangible information, and short-term as well as long-term plans which are attained at the social level. This type of socialization will improve the level of trust shared between partners, and it can impact performance measures of firms.

As in the case of any partnership, it is impractical to foresee all the events that will happen in a supply chain relationship. Firms would need to develop relational governance mechanisms to foster trust, loyalty and commitment to mitigate the risks associated with environmental and behavioral uncertainty (Greenberg et al., 2008; Puranam and Vanneste, 2009). The social capital theory has conceptualized relational social capital in dimensions such as mutual trust, mutual respect, long-term partnership, and family-like atmosphere (Chen and Pauraj, 2004; Lawson, Tyler, and Cousins, 2008; Carey, Lawson, and Krause, 2011; Villena, Revilla, and Choi, 2011). This study builds on these dimensions as a relational mode of governance to ensure a successful buyer-supplier relationship.

3.2.1 Relational governance

Relational governance can be defined as mechanisms in place to direct inter-firm relationships through social norms and behaviors (Macneil, 1980). Relational governance mechanisms should entail accepted social and cooperative norms that can lead to collaborative behavior (Zaheer and Venkatraman, 1995). Drawing from resource dependence theory and social capital theory, we postulate that firms with complementary resources will develop social norms and relationships to access each other's resources. These norms develop over time and help the firm mitigate risks associated with opportunistic behavior and performance ambiguity. This study utilizes theoretically established scales to measure relational norms when assessing its impacts on performance measures.

Zaheer and Venkatraman (1994) operationalized and saw the effects of trust on relationship performance. They reviewed the role of trust in conjunction with formal aspects of a relationship like negotiation and conflict (Zaheer, McEvily, and Perrone, 1998). Needless to say, studies suggest that trust and commitment have a huge role in economic exchange relationships. Griffith, Harvey, and Lusch (2006) investigated the impact of relational behavior such as information sharing, mutual commitment, and communication in a supply chain relationship and its impact on performance. Griffith and Myers (2006) also found a positive association between relational norms such as information exchange,

solidarity between partners and performance of firms in global supply chain relationships.

Poppo, Zhou, and Zenger (2008) conceptualized that relational governance was contingent on exchange hazards and tenure when predicting exchange performance in a partnership. They captured relational governance using a three item scale namely cooperation, similar long term and short term goals, and the ability of the partner to keep their word. Zaheer and Venkatraman (1994, 1995) looked only at trust as the sociological aspect in an exchange relationship in an inter-firm context. Sheng et al. (2006) operationalized relational governance mechanisms which consisted of three main elements: trust, loyalty, and shared values. They evaluated the interacting effects of instrumental, social communication and exchange hazards on relational governance. Thus, relational governance should capture informal aspects of the relationship like social norms and cooperative behavior. Among different types of communication, social communication seems to foster relational governance (Sheng et al., 2006). Shared values encompass future goals of partners in a successful relationship. It is also equally important to know if both partners have similar values, vision, and ambition (Tsai and Ghoshal, 1998; Zaheer and McEvily, 1998).

Therefore, this study postulate that when engaging in social or informal types of communication to access resources, relational governance will encompass four distinct dimensions namely mutual trust, loyalty, shared values,

and social communication in an inter-firm relationship (see Figure 3.2 and Table 3.2.1).

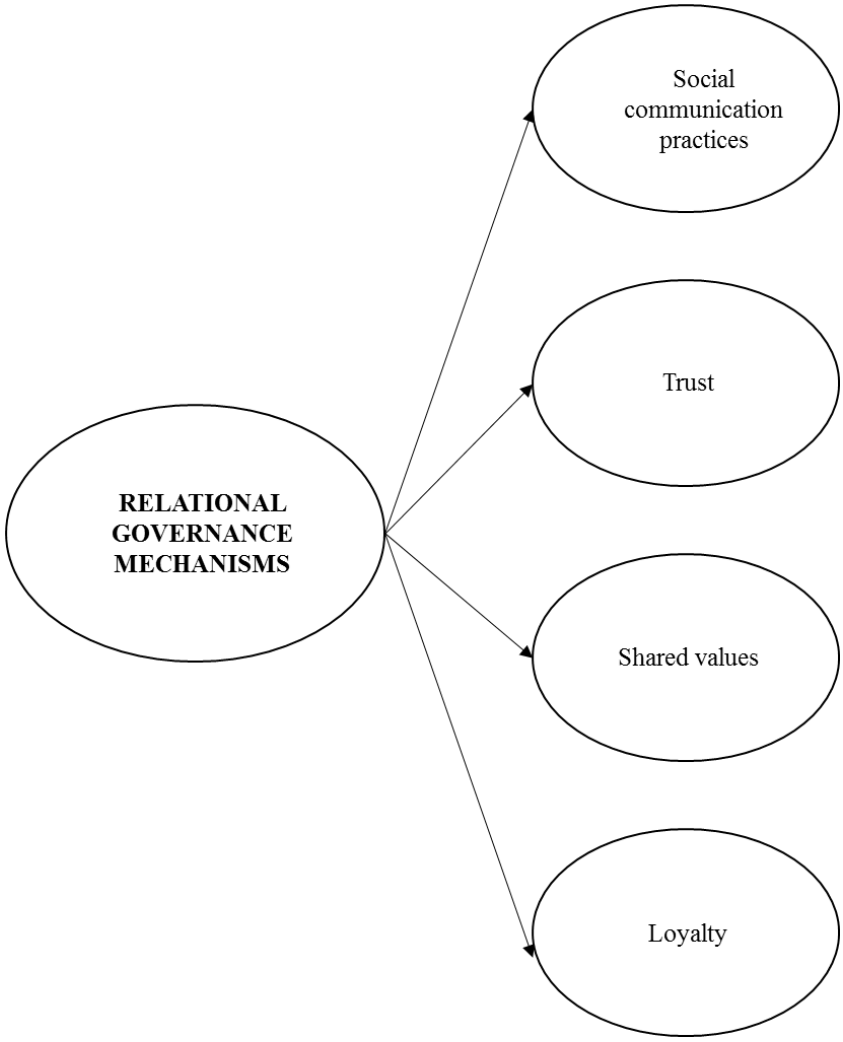


Figure 3.2 Relational governance construct

Table 3.2.1 Definition of second order constructs of relational mechanisms

Relational governance constructs	Definitions
Social communication practices	Social communication practices are informal sharing practices about things not listed in a written contract to reduce the risks involved in transactions (Sheng et al., 2006).
Trust	Zaheer, McEvily, and Perrone (1998, p. 143) define trust as *"the expectation that an actor (1) can be relied on to fulfill obligations, (2) will behave in a predictable manner, and (3) will act and negotiate fairly when the possibility for opportunism is present"* (Wheeless, 1978; Johnson-George and Swap, 1982; Rempel, Holmes, and Zanna, 1985; Anderson and Weitz, 1989; Zaheer, McEvily, and Perrnone, 1998).
Shared values	Shared values is defined as the extent to which a buyer's short-term and long-term goals, as well as future vision for the relationship, is aligned with their suppliers' (Wheeless, 1978; Johnson-George and Swap, 1982; Rempel et al., 1985; Zaheer and Mcevily, 1998; Sheng et al., 2006).
Loyalty	Loyalty as the psychological resolve to stay in a committed relationship for a long time (Wheeless, 1978; Sheng et al., 2006).

3.3 Summaries of theories and applications

Table 3.3 represents the relevant theories studied in literature about governance topic in different disciplines in social sciences.

Table 3.3 Relevant theories applied to governance studies

THEORY	THEORY APPLICATIONS	AUTHORS
Transaction Cost Theory	• Three types of governance structures can exist in three types of networks namely- market, firm/hierarchical and hybrid (Williamson, 1991, 1996) • The foundations of this theory were developed by Williamson in 1975 in his classic book 'Markets and Hierarchies.' • However, scholars posed a need to introduce the third aspect of governance mechanisms as most firms were transitioning toward network modes of governance in alliance relationships • Basic assumptions: Bounded rationality and Opportunism (Coase, 1937 and Williamson, 1975, 1985, 1991, 1996)	(Coase, 1937; Williamson, 1975, 1985, 1991, 1996)
Resource Dependency Theory	• This theory is used widely to understand how organizations with complementary resources form alliances and how they govern those alliances (Pfeffer and Salancik, 1978). Goo et al. (2009) developed service level agreements for IT outsourcing firms with complementary resources and are engaged in IT outsourcing relationships • Brass, Galaskiewicz, Greve, and Tsai (2004) discussed the availability of complementary resources as motivation behind strategic inter-organizational networks	(Pfeffer, and Salancik, 1978; Tsai and Ghoshal, 1998; Brass, Galaskiewicz, Greve, 2004; Goo et al., 2009)
Control	• Both contractual and relational governance are based on 'control theory' where you have 'formal' and 'informal' modes of control to achieve the desired behavior from the participants (Jaworski,	(Jaworski, 1988; Kirsch,

Theory	1988; Kirsch, 1997) • The formal control is composed of input, process, output while the informal control is composed of self, social, and cultural (Jaworski, 1988). Control theory is utilized in supply chain governance studies and also in relationship marketing studies	1997)
Commitment-Trust Theory	• This theory is applied to relational aspects of an exchange relationship in IT outsourcing relationships (Goo and Huang, 2008; Goo et al., 2009). The IT literature borrows this theory from marketing literature on relationship marketing (Morgan and Hunt, 1994) • They postulate the role of contractual agreements like service level agreements between IT companies as precedents for trust and commitment shared between two companies	(Morgan and Hunt, 1994; Goo and Huang, 2008; Goo et al., 2009).
Agency Theory	• Agency theory is commonly used in corporate governance literature in management • Corporations are comprised of two participants -*managers and shareholders* • Basic assumptions: Human beings are opportunistic and self-serving, and they place self-interests above the interests of others (Daily et al., 2003) • Based on these premises, there is a conflict of interests between principal and agent, i.e., manager and shareholder, leading to the need of creating governance structures such as institutional protection, ownership pattern, boards of directors and top management team (Daily et al., 2003; Young, 2008). For example, Stiles (2001) in his qualitative study found that board's influence on strategy can have a positive impact on organizational effectiveness	(Stiles, 2001; Daily et al., 2003; Young, Peng, Ahlstron, Bruton, and Jiang, 2008)

	• There can also be conflict of interest between principal and principal, i.e., major and minor shareholders leading to the need of redefining existing corporate governance mechanisms (Young et al., 2008)	
Stewardship Theory	• Stewardship theory postulate managers to be good stewards of their responsibilities (Davis et al., 1987; Hernandez, 1987) • They have long-term perspective of social exchange relationships and will expend affective commitment to ensure the organizational and individual goals are met (Hernandez, 1987) • Managers do not exhibit self-serving behaviors which focus on instant gratification. Stewardship theory views managers to be good stewards since their interests are intertwined with the interests of shareholders (Davis et al., 1987; Daily et al., 2003) • Stewardship is defined as *"the extent to which an individual willingly subjugates his or her personal interests to act in protection of others' long-term welfare"* (Hernandez, 2012, p. 174). This theory is just beginning to gain attention in governance related articles	(Davis et al., 1987; Daily et al., 2003; Hernandez, 2012)

3.4 Conclusion

In an inter-firm buyer-supplier relationship, transactions take place, and these transactions are governed at both formal and semi-formal levels. Williamson and Ouchi (1981) broadly defined governance as "mode of organizing transactions." Drawing from extant literature and transaction cost theory, this study postulates that this organization of transactions occurs at the formal level. Drawing from resource dependence theory and social capital theory, this study further postulates these modes of transactions also occurs at the relational level. Governance encompasses not just the initiation of a contract but rather maintenance of an ongoing relationship which involves both formal and relational dimensions (Palay 1984, Heide, 1994). Thus, this study concludes that governance would constitute two key dimensions namely, formal governance and relational governance.

CHAPTER 4

Conceptual Framework and Hypotheses development

4.1Discussion of frameworks in literature

Given the broad use of the term governance in literature, we wanted to present some of the key frameworks in literature on governance topic.

Table 4.1 Summary of few key studies on the relationship between formal governance, relational governance and performance measures in a buyer-supplier context

Authors	**Theory**	**Antecedent**	**Intermediate Variables**	**Outcomes**	**Conclusion**
Zaheer and Venkatraman (1994)	Transaction cost theory	Business process asset specificity, trust, reciprocal investment		Degree of electronic integration	Business process asset specificity and relational governance represented by trust had a positive impact on the degree of electronic integration.
Zaheer and Venkatraman (1995)	Transaction cost theory Reciprocal action theory	Sociological perspective-Trust Economic perspective-	Quasi-integration	Joint action	Trust when combined with traditional governance structure explains quasi-integration and joint action between partners.

		asset specificity, uncertainty, reciprocal investments			
Zaheer, McEvily, and Perrone (1998)	Transaction cost theory Relational exchange theory				Interpersonal trust is built by individual boundary spanners. When the process of information exchange becomes institutionalized, the interpersonal trust will lead to improved inter organizational trust. This inter organizational trust has a positive impact on different types of exchanges.
Poppo and Zenger (2002)	Game theory	Exchange hazards	Relational governance Customized contracts	Exchange performance	In this study on IS executives, they found that formal and relational governance share a complementary relationship.
Sheng, Brown, Nicholson, and Poppo (2006)	Transaction cost economics	Exchange hazards-Transaction specific assets, Uncertainty	Communication	Relational governance	Communication moderates the effects of exchange hazards and positively impacts relational governance represented by trust, loyalty, and shared values.
Poppo, Zhou, and Zenger (2008)	Transaction cost theory	Relational governance	Exchange hazards-asset specificity, measurement	Performance	Exchange hazards and exchange tenure negatively moderated the relationship between relational governance and performance.

	Agency theory		difficulty Exchange tenure		
Poppo, Zhou, and Ryu (2008)	Transaction cost theory Social exchange theory	Exchange hazards- asset specificity, uncertainty	Prior exchange history Expectation of continuity	Trust	Exchange hazards had two effects on the expectation of continuity. Higher asset specificity had a positive effect on the expectation of continuity while higher uncertainty had a negative effect on the expectation of continuity. Prior exchange history and the expectation of continuity had a combined positive effect of trust while the expectation of continuity is a positive mediator between prior exchange history and trust.
Liu, Luo, and Liu (2009)	Transaction cost theory Social exchange theory	Transactional Mechanisms Relational Mechanisms		Opportunism Relational performance	Transactional mechanisms and relational mechanisms reduced opportunism and improved relationship performance. Both transactional and relational mechanisms reduced opportunism more effectively when used jointly.
Zhou and Poppo (2010)	Institutional theory	Exchange Hazards- Asset specificity, Environmental uncertainty, Behavioral	Perceived legal enforceability	Relational reliability	Legal enforceability does not moderate the relationship between relational reliability and explicit contracts. Relational reliability has a positive impact on explicit contracts. Explicit contracts positively influence

		uncertainty			relational reliability and legal enforceability negatively moderates the relationship. When legal enforceability improves, the effect of explicit contracts on relational reliability decreases.
Li, Poppo, and Zhou (2010)	Resource based view	Relational mechanisms	Formal contracts	Knowledge acquisition	The study focuses on knowledge acquisition of local suppliers. Their findings suggest that formal contracts positively impacts explicit knowledge acquisition. A formal contract has a complementary relationship with relational mechanisms for explicit and tacit knowledge acquisition.
Abdi and Aulakh (2014)	Transaction cost economics Motivation crowding theory	Governance mechanisms Behavioral uncertainty Environmental uncertainty	Interacting effects of behavioral with relational governance and environmental uncertainty with formal governance	Relational Governance Contractual Governance	The study demonstrates that complementary or substitutionary relationship between formal and relational governance is affected by certain other contingencies such as behavioral uncertainty and environmental uncertainty when assessing the nature of the relationship between formal and relational governance.

4.2 Conceptual framework

Grounded in the conceptual foundations of transaction cost theory, resource dependence theory, and social capital theory, we postulate the base model

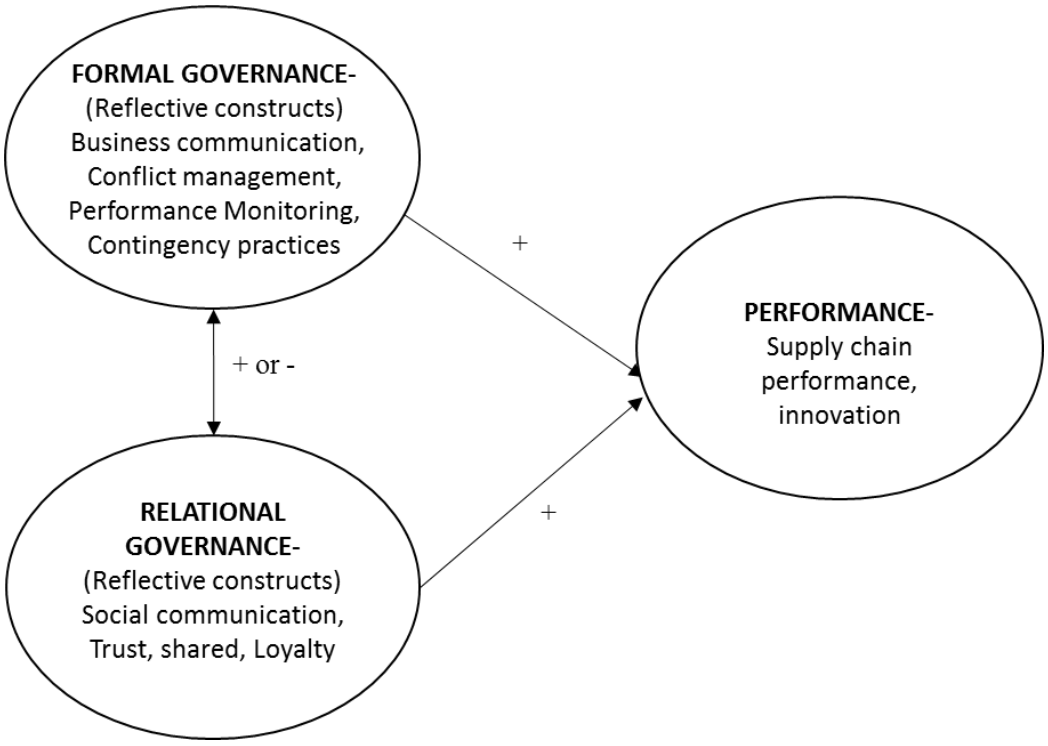


Figure 4.2.1 Conceptual framework

Drawing from TCT Theory and focusing on formal governance model alone, we propose the following model to assess the mediating effects of environmental governance between formal governance and performance measures

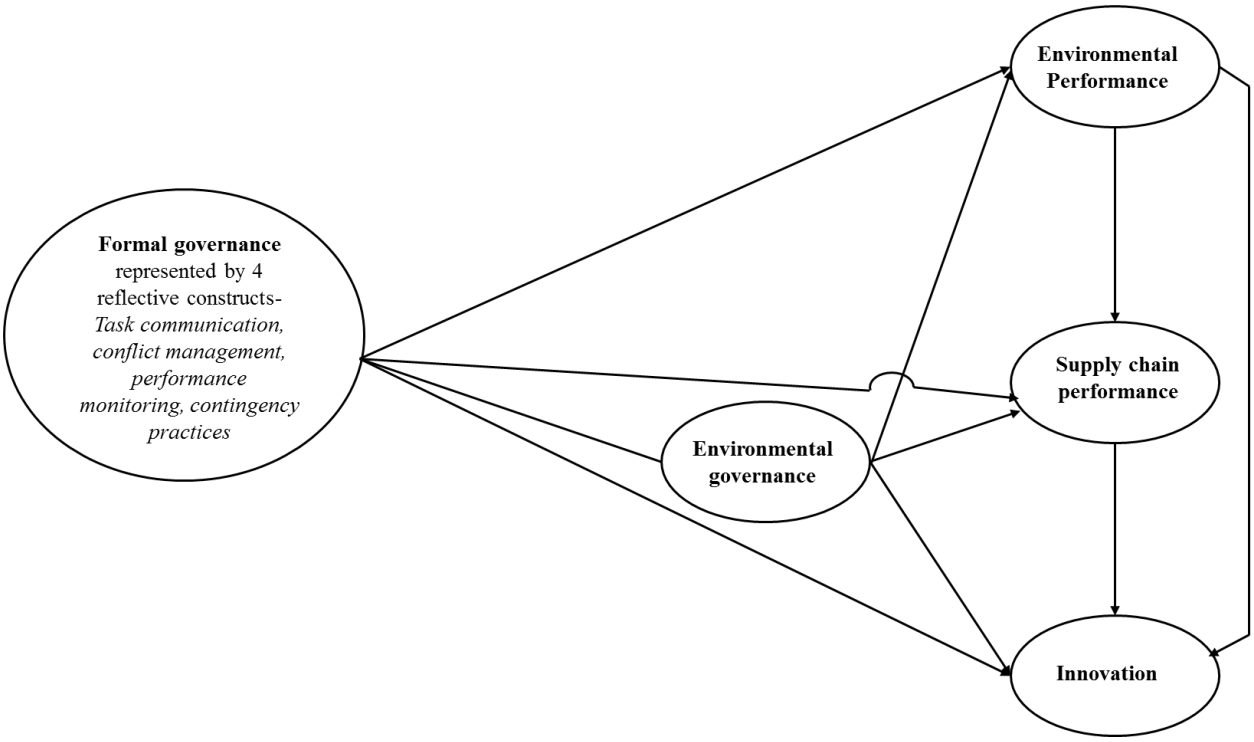


Figure 4.2.2 Formal governance model (FG)

Drawing from Resource Dependence Theory and Social Capital Theory and focusing on relational governance model alone, we propose the following model to assess the mediating effects of environmental governance between relational governance and performance measures

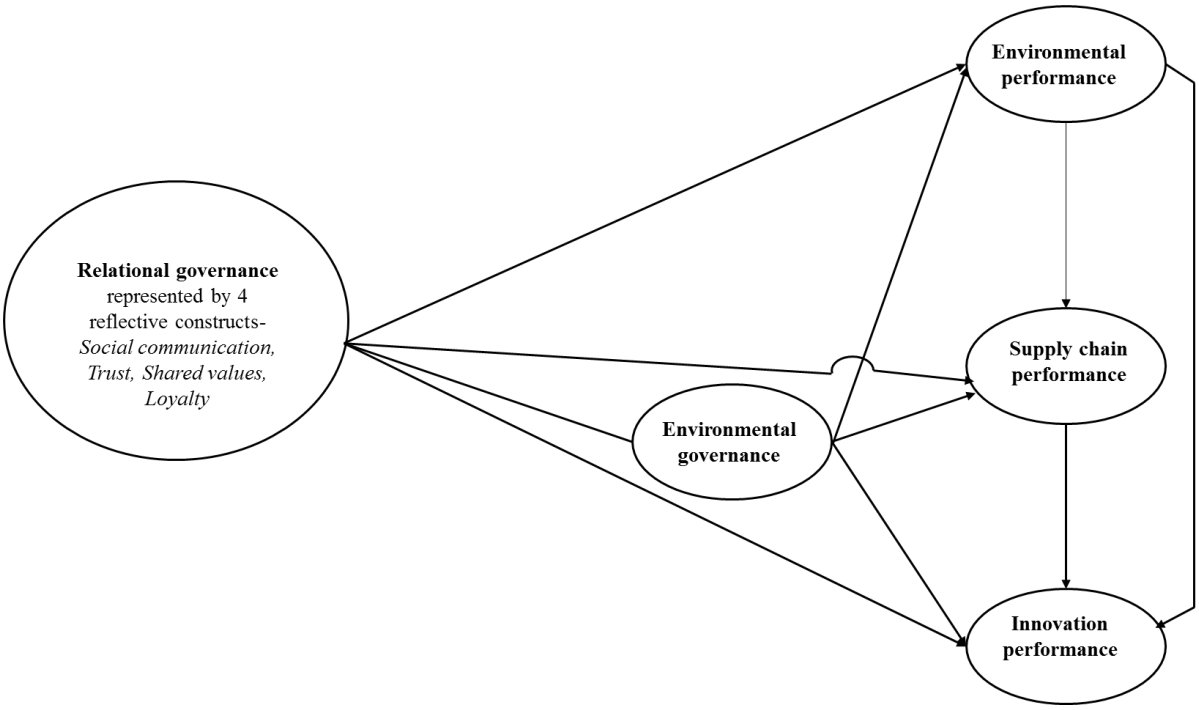


Figure 4.2.3 Relational governance model (RG)

4.3 Hypotheses development

4.3.1 Relationship between formal and relational governance

Poppo and Zenger (2002) investigated whether formal and relational governance mechanisms act as substitutes or complements. They used IS executives in outsourcing relationships to test their propositions. They measured formal contracts which are *apriori* by assessing the level of contractual complexity. They measured relational governance using dimensions like open communication, information sharing, trust, dependence, and cooperation. In summary, they found that relational governance enabled managers to customize their contracts better as it gave them a clear idea of expectations on either side. On the other hand, when customization of contracts enhanced, improvement occurred in relational governance.

Poppo and Zenger (2002) found that increased uncertainty associated with technological changes and asset specificity resulted in more complex contracts as well as increased relational governance mechanisms. Thus, these risks can have an effect on the formal and relational governance mechanisms. Formal governance mechanisms can mitigate the risks associated with ambiguity by establishing practices like performance monitoring and contingency practices (Carson, Madhok, and Wu, 2006). Relational governance mechanisms can mitigate risks associated with ambiguity and behavioral uncertainty by executing informal communication practices more frequently.

Liu, Lou, and Liu (2009) found that transaction specific investments and trust when combined led to an improved relationship performance suggesting a complementary relationship. We argue that contract management practices that are post hoc in nature can improve relationship governance mechanisms as both the parties are dealing with less ambiguity, and uncertainty. The improved relationship in terms of trust, loyalty, shared values and social communication can positively affect formal mechanisms as the buyer will have a better understanding of supplier's expectations concerning communication practices, incentive system, contingency planning, and conflict negotiation.

Li, Xie, Teo, and Peng (2008) examined the complementary and substitutionary relationship between formal and relational governance in Chinese buyer-supplier relationships. The authors asserted that the nature of the relationship between formal and relational governance are not always straightforward. The findings in their study suggested that formal and relational governance shared a substitutionary relationship amongst domestic buyer-supplier dyads while they postulated a complementary linkage between both constructs in an international buyer-supplier relationship. In another study conducted by Cousins, Handfield, Lawson, and Peterson (2006), they found that even though formal socialization did not impact relational capital, it could work in conjunction with informal socialization to facilitate desired relational outcomes. Therefore,

this study hypothesizes a mutually beneficial relationship between formal and relational governance.

H1a: *Formal and relational governance share a mutually complementary relationship.*

Contracts are in place to reduce opportunism. Ghoshal and Moran (1996), Macaulay (1963), Fehr and Gachter (2000) supported another view known as the substitutionary view. They argued that the presence of *apriori* contracts could sometimes signal a lack of trust and have a negative impact on relational governance mechanisms. When a supplier feels untrusted, they can be more profit focused instead of relationship oriented in the supply chain exchange. They argued that pure incentive based systems can reduce relational cooperation (Fehr and Gachter, 2000). Effective relational governance mechanisms can substitute formal contracts as the presence of a formal contract can become an unnecessary expense when you already trust each other.

This study test the nature of this relationship as Liu, Lou, and Liu (2009) found that when explicit contracts and trust were combined, it did not have a significant effect on relationship performance of buyer-supplier dyads suggesting that one can substitute the other. Abdi and Aulakh (2014) postulated that the complementary and substitutionary relationship between formal and relational governance was contingent on environmental uncertainty and behavioral uncertainty. The findings in their study suggested that formal and relational

governance shared a substitutionary relationship when external environmental uncertainty was high while both the constructs shared a complementary role when behavioral uncertainty was high. This rationale was supported by the argument that when behavioral uncertainty is high, firms need to access both formal and relational mechanisms to ensure a successful relationship.

Behavioral and environmental uncertainties are the other risks in an exchange relationship (Williamson, 1985). Behavioral uncertainty deals with problems associated with measurement ambiguity, how performance will be rewarded, and free riding. Environmental uncertainty deals with risks like market volatility and competition. Environmental uncertainty refers to *"unanticipated, unpredictable changes in circumstances surrounding an exchange"* (Williamson, 1985, 1991, 1996). This suggests that as environmental uncertainty increases, one will be stricter about their control mechanisms. Behavioral uncertainty occurs *"when one party cannot effectively monitor or measure the collective performance of the other. When performance is difficult to measure, parties have incentives to limit their efforts, because their partner cannot accurately measure or reward productivity"* (Williamson, 1985, 1991, 1996).

Relational governance will reduce the risks associated with behavioral uncertainty. When there is high level of environmental uncertainty, the firms would rather invest their energy and resources in one form of mechanism, thus supporting the substitutionary view. Drawing from this rationale, we argue that

formal governance mechanisms can substitute relational governance mechanisms and vice-versa. Therefore, the following hypotheses is proposed.

H1b: *Formal governance and relational governance mechanisms share a mutually substitutionary relationship.*

4.3.2. Formal Governance

By using the term *'formal governance mechanisms'*, we are trying to capture post hoc contractual management practices in supply chain partnerships. Goo et al. (2010) found that the governance aspects of their service level agreement had a positive impact on relational outcomes. Mahapatra, Narasimhan, and Barbieri (2010) proposed in their conceptual paper that an effective governance structure can lead to improved operational performance. Richey, Roath, Whipple, and Fawcett (2010) showed that the governance of facilitators of supply chain integration led to improved supply chain performance whereas barriers to the governance of supply chain integration had a negative impact on supply chain performance.

Liu, Luo, and Liu (2009) showed that the presence of explicit contracts and transaction specific assets would lead to improved relational performance. Furthermore, they established that formal governance mechanisms entail explicit knowledge transfer in the form of written contracts (Li, Poppo, and Zhou, 2010). Task or goal-oriented practices in the form of instrumental communication can

reduce exchange hazards like transaction specific assets and uncertainty and improve relational performance (Sheng et al., 2006).

Several studies have indicated a positive association between corporate governance and firm performance. Gordon et al. (2012) in their study on publicly traded small Canadian firms in the Toronto Stock Exchange found that corporate governance led to improved firm performance. The governance score was measured using index scoring, and this scoring was based on external auditors, the board of directors, policies, and board composition. Firm performance was measured using Tobin's Q and sales. Klapper and Love (2004) also indicated that firm-level corporate governance was essential to firms in weaker legal environments. The determinants of firm-level governance in their study were: *discipline, transparency, independence, accountability, responsibility, fairness and social awareness.* Their results indicated a positive association between good governance and market valuation, sales, operating performance and Tobin's Q and this result was statistically more significant for countries with a weaker judicial system.

In an inter-firm context, Cousins and Menguc (2006) found that socialization mechanisms like social events, joint workshops, on-site visits, conferences and team building exercises positively impacted suppliers' operational and communication performance. Ferguson, Pauline, and Bergeron (2005) found that contractual governance had a mediating role on the relationship

between boundary spanners of the firm and exchange partners in banking firms. Ryu and Eyeboglu (2007) established empirical evidence for their study in which norm of information sharing in a formal context improved supplier performance. We assert that at formal governance level, governance in the form of task and goal related communication can improve buyer's supply chain performance. Based on these results, this study proposes the following the hypotheses in supply chain partnerships.

H2a: *The more effective the formal governance mechanisms (task/goal related communication, performance monitoring, conflict negotiation, contingency practices), the better will be the supply chain performance.*

H2b: *The more effective the formal governance mechanisms (task/goal related communication, performance monitoring, conflict negotiation, contingency practices), the better will be the innovation performance.*

4.3.3 Relational Governance

Zaheer, McEvily, and Perrone (1998) indicated that inter organizational trust could lead to improved performance. They also showed the importance of trust in examining co-operative behavior (Zaheer and Venkatraman, 1994). Zaheer and Venkatraman (1995) found that when trust was combined with economic exchange, it had higher explanatory power on the joint action between firms. Ferguson et al. (2005) established relational governance had a mediating

role on the relationship between boundary spanners of the firm and exchange partners in banking firms. The findings in their study suggested relational governance had a stronger effect on exchange performance in comparison to contractual governance. Liu et al. (2009) in their dyadic study also found relational mechanisms like trust and relational norms led to improved relationship performance. They measured relationship performance by calculating profit, sales, satisfaction, and the expectation to continue the exchange relationship.

Poppo and Zenger (2002) suggested that relational governance positively impacted exchange performance between partners. Relational governance mechanisms encourage tacit knowledge transfer in the form of social communication (Li, Poppo, and Zhou, 2010). Social communication will reduce the risks associated with asset specificity and uncertainty and thus improve relational performance (Sheng et al., 2006).

Cousins et al. (2006) found informal socialization mechanisms positively impacted relational capital and supplier relationship outcomes. The relational capital was assessed by mutual interaction, trust, and respect. They observed that the relational capital improved outcomes such as process design, lead time, and improved product design. Liu et al. (2009) in their study supported the hypotheses that trust and relational norms improved relationship performance. Lee and Cavusgil (2006) in their empirical study on business alliances established relational governance which was represented by commitment, trust, and relational

capital had a significant association with alliance strength, alliance stability, and knowledge acquisition. Li, Poppo, and Zhou (2010) also found evidence for the association between relational mechanisms symbolized by trust, shared goals and knowledge acquisition. Governance through dependence on relational norms and mutual trust has been associated with a manufacturer's competitiveness (Zhang, Cavusgil, and Roath, 2003). Therefore, the following hypotheses are proposed.

H3a: *The more effective the relational governance mechanisms (social communication practices, trust, shared values, loyalty), the better will be the supply chain performance.*

H3b: *The more effective the relational governance mechanisms (social communication practices, trust, shared values, loyalty), the better will be the innovation performance.*

4.3.4 Environmental governance/Contingency practices

The need to manufacture environmentally friendly products have achieved significant importance for most supply chain processes. The concept of green supply chain management has received phenomenal attention in the recent decade. This requires buyers to not only meet the environmental standards set by their firms but also to ensure that their suppliers meet this criterion when the manufacturing process is outsourced. The existence of just formal and relational mechanisms might not in itself ensure that supplier is performing environmentally

safe manufacturing processes. There is an obligation on buyer's part to monitor whether environmental regulations are being met by the supplier. Therefore, buyers are required to incorporate environmental issues when managing their supply chain.

Kliendorfer, Singhal, and Wassenhove (2005) defined sustainable OM as *"the set of skills and concepts that allow a company to structure and manage its business processes to obtain competitive returns on its capital assets without sacrificing the legitimate needs of internal and external stakeholders and with due regard for the impact of its operations on people and the environment."* Klassen and Vereecke (2012) in their case studies conceptualized a framework for socially responsible practices in supply chain and its effects on supply chain performance.

Ageron, Gunusekaran, and Splanzani (2012) highlighted the importance of sustainable supply chain management by applying their proposed framework on a group of French companies. They found that waste reduction strategies had an effect on greening the supply chain. There are a larger number of firms now aligning their efforts toward all three aspects of performance-namely external and internal stakeholders, financial performance, and environmental performance. Consumers are becoming more environmentally conscious when choosing their products. This puts pressure on buying firms to ensure that their supply chain processes are environmentally responsible. Triple bottom line concept is intended to *"capture the whole set of values, issues and processes that companies should*

address in order to minimize any harm that results from their activities and to insure creation of positive economic, social and environmental value" (Elkington, 1998). Part of this economic value can be attained when environmental governance practices are implemented conjointly with formal governance practices. This informs the supplier that the buyer is committed to achieving their environmental objectives in the supply chain relationship.

Hajmohammad, Vachon, Klassen and Gavronski (2013) postulated that supply management represented by formal control mechanisms had a positive impact on environmental practices and environmental performance while environmental practices mediated the relationship between supply management and environmental performance. Their empirical results obtained from a sample of Canadian manufacturing plants supported both these assertions (Hajmohammad et al., 2013). Paulraj, Jayaram, and Blome (2014) in their study posited that environmental collaboration mediated the relationship between governance mechanisms and environmental performance. These environmentally collaborative activities when implemented jointly with formal governance mechanisms also impacts the social performance of the firms accounting for the general well-being of all stakeholders in the supply chain relationship. The findings in their study asserted that the process aspects of governance depicted by communication practices and team work positively impacted environmental collaboration activities.

Cheng, Lee and Chen (2014) found a positive association between the transactional orientation of the manufacturing firms and corporate social responsibility which included environmental initiatives. Formal transactions also impacted inter-organizational performance while corporate social responsibility mediated this relationship. Performance monitoring which is one of the dimensions of formal governance involves measuring supplier performance and offering incentives or penalties dependent on their performance. Sancha, Wong, and Thomsen (2014) found that transactional mechanisms in the context of high product complexity, relationship adaptability, and stability positively impacted supplier's commitment to comply with environmental standards leading to improved environmental performance.

Porteous, Rammohan, and Lee (2015) demonstrated that supplier incentives were a significant predictor of both social and environmental performance. Lee (2015) theorized a positive relationship between the structural dimension of social capital and environmental and operational performance of the firm using a sample of supplying firms. The findings in their study suggested a positive relationship between structural capital and environmental performance of the firm. (Lee, 2015). Structural capital in their study involved information sharing, joint problem solving, knowledge transfer, and frequent interactions. Drawing from existing literature, this study asserts that some aspects of formal governance symbolized by formal communication, conflict management, and

performance monitoring can positively impact environmental performance of the firm. Therefore, the following hypotheses are proposed.

H4a: *Formal governance mechanisms will positively impact environmental performance.*

H4b: *Formal governance mechanisms will positively impact environmental governance practices.*

H4c: *Environmental governance mechanisms will mediate the relationship between formal governance and environmental performance*

H4d: *Environmental governance mechanisms will mediate the relationship between formal governance and supply chain performance.*

H4e: *Environmental governance mechanisms will mediate the relationship between formal governance and innovation performance.*

Drawing from relational exchange theory and resource-based view, Paulraj et al. (2014) depicted that structural aspects of governance did not impact environmental collaborative activities. Consequently, it was more of the process aspects of relational governance that impacted environmentally collaborative activities and performance measures at environmental and social level. Gopalakrishnan, Yusuf, Musa, Abubakar, and Ambursa (2012) conceptualized a framework linking the three pillars of the triple bottom line- people, planet, and profit. The framework postulated that taking care of the people dimension of

triple bottom line was inter-linked with environmental initiatives which could impact economic performance. Since relational governance is represented by social norms between boundary spanners of a supply chain, we postulate that relational governance can impact environmental governance practices. If both firms trust each other, have shared values on environmental initiatives, communicates these ideas to each other at a social level, it can plausibly impact the environmental initiatives between partners.

Parmigiani, Klassen, and Russo (2011) proposed that social capabilities of the firm will impact both social and environmental performance of the firm. Cheng et al. (2014) examined the impact of both transactional and relational orientation amongst Taiwanese manufacturing firms and how it impacted inter-organization performance. The reported findings in their study suggested that both transactional and relational predictors positively affected the inter-organization performance while corporate social responsibility mediated this relationship (Cheng et al., 2014). In their study, corporate social responsibility encompassed the importance of recycling, reusing products, complying with environmental regulations, and funding environmental initiatives along with other social and economic measures. The findings in their study highlighted that corporate social responsibility which includes environmental initiatives can impact inter-organization performance. Sancha et al. (2014) established that relational mechanisms implemented in the context of low product complexity and low

relationship adaptability positively impacted supplier's commitment to comply with environmental standards leading to improved environmental performance.

In a study of shipping firms, Lun, Lai, Wong, and Chen (2015) conceptualized environmental governance to be composed of contractual, relational, and environmental governance and postulated it as a predictor of environmental performance of the firm. Lee (2015) studied the relationship between relational social capital symbolized by mutual trust, mutual respect, long-term partnership, and family like atmosphere and performance outcomes such as operational and environmental performance. The findings in his study established a positive association between relational social capital and both operational and environmental performance (Lee 2015). Therefore, we predicate the following hypotheses.

H5a: *Relational governance mechanisms will positively impact environmental performance.*

H5b: *Relational governance mechanisms will positively impact environmental governance.*

H5c: *Environmental governance mechanisms will mediate the relationship between relational governance and environmental performance.*

H5d: *Environmental governance mechanisms will mediate the relationship between relational governance and supply chain performance.*

H5e: *Environmental governance mechanisms will mediate the relationship between relational governance and innovation performance.*

Several initiatives have been undertaken by firms to ensure that manufacturing processes are environmentally compliant. In the automobile industry, there are product designs like hybrid cars that specifically sell their products to consumers emphasizing environmental conservation. The relationship between contingency practices for environmentally friendly products and various firm performance measures have been investigated. However, very little is known about the impact of environmental governance in a governance context. How do buyers monitor the suppliers concerning sustainable product and process designs? Several studies have posited that greening the supply chain could lead to improved performance (Klassen and McLaughlin, 1996; Sarkis, 1999).

Rao and Holt (2005) empirically tested this linkage, and their findings suggested a significant positive relationship between green supply chain activities and competitiveness and economic performance. Parmigiani, Klassen, and Russo (2011) conceptualized environmental capabilities as an antecedent to environmental performance. Gimenez, Sierra, and Rodnon (2012) conducted an

intra-firm study to test the association between environmental initiatives, corporate social responsibility, and various performance measures. The authors validated a positive association between environment management programs and economic, environmental, and social performance. However, social initiatives only impacted environmental and social performance and not the economic performance of the firm (Gimenez et al., 2012).

Hajmohammad et al. (2013) utilizing plant level data of Canadian manufacturing firms supported their hypotheses that environmental practices indeed improved the environmental performance of their plants. Li, Jayaraman, and Paulraj, and Shang (2014) found that green supply chain process and green product designs positively impacted environmental performance. Although green product design did not have a significant positive relationship with the financial performance, green process design did in fact significantly impact the financial performance of the firm.

Blome, Hollos, and Paulraj (2014) in their study on western European firms examined the antecedents to green procurement and also looked at its effects on green supplier development and supplier performance. The results implied that firms who were environmentally conscious in their procurement also positively impacted green supplier development. Green supplier development had a significant effect on supplier performance, and it mediated the relationship between green procurement and supplier development. The findings in this study

shed light for the buyers to not just procure environmentally friendly products but also to ensure training and implementation of sustainable manufacturing initiatives at the supplier end. Gualandris and Kalchschmidt (2016) conceptualized and empirically tested the linkage between sustainable management and sustainability performance. The results suggested that external sustainable performance of a firm was mediated by key supplier's sustainability performance (Gualandris and Kalchschmidt, 2016).

Li (2014) in an intra-firm study on Chinese manufacturers found that environmental innovation practices had a positive association with environmental performance of firms but not with financial performance. Paulraj at al. (2014) postulated a strong association between environmentally collaborative activities and environmental performance. Tachizawa, Gimenez, and Sierra (2015) discovered that monitoring the supplier concerning environmental practices led to joint environmental collaborative activities in a buyer-supplier relationship which further improved environmental performance.

Kushwaha and Sharma (2016) in their exploratory literature review study conceptualized green initiatives like green supply chain management as the antecedents for firm's operational and environmental performance, and also conservation of the environment. Roy and Khastagir (2016) in their intra-firm study of petro-chemical industry found a positive association between the top commitment of management and implementation of green management practices.

The findings in their intra-firm study further established a positive relationship between green management practices and product improvement, process improvement, and organizational innovation (Roy and Khastagir, 2016). We assert that this relationship can be applied at the inter-firm level where environmental collaborative activities in the buyer-supplier relationship can improve innovative capabilities of the buying firm.

Luthra, Garg, and Haleem (2016) conducted a study on automobile industry discussing the critical success factors for implementation of green supply chain practices and its impacts on environmental, operational, social, and financial performance measure. The empirical support for the positive relationship between sustainable supply chain practices and supply chain performance was further asserted by Gopal and Thakkar (2016) based on the findings of their study on the Indian automobile industry. Jackson, Gopalakrishna-Remani, Mishra, and Napier (2016) extended the sustainability literature by hypothesizing the inter-relationship between quality management, environmental initiatives, and firm performance measures. The findings in their study suggested that environmental initiatives such as design for environment improved environmental performance of the firm (Jackson et al., 2016). Therefore, the following hypotheses are proposed.

H6a: *When implementing formal governance mechanisms, environmental governance will improve environmental performance.*

H6b: *When implementing formal governance mechanisms, environmental governance will improve supply chain performance.*

H6c: *When implementing formal governance mechanisms, environmental governance will improve innovation performance.*

H6d: *When implementing relational governance mechanisms, environmental governance will improve environmental performance.*

H6e*: When implementing relational governance mechanisms, environmental governance will improve supply chain performance.*

H6f*: When implementing relational governance mechanisms, environmental governance will improve innovation performance.*

4.3.5 Environmental Performance

It is intriguing to evaluate whether firms that are performing well environmentally would also perform well on other performance measures such as supply chain performance and innovation performance. Rokhmawatia, Sathyeb, and Sathyec established a positive association between environmental performance and financial performance. Hart and Ahuja (1996) investigated whether investing in green practices led to financial or operational performance using secondary data. The results suggested that green practices indeed improved ROE and ROA the following year while the lack of green practices increased the cost of capital thus negatively impacting the performance of firms. Klassen and

Vereecke (2012) postulated that socially responsible companies could reduce the associated supply chain costs. Youn, Yan, Hong, and Park (2013) theorized a link between environmental initiatives in a supply chain and environmental performance and also a positive relationship between environmental performance and business performance of the firm.

Although the increasing emphasis on environmental performance is in place, fewer studies have examined the relationship between environmental performance and other performance measures such as supply chain and innovation. To perform environmentally well, we assert that firms are required to be innovative in their product and process designs. In the retail environment, we observe that some retail firms replace plastic bags with the consumer having to bring their bag or by providing paper bags to carry groceries. This not only saves the environment but also cost for some businesses. Similarly, automobile industry has had to be innovative to manufacture environmentally friendly hybrid cars. These products have found a niche customer market.

Lee (2015) in his study of supplying firms in South Korea demonstrated a significant relationship between environmental performance and operational outcomes which included new product development, productivity, customer satisfaction, and supply chain performance (quality, cost, delivery, and flexibility). This study empirically tests this relationship between environmental

performance and innovation in both formal and relational governance context. Therefore, we hypothesize that

H7a: *When implementing formal governance mechanisms, environmental performance will lead to improved supply chain performance.*

H7b: *When implementing formal governance mechanisms, environmental performance will lead to improved innovation performance.*

H7c: *When implementing relational governance mechanisms, environmental performance will lead to improved supply chain performance.*

H7d: *When implementing relational governance mechanisms, environmental performance will lead to improved innovation performance.*

4.3.6 Supply chain performance

According to Ellram, Tate, and Billington (2004), *"Supply chain management is the management of information, processes, goods and funds from the earliest supplier to the ultimate customer, including disposal."* Due to the cross-functional nature of the supply chain, supply chain performance can be evaluated on several dimensions such as: *longevity of the buyer-supplier relationship, buyer performance, supplier performance, supply chain cost, supply chain service level, supply chain flexibility, functional and operational*

performance (Beamon, 1999; Gunasekaran, Patel, and Tirtiroglu, 2001; Narasimhan and Das, 2001; Ho, Au, and Newton, 2002; Gunasekaran, Patel, and McGaughey, 2004; Krause and Handfield, 2007).

Supply chain performance is also measured using the following dimensions: *delivery cycle time, manufacturing cycle time, missing/wrong/damaged/defective products shipped, on-time delivery performance, and warranty/returns processing costs* (Lee, 2004; Supply Chain Council, 2005; Swafford, Ghosh, and Murthy, 2006). In our study, we primarily capture the supply chain performance measure using cost, quality, delivery speed, and flexibility. In a fast paced changing global environmental where customer preferences are rapidly changing; it is essential to observe the impact of governance practices on innovative capabilities of the buying firm. Therefore, this study included innovation scales as a performance measure.

Kroes and Ghosh (2010) found empirical evidence for increased supply chain performance leading to improved firm level performance. Yang, Lai, Wang, Rauniar, and Xie (2015) found a positive relationship between dyadic quality performance and innovation capability of the firm in a strategic alliance formation. Revilla and Knoppen (2015) in their inter-firm study on buyer-supplier dyads hypothesized that strategic supply chain management had a positive effect on knowledge integration which further improved both operation efficiency concerning reduction of cost and innovation. The findings in their study asserted a

positive relationship between operational efficiency and innovation (Revilla and Knoppen, 2015). Therefore, we argue that supply chain performance measures can also improve innovative capabilities of a firm because supply chain measures such as flexibility, and delivery speed can positively impact new product and process development, improvement of existing processes and products. Thus, following hypotheses are proposed.

H8a: *When implementing formal governance mechanisms, supply chain performance will lead to improved innovation performance.*

H8b: *When implementing relational governance mechanisms, supply chain performance will lead to improved innovation performance.*

CHAPTER 5

Research Methodology

5.1 Scale development

The research was conducted in two stages. For both formal and relational governance mechanisms, we pre-tested the questionnaire using a group of 20 academics and practitioners. The respondents not only answered the survey, but they also gave general feedbacks on how formal and relational governance mechanisms are executed in their firms as shown below. When pre-testing the questionnaire, respondents went through each of the scale items and gave their feedbacks. The company names are kept confidential. Additionally, they also gave feedbacks on the constructs proposed in our model. Some of the excerpts from pre-testing of survey questionnaire are mentioned below:

> When asked about **supplier opportunism**, one respondent stated, *"More specialized the equipment, higher likelihood that the supplier will act opportunistically."*

> When assessing the importance of **culture**, a defense employee in administration stated, *"My Israeli suppliers value friendship and camaraderie over a list of rules written in a piece of paper. They find it tiresome to even read them! On the other hand, I review my contract very often to ensure standard expectations are met."*

> *"Asians and Americans are handled differently. Of course the contract still holds the same for both suppliers irrespective of country. We just negotiate and treat them differently in terms of personal relationships"*- Director of Logistics and Operations of a major laptop manufacturing firm.

When asked about the **risks of supplier dependence**, VP of global supply chain management in a manufacturing firm responded stating that *"My Indian suppliers truly believe that they can deliver on time and they usually fail to keep their promises. In order to minimize my risks, I have three new suppliers in three different countries now."*

When discussing the importance of which mechanism (formal or relational) might be more important, VP of supply chain management in a manufacturing firm stating that *"I would like to believe that formal and relational controls work synergistically. One gives the rules of thumb while the other facilitates and reduces any confusion in the relationship"*-

When asked about the **performance monitoring** techniques and incentive programs in companies, some of the responses were-

"We reward them by putting them on preferred supplier list. We also charge them less as we are confident of their quality, and this will save us time from doing quality inspection"-Project manager in a government firm for military equipment.

"*We share a portion of our profits with our suppliers as agreed in the contracts. When expectations are not met, we have an acceptable product failure limit. Once the limit has exceeded, supplier will bear the cost."*- Director, Logistics and Operations, laptop manufacturing firm.

Director of Operations in a logistics company- *"We had 30-60-10 % rule with our German supplier. The first 30% amount is paid up front when contract is initiated, 60% is paid when the machine arrives in the US, and the remaining 10% is paid after machine testing. If the machine is not working, we hold back the remaining 10% which is 35% of their margin."*

"When on-time delivery is an issue, we give them one warning. Then, we remind them about the contractual agreement. If that fails, they bear the cost."- VP of supply chain management.

When asked about the importance of **relational** aspects of the exchange relationships, following responses were recorded-

"Trust plays a huge role because we view price-based suppliers as mere business partners while trust-based suppliers are for long term strategic relationships, discussing engineering solutions, etc. Additionally trust has a huge impact on the relationship as our firm, and our competitors share some common suppliers. Trust and social communication also provide us information on whether the supplier is adaptive and prepared for the challenges in a fast paced changing business environment"- Director, Logistics and Operations, laptop manufacturing firm.

"We play golf together, eat lunches and even accept gifts within an acceptable price range in accordance with the company policies."- Director, Logistics and Operations, IT firm.

When assessing the importance of **trust,** COO of a manufacturing firm stated, *"We initiate the contract with our German suppliers based on the fact that we have established a certain level of trust and friendship over a glass of beer and dinner."*

When asked about other social aspects, few of the responses were-

"Oh yes, I know where my supplier's wife works and where his son goes to school. I do engage in social conversations."-VP of operations in a manufacturing firm.

One major catering supplier in the airline industry stated on relational aspects- *"We do not care about these aspects. Our relationship is purely driven by price."*

We pre-tested our 20 questionnaires with academics and practitioners to fine tune the scale items for manufacturing firms. The positions held by practitioners were: one COO (manufacturing), one Director of Logistics (manufacturing), two VP of operations (manufacturing), three Consultants (IT), two attorneys (construction and food catering service), one former government employee (manufacturing). The academics were professors in the field of management,

operations management, supply chain management, and information systems. Pre-testing of formal mechanisms which symbolized post hoc contract management practices was crucial as we did not have sufficient empirical studies in supply chain literature for this construct. Formal governance mechanisms were taken from past case studies, existing literature (Lusch and Brown, 1996) and few were developed during our pre-testing stage. Several facets of this measure are studied in conflict management literature and qualitative studies. Relational governance measures were taken directly from literature and fine-tuned as the unit of analysis is a 'firm' in this study.

Then an initial content adequacy test was conducted to test for content validity of formal governance mechanisms (Hinkin, 1995, 1998; Schiersheim, Powers, Scandura, Gardiner, and Lankau, 1993). Content adequacy is defined as *"as a minimum initial psychometric requirement for all new, substantially modified, or previously unexamined measures"* (Schriescheim et al., 1993; Hinkin, 1995; Hinkin, 1998). As mentioned in the above sections, most studies focused on the apriori stage of a contract and how the finer nuances in the contract impacted performance measures like supply chain performance and innovation. Since, our study focused on contract management practices at post hoc stage which is the control stage of a relationship, we had to conduct a simple content validity test before using the scales for our pilot study and actual survey.

We followed Hinkin's (1995, 1998) method to conduct this test. The total sample consisted of 60 students at the UT Arlington, College of Business. The convenience sample consisted of 22 undergraduate students, 28 MBA students, and 10 Ph.D. students. One definition of each formal governance construct was placed on top of each page. The four second order constructs for formal governance mechanisms were- *communication practices, performance monitoring, conflict management, and contingency practices.* The definition for each of these constructs is discussed in Table 3.1.2. Then, the respondents were asked to rate each item on a likert scale (1= least likely to 5=most likely) to assess the degree to which each item corresponded to the definition provided on top of each page. After conducting the content adequacy test, we ran the principal axis factor analysis with direct oblimin rotations to check for content validity. We suppressed all loadings below 0.40. Since this was a preliminary test the methodology utilized was not as rigorous.

The bartlett's test of sphercity was significant at 0.000 level of significance. The loadings for communication practices ranged between 0.616 to 0.794. The loadings for performance monitoring ranged between 0.738 to 0.781. The loadings for conflict management ranged between 0.818 to 0.856. The loadings for contingency practices ranged between 0.54 to 0.73 (see Appendix D).

The initial pre-testing of scales with academics and practitioners established face validity for the formal constructs. The content adequacy test

established content validity for formal governance items. Other constructs presented in the model were pre-established scales and therefore it was not essential to test them for content validity. One of the drawbacks of content adequacy test is that we used a convenience sample to test our scales. An additional thirty surveys were sent online to appropriate supply chain professionals and academics to get feedbacks on wording, length, and time taken to finish the survey. The feedbacks and responses from content adequacy test, the online survey using qualtrics, and pre-testing of each of the constructs helped fine tune the formal governance scales for the final survey.

5.2 Data collection

For the required data collection process, IRB approval was sought from UT Arlington and Ethics committee approval for the market research team affiliated with York University (See Appendix B). The final survey was conducted in two stages. A Canadian marketing firm collected the data via telephone interviews from the manufacturing industry. The marketing firm collected the data using *'key informant'* analysis. The Institute of Social Research (ISR) further made more changes to survey questionnaire to ensure responses would be collected in a more efficient manner on the phone.

Initially, a letter was sent out describing the nature of the interview and if the participant was interested in participating (See Appendix C). If the participant was not interested in participating or had any questions regarding the survey, they were provided a phone number and email address of the principal investigator. Some refused to participate in the survey, and this information was relayed to the principal investigator either through a phone call or email. The details of non-responses are provided in the next section. Two weeks after the mails were sent out, phone calls were made to professionals holding senior or middle management titles in various functions such as supply chain, procurement, purchasing, operations and logistics (see Table 5.3.2.3).

We ensured that these respondents were most informed about the outsourcing relationship and are in most frequent contact with the supplier as asked initially in our survey (see Appendix A). If the call went to the wrong person, that person re-directed the phone call to the appropriate candidate in the organization who could answer the survey questions. A total of ten calls were made for each respondent. Once, we got the respondent on the phone; they were asked about their willingness to participate in the actual telephone survey. Then, a time and day were scheduled for the actual phone interview based on respondent's availability. The details of the sample are provided in the following sections.

5.3 Descriptive statistics

5.3.1 Response rates

A total of 4338 surveys were sent out to North American manufacturing firms (US=3348, Canada=998). We received a total of 222 answered surveys. Out of 222 total surveys, 22 surveys had missing data over 20%. This reduced the sample size to 200. The percentage of usable surveys was approximately 4.61%. The table below provides frequency and percentage of responses for both US and Canada. For the 200 responses, the average time taken to complete the phone interviews were 23 minutes.

Table 5.3.1 Response rates

		n=222		**n=200 (after deleting 22 surveys with over 20% missing responses)**	
Respondents	**Number of phone numbers**	**Frequency of answered surveys**	**% of answered surveys**	**Frequency of usable surveys**	**% of usable surveys**
US	3340	155	4.64%	143	4.28%=(143/3340)
Canada	998	67	6.71%	57	5.71%= (57/998)
Total	4338	222	5.11%	**200**	**4.61%=(200/4338)**

5.3.2 Descriptive statistics

Our data was collected from firms in the US and Canadian manufacturing industry. For the US database, we targeted a random sample from the population of machinery, electrical equipment, and transportation equipment businesses in the manufacturing industry. The mailing lists along with email addresses and phone numbers were provided by Dun and Bradstreet for both US and Canadian firms. For Canada, due to the unavailability of sufficient contacts in the Dun and Bradstreet database, we decided to collect data from all manufacturing industries belonging to SIC codes 20-39. A description of SIC Codes of the respondents who answered the phone survey are provided (see Table 5.3.2.1 and Table 5.3.2.2).

Table 5.3.2.1 SIC Codes of the US respondents

SIC 2 digit code	SIC Codes	Frequency	%	Description
35-Machinery	3531	6	4.20%	Construction Machinery
	3532	2	1.40%	Mining Machinery
	3537	5	3.50%	Industrial tracks and Tractors
	3571	6	4.20%	Electronic Computers
	3572	2	1.40%	Computer storage devices
	3575	1	0.70%	Computer terminal
	3577	5	3.50%	Computer Peripheral Equipment
36-Electrical equipment	3621	4	2.80%	Motors and generators
	3629	3	2.10%	Electrical Industrial Apparatus
	3639	1	0.70%	Household appliances
	3672	11	7.69%	Printed circuit board
	3674	14	9.79%	Semiconductor And related devices
	3677	1	0.70%	Electronic coils, Transformers, and

				other inductors
	3678	4	2.80%	Electronic connectors
	3679	15	10.49%	Electronic components
	3699	13	9.09%	Electrical Equipment and supplies
37-Transportation equipment	3711	5	3.50%	Motor vehicles and car bodies
	3714	19	13.29%	Motor vehicle parts and accessories
	3721	7	4.90%	Aircraft
	3724	3	2.10%	Aircraft engines and engine parts
	3728	12	8.39%	Aircraft parts and equipment
	3799	4	2.80%	Transportation equipment
		143	**100.00%**	

Table 5.3.2.2 SIC Codes of Canadian respondents

SIC 2 digit code	**SIC Codes**	**Frequency**	**%**	**Description**
20-Food kindred products	2021	1	1.75%	Creamery Butter
	2032	1	1.75%	Canned specialties
	2048	1	1.75%	Prepared feeds
	2085	1	1.75%	Distilled and Blended Liquors
	2092	1	1.75%	Fresh and frozen packaged foods
23-Apparel related products	2399	2	3.51%	Women's and Misses Outwear
24-Lumber food products	2411	1	1.75%	Logging
25-Furniture, Fixtures	2541	1	1.75%	Wood Partitions and Fixtures
26-Paper, Allied Products	2611	2	3.51%	Pulp Mills
27-Printing Publishing	2711	1	1.75%	Newspapers
	2721	3	5.26%	Periodicals
	2731	1	1.75%	Book Publishing
	2751	2	3.51%	
	2759	1	1.75%	Commercial Printing
28-Chemicals, Allied Products	2819	1	1.75%	Industrial Organic Chemicals

	2879	1	1.75%	Agricultural Chemicals
30-Rubber and Plastics	3081	1	1.75%	Unsupported plastics film and sheet
	3089	1	1.75%	Plastic products
31-Leather, Leather products	3144	1	1.75%	Women's footwear Except Athletic
32-Stone Clay, Glass Products	3211	1	1.75%	Flat Glass
	3231	1	1.75%	Products of Purchased Glass
	3271	1	1.75%	Concrete Block and Brick
	3273	1	1.75%	Ready mixed concrete
	3291	1	1.75%	Abrasive Products
33-Primary Metal Industries	3355	1	1.75%	Aluminum Rolling and Drawing
34-Fabricated Metal products	3433	1	1.75%	Heating equipment, except electric
	3442	1	1.75%	Metal doors, Sash and Trim
	3451	1	1.75%	Screw Machine Products
	3452	1	1.75%	Bolts, Nuts, Rivets & Washers
	3479	1	1.75%	Metal Coating and Allied Service
	3493	1	1.75%	Steel Springs except wire
	3495	1	1.75%	Wire springs
	3499	1	1.75%	Fabricated metal products
35-Machinery Except Electrical	3523	2	3.51%	Farm Machinery and Equipment
	3561	2	3.51%	Pumps and Pumping Equipment
	3592	1	1.75%	Carburetors, Pistons, Rings, Valves
	3599	3	5.26%	Industrial Machinery
36-Electrical Equipment	3612	1	1.75%	Transformers, Except Electric
	3622	1	1.75%	
	3623	1	1.75%	
	3625	1	1.75%	Relays & Industrial Controls
	3651	1	1.75%	Household Audio & Video Equipment
	3677	1	1.75%	Electronic Coils,

				Transformers & Other Inductors
37-Transportation Equipment	3714	1	1.75%	Motor Vehicle Parts & Accessories
39-Miscellaneous Manufacturing	3931	1	1.75%	Musical Instruments
	3949	1	1.75%	Sporting & Athletic Goods
	3993	2	3.51%	Signs & Advertising Specialties
		57	100.00%	

Out of the 200 respondents, 143 belonged to the US manufacturing industry and 57 to Canadian manufacturing firms. Even though there are 200 usable surveys, some of the respondents did not answer a few demographic questions like gross sales of buyer and supplier. Therefore, missing observations are reported in the descriptive statistics table for both buyer and supplier. A summary table of our sample characteristics are provided (see Table 5.3.2.3).

Table 5.3.2.3 Buyer sample characteristics

Variable	**Frequency**	**Percentage**
Gender		
Female	56	28.00%
Male	144	72.00%
Total	200	100%
Job Title		
Assistant Logistics Manager	1	0.50%
Director Of Purchasing	30	15.00%
General Manager	2	1.00%
Logistics Coordinator	2	1.00%
Logistics Specialist	1	0.50%

Manager Of Purchasing	42	21.00%
Operational Vice President	9	4.50%
Owner	1	0.50%
President	27	13.50%
Procurement Manager	1	0.50%
Purchasing	52	26.00%
Purchasing Coordinator	1	0.50%
Purchasing Department	1	0.50%
Purchasing Supervisor	5	2.50%
Purchasing Team Leader	1	0.50%
Senior Buyer Purchasing	1	0.50%
Supply Chain Manager	8	4.00%
Vice President Manufacturing	2	1.00%
Vice President Of Operations	12	6.00%
Vice President of Purchasing	1	0.50%
Total	200	100%
Language of the respondent		
English	200	100%
French	0	0%
Total	200	100%
Country of buyer		
US	143	71.50%
Canada	57	28.50%
Total	200	100%
Length of the relationship between buyer and supplier		
<1	0	0.00%
1 to 5	23	11.50%
6 to 10	56	28.00%
11 to 15	26	13.00%
16 to 20	39	19.50%
>20	41	20.50%
Missing	15	7.50%
Total	200	100%
Direct involvement with supplier		
Yes	195	97.50%
No	5	2.50%

Total	200	100%
Gross sales of the buyer		
< $1 million	22	11.00%
$1 million to less than 5 million	30	15.00%
$5 million to less than 10 million	25	12.50%
$10 million to less than 50 million	34	17.00%
$50 million to less than 100 million	15	7.50%
$100 million to less than 500 million	23	11.50%
$500 million to less than 1 billion	5	2.50%
> $1 billion	12	6.00%
Missing	34	17.00%
Total	200	100%
Number of employees for the buyer		
<100	112	56.00%
100-500	48	24.00%
501-1000	11	5.50%
1001-5000	11	5.50%
5001-10000	5	2.50%
>10000	0	0.00%
Missing	13	6.50%
Total	200	100%

With regard to supplier information, we encountered missing data as some of the buyers were not sure of certain demographic questions (See Table 5.3.2.4). With regard to supplier location, 90% of the suppliers belonged to the western countries namely, Canada, Montreal, Germany, and the United States while 10% belonged to the eastern nations such as Asia, China, Japan, and Taiwan. The suppliers primarily were located in the US or Canada. The table below provides a summary on supplier locations. A summary table of supplier sample characteristics are provided (see Table 5.3.2.4). Missing observations are

reported in the descriptive statistics table 5.3.2.4 as some of the buyers did not have specific supplier information such as supplier gross sales and supplier firm size.

Table 5.3.2.4 Supplier sample characteristics

Variable	**Frequency**	**Percentage**
Do you formal, written contract with supplier?		
Yes=1	90	45.00%
No=5	105	52.50%
Missing	5	2.50%
Total	200	100%
Country of supplier		
Asia	1	0.50%
Canada	40	20.00%
China	9	4.50%
Germany	3	1.50%
International	2	1.00%
Japan	3	1.50%
Mexico	3	1.50%
Montreal	1	0.50%
Taiwan	1	0.50%
Thailand	1	0.50%
US	136	68.00%
Missing	0	0.00%
Total	200	100%
Gross sales of the supplier		
< $1 million	12	6.00%
$1 - 5 million	24	12.00%
$5 - 10 million	13	6.50%
$10 - 50 million	28	14.00%
$50 - 100 million	11	5.50%
$100 - 500 million	13	6.50%
$500 - 1 billion	13	6.50%

> $1 billion	17	8.50%
Missing	69	34.50%
Total	200	100%
Number of employees for the supplier		
<100	52	26.00%
100-500	39	19.50%
501-1000	8	4.00%
1001-5000	8	4.00%
5001-10000	1	0.50%
>10000	0	0.00%
Missing	92	46.00%
Total	200	100%
Frequency of contact with supplier		
1 =many times during the week	127	63.50%
2 = a few times in a month	56	28.00%
3 = every other month	8	4.00%
4 =quarterly	8	4.00%
5 =about once a year	1	0.50%
Missing	0	0.00%
Total	200	100%
Number of other suppliers that provide this item		
0	41	20.50%
1 to 3	78	39.00%
4 to 8	25	12.50%
more than 8	10	5.00%
Missing	46	23.00%
Total	200	100%
% of company's total purchases of this particular item is purchased from the key supplier		
0 to ≤ 25%	76	38.00%
26% to ≤50%	34	17.00%
51% to ≤75%	19	9.50%
76% to ≤100%	53	26.50%
Missing	18	9.00%
Total	200	100%

When assessing the effects of formal, relational, and environmental practices in a buyer-supplier relationship, we also wanted to ensure capturing certain additional variables such as the criticality of the component outsourced. We also wanted to evaluate how important is compliance with environmental issues when outsourcing manufacturing to a supplier. We captured this information at the beginning of the survey (See Table 5.3.2.5 and Appendix A).

Table 5.3.2.5 Criticality of the component outsourced

Criticality of component outsourced	**Frequency**	**Percentage**
1=not critical at all	5	2.50%
2	2	1.00%
3	14	7.00%
4	37	18.50%
5=very critical	140	70.00%
0=did not answer	2	1.00%
Grand Total	**200**	100.00%

Table 5.3.2.6 Criticality of environmental practices

Criticality of environmental practices	**Frequency**	**Percentage**
1=not crucial at all	16	8.00%
2	16	8.00%
3	42	21.00%
4	49	24.50%
5=very crucial	65	32.50%
0=did not answer	12	6.00%

Grand Total	**200**	**100.00%**

5.3.3 Missing value analysis

Given the large proportion of missing data, we conducted a missing data analysis to examine whether data was missing at random. The hypothesis testing using Little's MCAR test we tested the following hypotheses where Null hypothesis is: Data missing in a random way and Alternate hypothesis is: Data is missing in a non-random way. The level of significance from the expectation maximization means table was 0.332 which was non-significant suggesting that data was missing in a random manner. We failed to reject the null hypothesis.

Initially individual surveys over 20% missing data was removed from the database. We deleted 22 surveys which had more than 20% missing data reducing the final sample size to 200. We ran univariate analysis, histogram plots, normal P-P and Q-Q plots just for all the quantitative variables and examined the Z scores to look for outliers, skewness and kurtosis. We divided the kurtosis value with standard error and examined those z values to assess the flatness of distribution. Given the sample size and requirement to have as many observations as possible for further analysis, we were less conservative for both skewness and kurtosis using a range of -4 to +4 (Hair, Black, Babin, and Anderson, 2010).

We decided to impute the missing data based on the proportion of missing observations per variable. We utilized mean replacement technique for 69 variables (60% of the variables) with less than 5% missing data. For variables with missing data from 5% to 20%, we used expectation maximization technique. We conducted expectation maximization technique on 39 variables (34% of the variables). Out of the 39 variables,22 variables (19%) had missing data less than 10%, 10 variables(8%) had missing data between 10-15%, and 7 variables (6%) had missing data between 15% to 20%. Finally, 6 variables (5%) had missing data over 20% (See Table 5.5.3.1 and Table 5.5.3.2). Given the large proportion of missing observations for these 6 variables, we did not use these 6 variables for further analysis. The tables below provided a brief overview of missing data analysis at case level and variable level (Hair et al., 2010).

Table 5.5.3.1 Missing value analysis at case level

Individual cases	**Frequency**	**Percentage**	**Cumulative percentage**
Missing responses 0 to ≤ 2%	75	37.50%	37.50%
Missing responses ≤ 5%	43	21.50%	59.00%
Missing responses ≤ 10%	34	17.00%	76.00%
Missing responses ≤ 15%	25	12.50%	88.50%
Missing responses ≤ 20%	23	11.50%	100.00%
Grand Total	**200**	**100.00%**	

Table 5.5.3.2 Missing value analysis at variable level

Individual variables	**Frequency**	**Percentage**
Missing responses 0 to $\leq 2\%$	54	47.37%
Missing responses $\leq 5\%$	15	13.16%
Missing responses $\leq 10\%$	22	19.30%
Missing responses $\leq 15\%$	10	8.77%
Missing responses $\leq 20\%$	7	6.14%
Missing responses greater than 20%	6	5.26%
	114	**100.00%**

5.3.4 Unit of analysis

The unit of analysis for this research was 'firm' even though data was collected from boundary spanners of firms who are key informants. Previous studies have assessed factors like trust and shared values examining the boundary spanners of firms using key informant analysis (Zaheer and Venkatraman, 1995; Zaheer, McEvily, and Perrone, 1998). Given that data was collected focusing on professionals in purchasing, supply chain, and logistics and who are in frequent interaction with their supplier in the past one year (see Appendix A), we assert that the governance mechanisms executed by these individuals would represent the firm's general policies on formal and relational governance.

5.4 Measures

The methodology utilized to collect the data was survey. Responses were collected via phone interviews. For consistency across scales, all responses were recorded on a scale of 1 to 5 for consistency.

Formal governance

Formal governance mechanisms were measured on a scale of 1 to 5 where 1= strongly disagree, 2= somewhat disagree, 3= neutral, 4= somewhat agree, 5= strongly agree, r= don't know, not sure, it varies over the course of the year, refused, etc.

Table 5.4.1 Formal governance measures

Construct	Second Order Constructs	Measures with indicator acronyms
Formal Governance Mechanisms	Communication Practices (Task or goal related) [BUSC]	• *"The supplier and your company have periodic reviews to discuss the overall progress of tasks"* –new measure (Modified and adapted from Sheng et al., 2006) [FGOV1] • *"The supplier and your company clarify who will perform each task"* (Adapted from Sheng et al., 2006) [FGOV2[• *"The supplier and your company discuss your long term plans"* (Adapted from Sheng et al., 2006) [FGOV3] • *"When you communicate with your supplier, you talk about current tasks and job responsibilities"* (Adapted from Sheng et al., 2006) [FGOV4] • *"The supplier provides you with any updates in cost structure information for the component you purchase from them"*-new measure [FGOV5] • *"The supplier and your company have periodic discussions on how you can focus your goals in this partnership"* (Adapted from Sheng et al., 2006) [FGOV6] • *"Any changes in the contractual agreement are communicated frequently"* (Adapted and refined from Goo and Huang, 2008) - New measure [FGOV7]

	Performance monitoring [MONIT]	• *"Your company monitors the delivery performance of the supplier for the goals listed in the contract"* (Adapted from Goo, 2010)-*new measure* [FGOV8] • *"Your company offers the supplier non-financial incentives for achieving goals listed in the contracts"* (Adapted from Goo, 2010)-*new measure* [FGOV9] • *"Your company offers the supplier financial incentives for achieving goals listed in the contract"* (Adapted from Goo, 2010)-*new measure* [FGOV10] • *"Your company imposes penalties on the supplier when the terms of the contract are not fulfilled"* (Adapted from Goo, 2010)-*new measure* [FGOV11] • *"Your company monitors how each party is performing as previously defined in our contracts"* (Adapted from Lusch and Brown, 1996) [FGOV12] • *"Your company monitors the execution of responsibilities by each party as previously defined in our contracts"* (Adapted from Lusch and Brown, 1996) [FGOV13]

	Conflict management practices [COMGMT]	• *"It is easy to negotiate with the supplier over sharing the burden of unexpected costs, such as engineering changes"* (Adapted and refined from Zaheer, McEvily, and Perrone, 1998) [FGOV14] • *"We have quick negotiations over sharing the burden of unexpected costs, such as engineering changes"* (Adapted and refined from Zaheer, McEvily, and Perrone, 1998) [FGOV15] • *"It is easy to negotiate with the supplier over sharing the burden of unexpected costs, such as manufacturing changes"* (Adapted and refined from Zaheer, McEvily, and Perrone, 1998) [FGOV16] • *"We have quick negotiations over sharing the burden of unexpected costs, such as manufacturing changes"* (Adapted and refined from Zaheer, McEvily, and Perrone, 1998) [FGOV17] • *"For managing major conflicts, your company communicates with the supplier in person"* (Adapted from Goo, 2010)-*new measure* [FGOV18] • *"You have scheduled regular interactions with the supplier for resolving conflicts with regard to day-to-day operations"–new measure* [FGOV19]

	Contingency practices [CONPRACT]	• *"In case of crucial issues, your company seeks help from a mutually agreed upon third party"* (Modified and Adapted from Goo, 2010)-*new measure* [FGOV20] • *"In case of major disagreements, your company uses a mutually agreed upon arbitrator"* (Modified and Adapted from Goo, 2010)-*new measure* [FGOV21] • *"Your supplier contract specifies a resolution mechanism for disputes"- new measure* [FGOV22] • *"If disputes arise, you generally adhere to the resolution mechanisms specified in your contract"-new measure* [FGOV23] • *"In dealing with the supplier, your contracts define a strategy in case of an unplanned event (Example: Act of God, Catastrophic event)"* (Adapted from Goo, 2010) – *new measure* [FGOV24] • *"Your company requires non-disclosure agreements when sourcing sensitive information"* (Adapted from Goo, 2010) - *new measure* [FGOV25] • *"In case of an unplanned event (Example: Act of God, Catastrophic event), you enforce the terms stated in our contract"* (Adapted from Goo, 2010) - *new measure* [FGOV26] • *"Your company requires non-disclosure agreements when sourcing proprietary work"* (Adapted from Goo, 2010) - *new measure* [FGOV27]

Relational governance

Relational governance mechanisms were measured on a scale of 1 to 5 where 1= strongly disagree, 2= somewhat disagree, 3= neutral, 4= somewhat agree, 5= strongly agree, r= don't know, not sure, it varies over the course of the year, refused, etc.

Table 5.4.2 Relational governance measures

Construct	**Second Order Constructs**	**Measures with indicator acronyms**
Relational Governance Mechanisms	Social communication practices [SOC]	• *"The supplier and your company share updated information about the product"* (Adapted from Sheng et al., 2006) [SOC1] • *"You and your supplier talk about our outside (of work) interests"* (Adapted from Sheng et al., 2006) [SOC2] • *"You and your supplier have meetings that are purely social"* (Adapted from Sheng et al., 2006) [SOC3] • *"You and your supplier talk about things other than product purchasing"* (Adapted from Sheng et al., 2006) [SOC4]

	Trust [TRUST]	• *"You know that when the supplier promises you something, they'll come through for you"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985) [TRUST1] • *"You are not hesitant to deal with this supplier even when the specifications are vague"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985) [TRUST2] • *"Your company and the supplier are both enthusiastic about pursuing the success of this relationship"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985) [TRUST3] • *"You know that the supplier will deal with us fairly"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985) [TRUST4] • *"The supplier does not use the opportunities that arise to profit at your expense"* (Zaheer, McEvily, and Perrone, 1998) [TRUST5] • *"You can rely on the supplier to keep the promises they make"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985) [TRUST6] • *"The supplier is evenhanded in their negotiations with you"* (Zaheer, McEvily, and Perrnone, 1998) [TRUST7] • *"You expect my major supplier to tell you the truth"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985; Zaheer, McEVily, and Perrnone, 1998) [TRUST8]

	Shared values [SHARED]	• *"Both parties are committed to the improvements that may benefit the relationship as a whole"* (Dhanaraj, Lyles, Steensma, and Tihanyi 2004; Szulanski, 1996; Sheng et al., 2006) [SHARED1] • *"Both parties share the same ambition"* (Tsai and Ghoshal, 1998; Zaheer and McEvily, 1998) [SHARED2] • *"Both parties have the same vision"* (Tsai and Ghoshal, 1998; Zaheer and McEvily, 1998) [SHARED3] • *"In most aspects of the relationship the parties are jointly responsible for getting things done"* (Tsai and Ghoshal, 1998; Zaheer and McEvily, 1998) [SHARED4] • *"Your position on running a business is very compatible with the supplier's position"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985) [SHARED5] • *"You and the supplier share the same basic business values"* (Wheeless, 1978; Johnson-George & Swap, 1982; Rempel, Holmes, & Zanna, 1985) [SHARED6]
	Loyalty [LOYALTY]	• *"You would like to work with this supplier for a long time"* (Wheeless, 1978) [LOYAL1] • *"You would rather stay with this supplier than change to another supplier"* (Wheeless, 1978) [LOYAL2] • *"You are quite proud to tell others that you work with this supplier"* (Wheeless, 1978) [LOYAL3] • *"You feel a strong sense of loyalty to this supplier"* (Wheeless, 1978) [LOYAL4]

Environmental governance

Environmental governance questions were asked to see the extent to which the compliance with environmental practices were implemented by the buyer firms when outsourcing a manufacturing process to the supplier. So, even before asking these questions, the respondents asked on a scale of 1 to 5 where 1=not crucial and 5= very crucial, “How crucial are environmental issues to your company when you collaborate with your supplier formally and informally?” Based on their ratings, environmental questions were asked to the respondent on a scale of 1 to 5, where 1= strongly disagree, 2= somewhat disagree, 3= neutral, 4= somewhat agree, 5= strongly agree, r= don't know, not sure, it varies over the course of the year, refused, etc.

Table 5.4.3 Environmental governance measures

Construct	**Measures**
Environmental governance [ENV]	• *"You cooperate with your supplier to achieve environmental objectives"* (Paulraj, Jayaraman, and Blome, 2014) [ENV1] • *"You encourage your supplier to develop new source reduction strategies"* (Paulraj et al., 2014) [ENV2] • *"You cooperate with your supplier to improve their waste reduction initiatives"* (Paulraj et al., 2014) [ENV3] • *"You work with your supplier for cleaner production"* (Paulraj et al., 2014) [ENV4] • *"You collaborate with your supplier to provide materials, equipment, parts or services that support your environmental goals"* (Paulraj et al., 2014) [ENV5] • *"You provide your supplier with design specification that include environment requirement for purchased items"* (Paulraj et al., 2014) [ENV6]

Environmental performance

Environmental performance measures were measured on a scale of 1 to 5 where 1= strongly disagree, 2= somewhat disagree, 3= neutral, 4= somewhat agree, 5= strongly agree, r= don't know, not sure, it varies over the course of the year, refused, etc.

Table 5.4.4 Environmental performance measures

Construct	**Measures**
Environmental performance [ENVPER]	• *"The supplier has helped reduce your carbon emissions"* (adapted from Paulraj, Jayaraman, and Blome, 2014) [ENVPER1] • *"The supplier has helped reduce your manufacturing waste"* (adapted from Paulraj, Jayaraman, and Blome, 2014) [ENVPER2] • *"The supplier has helped decrease the consumption of toxic material"* (adapted from Paulraj, Jayaraman, and Blome, 2014) [ENVPER3] • *"The supplier has helped decrease the frequency of environmental accidents"* (adapted from Paulraj, Jayaraman, and Blome, 2014) [ENVPER4] • *"The supplier has helped increase your energy savings due to conservation and efficiency"* (adapted from Paulraj, Jayaraman, and Blome, 2014) [ENVPER5] • *"The supplier has helped your company in complying with environmental regulations"* (Judge and Douglas, 1998) [ENVPER6] • *"The supplier has helped your company in limiting environmental impact beyond compliance"* (Judge and Douglas, 1998) [ENVPER7] • *"The supplier has helped your company in preventing and mitigating environmental crises"* (Judge and Douglas, 1998) [ENVPER8] • *"The supplier has helped your company in educating the employees and the public about the environment"* (Judge and Douglas, 1998) [ENVPER9]

Supply chain performance

Supply chain performance measures were measured on a scale of 1 to 5 where 1= strongly disagree, 2= somewhat disagree, 3= neutral, 4= somewhat agree, 5= strongly agree, r= don't know, not sure, it varies over the course of the year, refused, etc.

Table 5.4.5 Supply chain performance measures

Construct	**Measures**
Supply Chain Performance [SCP]	• *"Our supplier has helped lower the total cost of our products"* (Krause and Handfield, 2007) [COST] • *"Our supplier has helped improve our product quality"* (Krause and Handfield, 2007) [QUALITY] • *"Our supplier has helped increase the reliability of our product delivery time"* (Krause and Handfield, 2007) [DELIVERY] • *"Our supplier has helped improve our manufacturing flexibility"* (Krause and Handfield, 2007) [FLEXIBILITY]

Innovation performance

Innovation performance measures were measured on a scale of 1 to 5 where 1= strongly disagree, 2= somewhat disagree, 3= neutral, 4= somewhat agree, 5= strongly agree, r= don't know, not sure, it varies over the course of the year, refused, etc.

Table 5.4.6 Innovation measures

Construct	**Measures**
Innovation Performance [INNOV]	• *"Our supplier has helped improve our process design"* (Krause and Handfield, 2007) [INNOV1] • *"Our supplier has helped shorten our new product development life cycles"* (Krause and Handfield, 2007) [INNOV2] • *"Our supplier improves our capability of developing new products and features"* (Krause and Handfield, 2007) [INNOV3]

In market mechanisms and hierarchical mechanisms, size of the firm can influence the pricing of materials and their flow between several channels. Size can give larger negotiating power to one partner. Firm size is captured based on the number of employees. Given 80% of the firms primarily had less than 500 employees and belonged to one category of small to mid-sized firms, we did not control for this variable in our analysis.

6. DATA ANALYSIS AND RESULTS

6.1 Formal and relational governance

Our analysis was conducted in LISREL 9.2 as the methodology utilized for our study is structural equation modelling. When looking at the main model, given the constraints with sample size, number of constructs and number of variables, we mainly assessed the formal and relational governance measures and its effects on performance. When testing for complementary and substitutionary relationships between formal and relational governance mechanisms, we looked at its effects on each other and also on performance measures.

Two items with standardized loadings below 0.5 were dropped from further analysis as practical fit of the model became questionable. One was a formal governance item used to measure contingency practices and the other was a supply chain performance item used to measure whether the supplier helped in improving buyer's product quality. The scale dropped for contingency practices was a new scale modified and adapted from Goo et al. (2010). On the other hand, quality item used to measure supply chain performance is a pre-developed scale (Kraus and Handfield, 2007). Additionally, three trust items were also dropped from further analysis as the loading were way below 0.5.

The table 6.1 below provides the standardized loadings, t-values, error terms produced by assessing the measurement model in LISREL 9.2, Cronbach alpha's of the main items, and composite reliability.

Table 6.1 Descriptive statistics of measurement items

MAIN CONSTRUCT	CONSTRUCTS	Items	Standardized loadings in LISREL	t values	error values	Mean	Standard deviation	Composite Reliability	Cronbach alpha
FORMAL GOVERNANCE	Task/Goal related communication	fgov1	0.64	8.48	0.089	4.06	1.18	0.74	0.73
		fgov2	0.57	7.28	0.091	4.19	1.16		
		fgov3	0.65	7.78	0.100	3.80	1.26		
		fgov6	0.71	9.77	0.100	3.62	1.39		
	Performance monitoring	fgov8	0.63	6.95	0.090	4.32	1.09	0.84	0.81
		fgov12	0.93	14.67	0.070	3.95	1.24		
		fgov13	0.83	12.97	0.070	3.88	1.21		
	Conflict negotiation	fgov14	0.73	11.93	0.080	3.69	1.46	0.90	0.9
		fgov15	0.83	14.72	0.070	3.69	1.41		
		fgov16	0.90	19.93	0.062	3.47	1.39		
		fgov17	0.89	16.10	0.072	3.60	1.31		
	Contingency practices	fgov21	0.57	7.93	0.089	1.86	1.25	0.75	0.744
		fgov22	0.85	14.36	0.079	2.87	1.43		
		fgov24	0.69	11.54	0.080	3.19	1.43		
RELATIONAL GOVERNANCE	Social Communication practices	soc2	0.89	16.25	0.070	3.26	1.39	0.79	0.78
		soc3	0.52	8.55	0.070	2.03	1.30		
		soc4	0.81	12.96	0.084	3.33	1.36		
	Trust	trust1	0.54	7.26	0.063	4.44	0.87	0.77	0.738
		trust3	0.52	5.13	0.045	4.79	0.44		
		trust4	0.76	9.06	0.046	4.69	0.55		
		trust6	0.79	12.61	0.033	4.66	0.53		
		trust7	0.54	6.69	0.054	4.53	0.67		
	Shared Values	shared1	0.57	6.38	0.047	4.71	0.52	0.80	0.78
		shared2	0.75	9.35	0.063	4.48	0.78		
		shared3	0.73	10.68	0.062	4.16	0.88		
		shared4	0.51	7.69	0.047	4.53	0.70		
		shared5	0.55	8.00	0.058	4.36	0.84		
		shared6	0.63	8.18	0.055	4.48	0.71		
	Loyalty	loyal1	0.64	6.45	0.043	4.82	0.44	0.74	0.72
		loyal2	0.71	8.45	0.069	4.50	0.83		
		loyal3	0.58	6.66	0.076	4.42	0.89		
		loyal4	0.67	9.68	0.058	4.26	0.83		
PERFORMANCE	Supply Chain	cost	0.53	5.63	0.111	3.84	1.17	0.75	0.72
		delivery	0.79	8.24	0.097	4.17	1.08		
		flexibility	0.79	8.24	0.098	4.02	1.05		
	Innovation	innov1	0.74	11.80	0.079	3.39	1.27	0.80	0.82
		innov2	0.82	14.30	0.074	3.40	1.31		
		innov3	0.72	9.97	0.085	3.59	1.18		

6.1.1 Exploratory factor analysis

Given that some of the items utilized to capture formal governance mechanisms are new or significantly modified from prior scales, we ran an exploratory factor analysis on these items using both principal component factoring with varimax rotation and principal axis factoring with direct oblimin rotation with item loadings above 0.40. The exploratory factor analysis loadings are presented below.

Table 6.1.1 Exploratory factor analysis

	CONSTRUCTS	LABELS	Principal Component analysis	Cronbach Alpha	Principal axis factoring	Cronbach alpha
Formal Governance	Task or goal related Communication Practices	FGOV1	0.687	0.76	0.666	0.84
		FGOV2	0.625		0.567	
		FGOV3	0.663		0.620	
		FGOV4	0.437			
		FGOV5	0.440			
	Performance monitoring	FGOV6	0.659	0.81	0.611	0.81
		FGOV8	0.559		-0.497	
		FGOV12	0.668		-0.666	
		FGOV13	0.733		-0.754	
	Conflict Management	FGOV14	0.819	0.90	0.752	0.90
		FGOV15	0.888		0.872	
		FGOV16	0.892		0.881	
		FGOV17	0.879		0.857	
	Contingency Practices	FGOV20	0.625	0.73	0.468	0.73
		FGOV21	0.789		0.707	
		FGOV22	0.649		0.573	
		FGOV24	0.601		0.507	

6.1.2 Confirmatory factor analysis

After exploratory and confirmatory factor analysis, only items with standardized loadings above 0.5 in LISREL 9.2 were used for testing the hypothesized paths. Even though 0.6 is the minimum cut-off criteria for standardized loadings to establish construct reliability (Kline, 2005) and 0.7 is considered as the minimum cut-off criteria by other researchers (Srinivasan 1985; Hair and Anderson, 1998; Rossiter 2002), for the purpose of eliminating model non-convergence issues and model under-identification, we used 11 out of 38 items that had standardized loading between 0.5 and 0.6. For new construct development, standardized loadings as low as 0.5 are deemed as acceptable values (Nunnally, Bernstein, and Berge, 1967; Srinivasan 1985). For assessing the relationship between formal and relational governance mechanisms and its effects on performance measures, we compared the measurement model to structural model.

For the completely standardized loadings provided by LISREL 9.2, see Table 6.1. The t-statistic coefficients of scales loading into each of the reflective constructs were above the recommended cut-off value of 2.0 (See Table 6.1). Therefore, the data suggests convergent validity (Bagozzi and Yi, 1988). Following Hu and Bentler's (1999) two index strategy where we report fit index of SRMR based on maximum likelihood estimation along with any combination

of CFI, RMSEA, IFI, NNFI or RNI, we observe the following indices for the measurement model- SRMR=0.0593 and RMSEA=0.047, CFI=0.906, IFI=0.909 which are considered within moderately acceptable ranges (Kline, 2005; Hu and Bentler, 1999).

Now, in order to test the effects of governance mechanisms on performance measures, we tested the structural model. The fit indices for the structural model utilizing Hu and Bentler's two index strategy are within moderately acceptable ranges where SRMR= 0.06 and RMSEA=0.05. The χ^2 difference test between the measurement model and structural model [929.102(621)-898.011(620) = 31.091(1)] where $\chi^2_{\text{test statistic}}$=31.091 (1 degrees of freedom) is greater than $\chi^2_{\text{critical value}}$= 6.63 at 0.01 level of significance. This suggested that the structural model is significantly different from the measurement model at 0.01 level of significance. Therefore, we proceeded further assessing the relationships between formal and relational governance.

6.1.3 Results

In Poppo and Zenger's (2002) study, they validated the complementary and substitutionary relationship between contract and relational governance by looking at the signs of coefficients for both contract and relational governance when predicting performance measures. The negative coefficients suggested a negative relationship while positive coefficients suggested a positive relationship. In this study, formal governance mechanisms are represented by

task related communication practices, monitoring, conflict management, and contingency practices while relational governance practices are represented by social communication practices, trust, shared values, and loyalty.

In alignment with the Poppo and Zenger (2002) study, the complementary or substitutionary relationship between formal (FG) and relational governance (RG) was assessed by examining the directionality of the path coefficients and $t_{statistic}$ values. We found that task related communication practices (FG construct) had a positive relationship with social communication ($t_{statistic}=3.896$), and shared values ($t_{statistic}=2.959$). Performance monitoring (FG) had a positive association with shared values ($t_{statistic}=2.853$). Conflict negotiation practices (FG) had a positive relationship with all four aspects of relational governance (RG) namely social communication practices ($t_{statistic}=1.982$), trust ($t_{statistic}=3.484$), shared values ($t_{statistic}=2.494$), and loyalty ($t_{statistic}=3.102$). Finally, contingency practices had a positive relationship with shared values ($t_{statistic}=1.791$).

Conflict negotiation practices is the only aspect of formal governance practices that had a positive association with all four aspects of relational governance. Given these patterns, hypotheses 1a is partially supported. None of the formal governance constructs had a significant negative relationship with relational governance. Therefore, hypotheses 1b on the substitutionary nature of the relationship between the formal and relational governance is not supported. When looking at its combined effects of FG and RG on performance measures,

only task/goal related communication practices had a significant impact on innovation ($t_{statistic}$=2.063) and conflict management had a significant impact on innovation ($t_{statistic}$=2.456). Amongst relational governance measures, loyalty was the only construct that impacted innovation ($t_{statistic}$=1.685). None of the other governance measures had an impact on supply chain performance measures when utilized conjunctively in the same model.

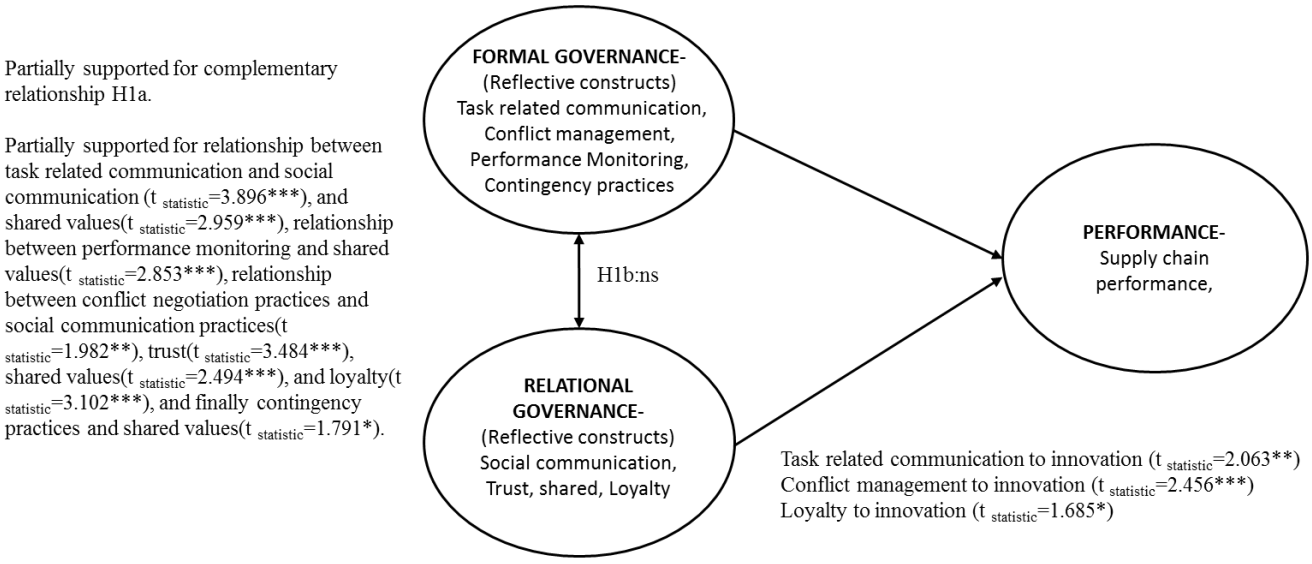


Figure 6.1 Testing for complementarity and substitutionary relationship between FG and RG

6.1.4 Discussion

Even though formal and relational aspects played a complementary relationship, in order to test the mediating effects of environmental governance, we decided to test the additional paths using two separate models. We argue this is acceptable as FG model is primarily grounded in TCT framework while RG model is grounded in RBV framework. We also found that the path coefficients toward performance measures were more statistically significant for performance measures when these paths were tested separately. The final sample size used in our analysis is 200. Most researchers recommend a minimum 1:5 subject versus variable ratio while some recommend a 1:10 variable to subject ratio.

Our current main model combining both relational and formal governance constructs had 38 variables for which we should have a minimum of 190 subjects considering 1:5 variable to subject ratio. When adding 13 additional environmental variables, we have a total of 51 variables for which the minimum sample size should be at least 255. When introducing two additional environmental constructs into our main model with 200 observations, we are barely meeting the criteria of 5:1 subject to variable ratio. Further, we encountered model convergence issues in comparison to testing these mediators separately on formal governance model and relational governance model. Therefore, we proceeded with two separate models testing the significance of hypothesized paths as formal governance is grounded in transaction cost theory

while relational governance is grounded in resource dependent and social capital theory.

6.2 Formal governance model results

The measurement model for formal governance model had moderately acceptable fit indices with SRMR=0.0692 and RMSEA=0.0646 (Hu and Bentler, 1999). The standardized loadings, t statistic values are reported in the table 6.2.1. Even though items with standardized loadings below 0.6 are dropped from the confirmatory factor analysis (Kline, 2005), we retained one formal governance item and one supply chain performance item with loadings between 0.5 and 0.6 to avoid construct under-identification. The formal governance item is a new measure and therefore a loading as low is 0.5 is acceptable (Nunnally et al. 1967; Srinivasan 1985) while the supply chain performance item assessing quality is a pre-developed scale. The composite reliability associated with each of the constructs ranged from 0.742 to 0.935 which is considered reliable as it is above the cut-off criteria of 0.70 (Fornell & Larcker, 1981 and Hair et al., 2010, p. 687). This provided further support for convergent validity suggesting that the items representing the underlying latent construct are reliable.

We further tested for discriminant validity which tests for whether each of the constructs is statistically distinct from each other (Hair et al., 2010). We examined inter construct correlations, squared construct correlations and

calculated the average variance extracted for each of the constructs. AVE values above 50% are considered acceptable for ascertaining discriminant validity (Fornell & Larcker 1981, Hair et al., 2010) shown in Table 6.2.2 and Table 6.2.3. The AVE values ranged from 41.90% to 70.10% as shown in table 6.2.3. Two constructs namely task related social practices and environmental governance had AVE values below 50%. However, they had a composite reliability of 0.742 and 0.842 respectively (see Table 6.2.1). Also, the average variance extracted were greater than squared correlations between each of the constructs (see Table 6.2.3), thus establishing discriminant validity.

Table 6.2.1 Complete standardized loadings of formal governance model and composite reliability

MAIN CONSTRUCT	CONSTRUCTS	Items	BUSC	MONIT	CONMGMT	CONPRACT	SCP	INNOV	ENV	ENVPER	Composite reliability
FORMAL GOVERNANCE	Task/Goal related communication (BUSC)	fgov1	0.665								0.742
		fgov2	0.58								
		fgov3	0.662								
		fgov6	0.679								
	Performance monitoring (CONMGMT)	fgov8		0.63							0.842
		fgov12		0.923							
		fgov13		0.828							
	Conflict negotiation(CONPRACT)	fgov14			0.733						0.903
		fgov15			0.83						
		fgov16			0.893						
		fgov17			0.883						
	Contingency practices (CONPRACT)	fgov21				0.552					0.749
		fgov22				0.888					
		fgov24				0.658					
PERFORMANCE	Supply Chain (SCP)	cost					0.525				0.753
		delivery					0.758				
		flexibility					0.829				
	Innovation (INNOV)	innov1						0.736			0.804
		innov2						0.825			
		innov3						0.716			
SUSTAINABILITY CONSTRUCTS	Environmental governance (ENV)	env1							0.614		0.842
		env2							0.68		
		env3							0.737		
		env4							0.793		
		env5							0.61		
		env6							0.675		
	Environmental performance(ENVPER)	envper1								0.767	0.935
		envper2								0.729	
		envper3								0.75	
		envper5								0.753	
		envper6								0.876	
		envper7								0.9	
		envper8								0.865	
		envper9								0.753	

Table 6.2.2 Construct correlations of formal governance model

	BUSC	MONIT	CONMGMT	CONPRACT	SCP	INNOV	ENV	ENVPER
BUSC	1.000							
MONIT	0.611	1.000						
CONMGMT	0.099	0.166	1.000					
CONPRACT	0.394	0.380	0.142	1.000				
SCP	0.338	0.294	0.099	0.473	1.000			
INNOV	0.336	0.337	0.174	0.084	0.117	1.000		
ENV	0.400	0.274	0.299	0.290	0.386	0.588	1.000	
ENVPER	0.276	0.320	0.155	0.379	0.720	0.273	0.583	1.000

Table 6.2.3 Squared correlations and AVE values of formal governance model

	BUSC	MONIT	CONMGMT	CONPRACT	SCP	INNOV	ENV	ENVPER
BUSC	1.000							
MONIT	0.373	1.000						
CONMGMT	0.010	0.028	1.000					
CONPRACT	0.155	0.144	0.020	1.000				
SCP	0.114	0.086	0.010	0.224	1.000			
INNOV	0.113	0.114	0.030	0.007	0.014	1.000		
ENV	0.160	0.075	0.089	0.084	0.149	0.346	1.000	
ENVPER	0.076	0.102	0.024	0.144	0.518	0.075	0.340	1.000
AVE	41.90%	64.50%	70.10%	50.90%	51.20%	57.80%	47.30%	64.30%

In order to test the mediating effects of environmental governance on formal governance items and performance measures, we conducted the mediation test in three stages (Baron and Kenny, 1986). Using Baron and Kenny (1986) approach, we ran the direct effects model, partial mediation model and full mediation model. Overall, the fit indices and χ^2 difference tests suggested that partial mediation model fit the data best.

Table 6.2.4 Testing environmental mediation in formal governance model

	Direct effects model (M1)	**Partial mediation model (M2)**	**Full mediation model (M3)**
Chi-square	979.478	916.798	1448.564
Degrees of freedom	502	499	511
Chi square/degrees of freedom	1.937	1.837	2.834
RMSEA	0.06	0.06	0.09
SRMR	0.07	0.06	0.132
N	200	200	200

Table 6.2.5 Change in χ^2 test- formal governance

Model comparison	**Change in df**	**Change in Chi square**	**Combined change**	**Chi square test statistic**	**Chi square critical value,***0.01**
M2-M1	502-499=3	979.478-916.798= 62.68	3(62.68)	188.04	11.34
M3-M2	511-499=12	1448.564-916.798= 531.766	12(531.766)	6381.192	26.22

When comparing the direct effects model to the partial mediation model, we observed that $\chi^2_{\text{test statistic}}$ of 188.04 was greater that $\chi^2_{\text{critical value}}$ of 11.34 at 0.01 level of significance suggesting that partial mediation model is a better fit. When comparing the partial mediation model to the full mediation, the $\chi^2_{\text{test statistic}}$ of 6381.92 was greater that $\chi^2_{\text{critical value}}$ of 26.22 at 0.01 level of significance again suggesting that partial mediation model is better than the full mediation model. Following Hu and Bentler's two index strategy, we observed that the partial mediation model has a moderately acceptable value for RMSEA=0.06 and

highly acceptable value for SRMR=0.06 (Hu and Bentler, 1999). For the chi-square test where the chi-square value divided by degrees of freedom is 1.837 for the partial mediation model which is closer to 2 and below 3 and therefore deemed acceptable.

When examining the relationships between various path coefficients, formal governance did not have a significant effect on supply chain performance. Thus, H2a is not supported. When examining the direct effects on innovation, task related communication ($t_{statistic}$=2.456) and conflict management ($t_{statistic}$=3.222) had a significant impact on innovation performance. However, performance monitoring and contingency practices did not impact innovation performance. Thus, H2b is partially supported. We found partial support for hypothesis 4a as only contingency practices had positive total effects on environmental performance ($t_{statistic}$=3.010), thus partially supporting hypothesis 4a.

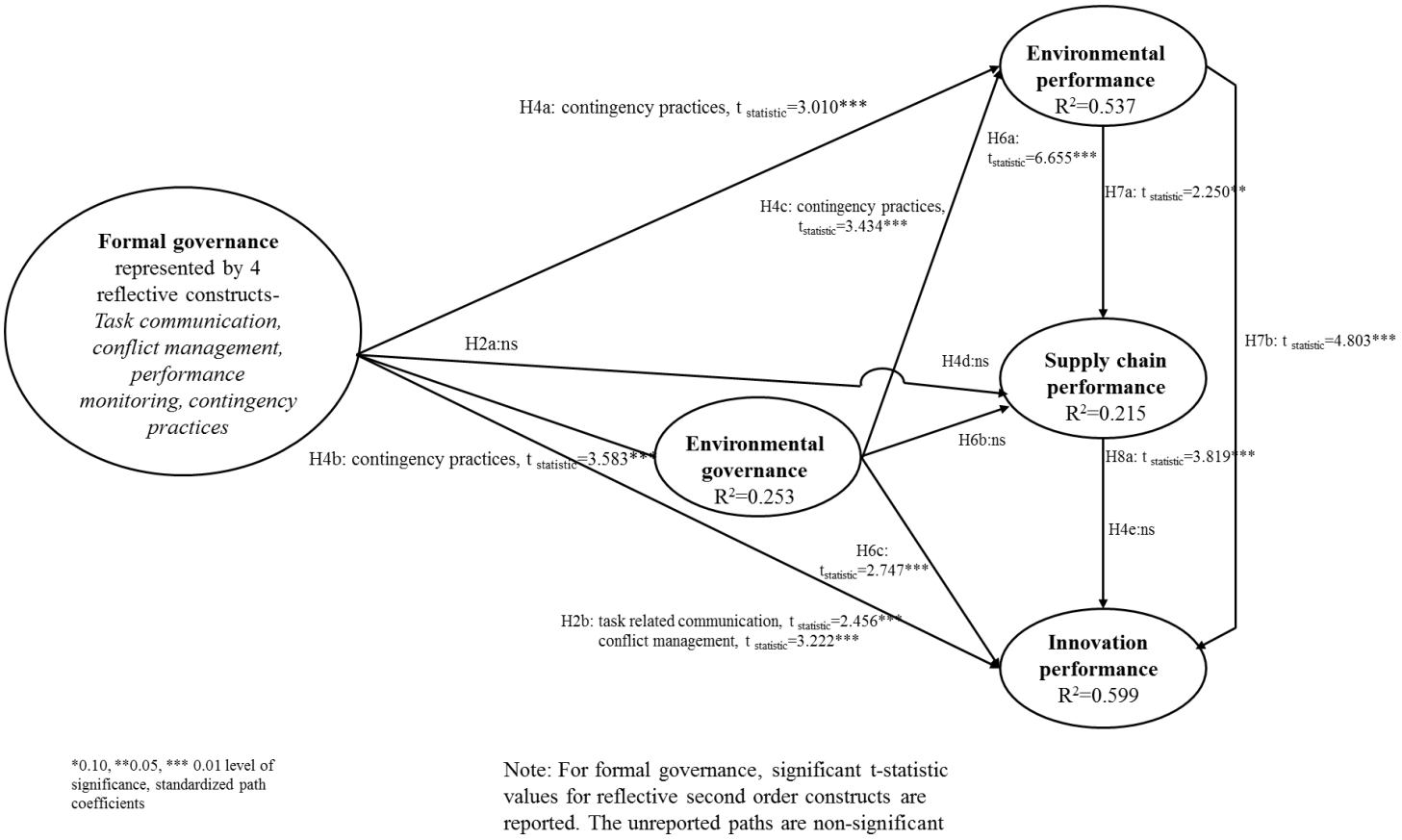
When examining the direct relationship between formal governance and environmental governance, the total and direct effect of contingency practices on environmental governance was significant at $t_{statistic}$=3.583, thus partially supporting hypothesis 4b. Task related communication, conflict negotiation, and performance monitoring did not have a direct effect on environmental governance. When examining the mediating effects of environmental governance on environmental performance, we found that it significantly mediated the

relationship between contingency practices and environmental performance ($t_{statistic}$=3.434). Thus, hypothesis H4c is only partially supported, and the t-value suggested partial mediation. Environmental governance did not mediate the relationship between formal governance and supply chain performance. Thus, hypotheses 4d was not supported. With an exception of contingency practices, none of other FG constructs had a significant relationship with environmental governance. Therefore, hypotheses 4d and 4e are not supported.

Finally, environmental governance had a significant impact on environmental performance ($t_{statistic}$=6.655), supporting H6a and innovation performance ($t_{statistic}$=2.747), thus fully supporting H6c. However, environmental governance practices did not impact supply chain performance of the buying firms. Thus, hypothesis H6b is not supported.

We also wanted to assess the impact of environmental performance measures on supply chain, innovation performance measures in a formal governance context. When implementing formal governance mechanisms, environmental performance improved supply chain performance ($t_{statistic}$=2.250) and innovation performance of the firm ($t_{statistic}$=4.803). Thus, hypotheses H7a and H7b are supported. In execution of formal governance mechanisms, we also observed that supply chain performance led to innovation performance, thus supporting H8a ($t_{statistic}$=3.819). Overall, R^2 value of 0.537 for environmental performance suggested that 53.7% variance in environmental performance is

explained by formal governance mechanisms and environmental governance, ceteris paribus. 59.9% of the variation in innovation performance is explained by exogenous constructs and mediator, ceteris paribus. 21.5% of the variation in supply chain performance measures is explained by formal mechanisms and mediator, ceteris paribus (See Figure 6.2).



Figures 6.2 Formal governance model results

6.3 Relational governance model results

Grounded in resource based theory and social capital theory, we postulated the relational governance model as relational norms practiced between exchange partners outside of a written contract impacting environmental regulations, supply chain, innovation, and environmental performance. We ran the measurement model which provided SRMR=0.0625 computed by maximum likelihood estimation and RMSEA=0.05 which belonged to acceptable value ranges according to Hu and Bentler's (1999) two index strategy.

Table 6.3.1 provides the complete standardized loadings of the relational governance model and composite reliability of each of the constructs. The composite reliability ranged from 0.744 to 0.935 which is above the cutoff value of 0.70 (Hair et al., 2010) ensuring moderately acceptable to highly acceptable construct reliability and convergent validity. The practical fit of the model is moderately acceptable as 9 out of 38 items had completely standardized loadings between 0.5 and 0.6. We decided to keep these items as they are pre-developed scales from literature (Nunnally et al., 1967).

Table 6.3.1 Complete standardized loadings of relational governance model and composite reliability

CONSTRUCTS	**Items**	SOC	TRUST	SHARED	LOYAL	SCP	INNOV	ENV	ENVPER	Composite reliability
Social communication practices (SOC)	soc2	0.855								0.793
	soc3	0.531								
	soc4	0.835								
Trust (TRUST)	trust1		0.531							0.769
	trust3		0.513							
	trust4		0.762							
	trust6		0.787							
	trust7		0.545							
Shared values (SHARED)	shared1			0.573						0.796
	shared2			0.751						
	shared3			0.735						
	shared4			0.506						
	shared5			0.548						
	shared6			0.639						
Loyalty (LOYAL)	loyal1				0.625					0.744
	loyal2				0.709					
	loyal3				0.598					
	loyal4				0.659					
Supply chain performance (SCP)	cost					0.536				0.755
	delivery					0.802				
	flexibility					0.782				
Innovation (INNOV)	innov1						0.751			0.805
	innov2						0.805			
	innov3						0.726			
Environmental governance (ENV)	env1							0.614		0.842
	env2							0.681		
	env3							0.743		
	env4							0.792		
	env5							0.609		
	env6							0.67		
Environmental performance(ENVPER)	envper1								0.765	0.935
	envper2								0.727	
	envper3								0.748	
	envper5								0.754	
	envper6								0.875	
	envper7								0.903	
	envper8								0.866	
	envper9								0.753	

In order to examine discriminant validity, we examined the inter-factor correlation matrix (see Table 6.3.2), squared multiple correlations of each of the factors, and we looked at AVE values of each of the constructs (see Table 6.3.3). Ideally AVE values should be above 50%. However, our AVE values ranged from 40% to 64.20% suggesting that trust and shared values are not very distinct from each other. Nevertheless, we decided to keep both these constructs for further analysis as they exhibited high reliability and these are pre-established constructs in literature (Sheng et al., 2006; Poppo and Zhou, 2010; Zaheer and Venkatraman, 1995). Even though the AVE values of loyalty and environmental governance practices were 40% and 47% respectively, these values are still above the squared correlations of the constructs, thus supporting their discriminant validity.

Table 6.3.2 Construct correlations of relational governance model

	SOC	TRUST	SHARED	LOYAL	SCP	INNOV	ENV	ENVPER
SOC	1.000							
TRUST	0.181	1.000						
SHARED	0.225	0.702	1.000					
LOYAL	0.267	0.676	0.664	1.000				
SCP	0.162	0.016	0.163	0.137	1.000			
INNOV	0.298	0.251	0.269	0.217	0.114	1.000		
ENV	0.312	0.102	0.266	0.252	0.383	0.579	1.000	
ENVPER	0.183	-0.050	0.204	0.225	0.717	0.255	0.585	1.000

Table 6.3.3 Squared correlations and AVE values of relational governance model

	SOC	TRUST	SHARED	LOYAL	SCP	INNOV	ENV	ENVPER
SOC	1.000							
TRUST	0.033	1.000						

SHARED	0.051	0.493	1.000					
LOYAL	0.071	0.457	0.441	1.000				
SCP	0.026	0.000	0.027	0.019	1.000			
INNOV	0.089	0.063	0.072	0.047	0.013	1.000		
ENV	0.097	0.010	0.071	0.064	0.147	0.335	1.000	
ENVPER	0.033	0.003	0.042	0.051	0.514	0.065	0.342	1.000
AVE	57.00%	40.80%	40.00%	42.10%	51.40%	58.00%	47.30%	64.20%

Grounded in resource dependence theory, we wanted to analyze the effects of relational norms and practices on supply chain, innovation, and environmental performance of a firm. When looking at the mediating effect of environmental governance on the relationship between relational governance and performance measures, we compared direct effects model with partial mediation model and partial mediation model with full mediation model (Baron and Kenny, 1986).

Table 6.3.4 Testing environmental mediation in the relational governance model

	Direct effects model (M1)	**Partial mediation model (M2)**	**Full mediation model (M3)**
Chi-square	1070.955	1019.592	1054.518
Degrees of freedom	640	637	649
Chi square/degrees of freedom	1.673	1.600	1.624
RMSEA	0.058	0.054	0.055
SRMR	0.063	0.062	0.076
N	200	200	200

Table 6.3.5 Change in χ^2 test- relational governance

Model comparison	Change in df	Change in Chi square	Combined change	Chi square test statistic	Chi square critical value,***0.01
M2-M1	640-637=3	1070.955-1019.592= 51.36	3(51.36)	154.08	11.34
M3-M2	649-637=12	1054.518-1019.592= 34.92	12(34.92)	419.04	26.22

To evaluate the mediating effect of environmental governance between relational governance mechanisms and performance measures, we conducted the chi-square difference test between direct effects model, partial mediation model and full mediation model to evaluate which model fits the data best (Baron and Kenny, 1986). When comparing the direct effects model to the partial mediation model, we observed that $\chi^2_{\text{test statistic}}$ of 154.08 was greater that $\chi^2_{\text{critical value}}$ of 11.34 at 0.01 level of significance suggesting that partial mediation model is a better fit in comparison to direct effects model. This also suggested that mediation exists. When comparing the partial mediation model to the full mediation, the $\chi^2_{\text{test statistic}}$ of 419.04 was greater that $\chi^2_{\text{critical value}}$ of 26.22 at 0.01 level of significance again suggesting that partial mediation model is better than the full mediation model. Following Hu and Bentler's two index strategy, we observed that the partial mediation model has a moderately acceptable value for RMSEA of 0.054 and highly acceptable value for SRMR of 0.062 (Hu and Bentler). For the chi-square test where the chi-square value divided by degrees of freedom is 1.6 for the partial mediation model is below 3 and therefore moderately acceptable.

Given partial mediation model fits the data best, we looked at the path coefficients for the hypothesized paths in the partial mediation model.

When assessing the relational governance mechanisms, social communication practices positively impacted supply chain performance of the firm ($t_{statistic}$=2.331), while trust, shared values, and loyalty did not impact supply chain performance. Thus, hypothesis 3a is partially supported. Regarding innovation performance, social communication practices ($t_{statistic}$=2.392) and shared values significantly impacted innovation performance ($t_{statistic}$=1.691) while loyalty and trust did not impact innovation. Therefore, hypothesis 3b is partially supported.

Shared values ($t_{statistic}$=2.103) and loyalty ($t_{statistic}$=2.158) had a significant direct effect on the environmental performance of the firm on the other hand social communication practices and trust did not impact environmental performance measures. Hypotheses 5a is partially supported. Relational governance symbolized by relational norms did not impact environmental governance directly. Thus, hypotheses 5b is not supported. Given that none of the relational norms had a positive effect on the mediator environmental governance, hypotheses 5c, 5d and 5e for mediating effects of environmental governance are not supported.

Environmental governance practices had a significant impact on environmental performance ($t_{statistic}$=3.290) and innovation performance

($t_{statistic}$=6.582) in a relational governance context. Thus hypotheses 6d and 6f are fully supported. When looking at the effects of environmental governance practices on supply chain performance, the relationship was not significant. Thus, hypotheses 6e was not supported.

In relational governance context, environmental performance positively impacted both supply chain ($t_{statistic}$=2.172) and innovation performance ($t_{statistic}$=4.235) of the firm. Thus, hypotheses 7c and 7d are fully supported. We also observed that improved supply chain performance helped improve innovation performance ($t_{statistic}$=3.833) of firm in relational context, thus supporting H8b. 58.6% of the variation in environmental performance was explained by relational mechanisms and environmental governance, ceteris paribus. 20.1% of the variation in supply chain performance was explained by the model, ceteris paribus. 55.3% of the variation in innovation performance was explained by other constructs in the model, ceteris paribus (See Figure 6.3).

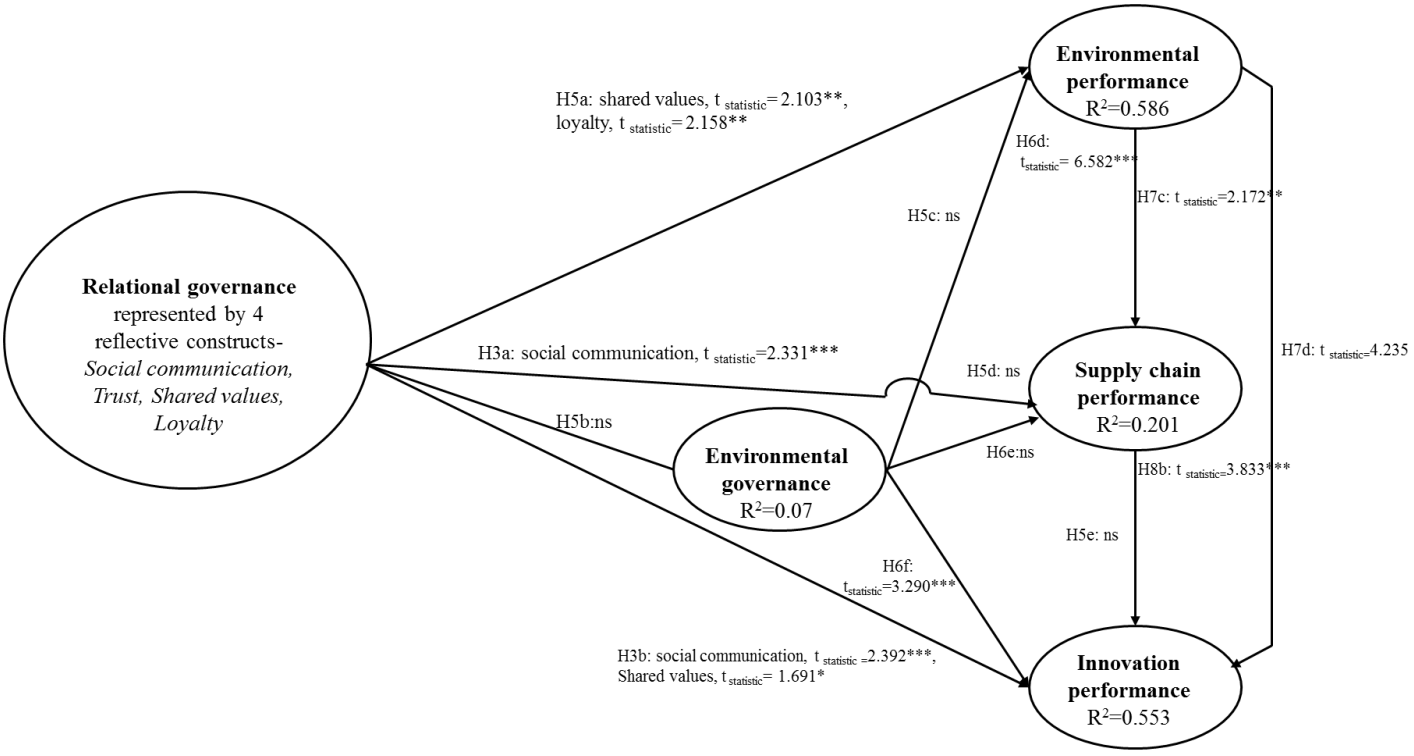


Figure 6.3 Relational governance model results

6.4 COMMON METHOD BIAS RESULTS

We ran the Harmon's one factor test to see whether a single method caused common method bias in our main model. In our factor extraction process in SPSS, more than one factor was extracted and total variance extracted was 70% suggesting that variance explained by factors is greater than variance explained by method (Podsakoff and Organ, 1986; Podsakoff, MacKenzie, Lee, and Podsakoff, 2003). 19% of the variance was explained by one common method factor which

indicated no method bias since common method bias is a potential threat when more than 50% of the variance is explained by one method factor which is not the case here.

We also tested for common method bias in formal governance model and relational governance model that tested for mediating effects of environmental governance. In the formal governance model, 27% of the variance was explained by one common method factor and in the relational governance model, 22% of the variance extracted was explained by one common method factor. In both cases, method variance was below 50%. Thus common method bias did not pose a threat to all three models.

Then, we ran Harmon's one factor test on the model combining FG and RG mechanisms. The fit indices for Harmon's one factor model are SRMR=0.126, CFI= 0.337, and RMSEA=0.119 and the fit indices for the hypothesized measurement model are SRMR=0.05, CFI=0.90, and RMSEA=0.0474. The model fit indices suggested that hypothesized model is a better fit. The χ^2 difference test between the hypothesized model and harmon's one factor model [2557.555(665)-898.011(620) =1659.544(45)] where $\chi^2_{\text{test statistic}}$=74679.48 is significantly greater than $\chi^2_{\text{critical value}}$=63.691 at 0.01 level of significance suggest that hypothesized model is a better fit. Thus, Harmon's one factor test show that method bias is not a significant threat.

We tested for common method bias in FG and RG model using Harmon's one factor test. In the FG model, the fit indices for the Harmon's model are SRMR=0.130 and RMSEA=0.132 while the fit indices for the FG model are SRMR=0.0692 and RMSEA=0.0646 implementing Hu and Bentler's fit index strategy (Hu and Bentler, 1999). The hypothesized formal governance model fits the data better than harmon's one factor model. The χ^2 difference test between the hypothesized model and harmon's one factor model [2365.140 (527)-864.03(499) = 1501.11(28)] where $\chi^2_{\text{test statistic}}$=42031.08 is significantly greater than $\chi^2_{\text{critical value}}$=44.314 at 0.01 level of significance suggest that hypothesized model is a better fit. Thus, harmon's one factor test show that method bias is not a significant threat to the formal governance model.

Finally, we ran the harmon's one factor test for relational governance model and compared it to the hypothesized measurement model. The fit indices for the hypothesized measurement model are SRMR=0.0625 and RMSEA=0.0548 while the fit indices for the harmon's one factor model are: SRMR= 0.149 and RMSEA=0.112. The fit indices show that hypothesized model is a better fit. The χ^2 difference test [2732.16 (779)-1019.592(637) = 1712.568(142)] where $\chi^2_{\text{test statistic}}$=243184.656 is significantly greater than $\chi^2_{\text{critical value}}$=135.807 at 0.01 level of significance demonstrate that hypothesized relational governance model is a better fit in comparison to harmon's one factor

model. Thus, method is not a significant threat to all three models. A summary of all the supported hypotheses are presented in the table 6.4.

Table 6.4 Summary of results

HYPOTHESES	RESULTS
Combining Formal (FG) and relational governance(RG)	
H1a: Formal and relational governance share a mutually complementary relationship.	Partially supported for relationship between FG- task related communication and RG-social communication ($t_{statistic}$=3.896***), shared values($t_{statistic}$=2.959***), relationship between FG-performance monitoring and RG-shared values($t_{statistic}$=2.853***), relationship between FG-conflict negotiation practices and RG-social communication practices($t_{statistic}$=1.982**), trust($t_{statistic}$=3.484***), shared values($t_{statistic}$=2.494***), and loyalty($t_{statistic}$=3.102***), and finally FG-contingency practices and RG- shared values($t_{statistic}$=1.791*).
H1b: Formal governance and relational governance mechanisms share a mutually substitutionary relationship.	Not supported.
Formal governance model	
H2a: The more effective the formal governance mechanisms (task/goal related communication, performance monitoring, conflict negotiation, contingency practices), the better will be the supply chain performance.	Not supported.

H2b: The more effective the formal governance mechanisms (task/goal related communication, performance monitoring, conflict negotiation, contingency practices), the better will be the innovation performance.	Partially supported for task related communication ($t_{statistic}$=2.456***) and conflict negotiation ($t_{statistic}$=3.222***).
H4a: Formal governance mechanisms will positively impact environmental performance.	Partially supported for contingency practices ($t_{statistic}$=3.010***).
H4b: Formal governance mechanisms will positively impact environmental governance practices.	Partially supported for contingency practices ($t_{statistic}$=3.583***).
H4c: Environmental governance mechanisms will mediate the relationship between formal governance and environmental performance	Partially supported for mediated relation between contingency practices and environmental performance ($t_{statistic}$=3.434***)
H4d: Environmental governance mechanisms will mediate the relationship between formal governance and supply chain performance.	Not supported
H4e: Environmental governance mechanisms will mediate the relationship between formal governance and innovation performance.	Not supported
H6a: When implementing formal governance mechanisms, environmental governance will improve environmental performance.	Supported ($t_{statistic}$=6.655***)

H6b: When implementing formal governance mechanisms, environmental governance will improve supply chain performance.	Not supported
H6c: When implementing formal governance mechanisms, environmental governance will improve innovation performance.	Supported ($t_{statistic}$=2.747***)
H7a: When implementing formal governance mechanisms, environmental performance will lead to improved supply chain performance.	Supported ($t_{statistic}$=2.250**)
H7b: When implementing formal governance mechanisms, environmental performance will lead to improved innovation performance.	Supported ($t_{statistic}$=4.803***)
H8a: When implementing formal governance mechanisms, supply chain performance will lead to improved innovation performance.	Supported ($t_{statistic}$=3.819***)
Relational governance model	
H3a: The more effective the relational governance mechanisms (social communication practices, trust, shared values, loyalty), the better will be the supply chain performance.	Partially supported for social communication practices ($t_{statistic}$=2.331***)
H3b: The more effective the relational governance mechanisms (social communication practices, trust, shared values, loyalty), the better will be the innovation performance.	Partially supported for social communication practices ($t_{statistic}$=2.331***), and shared values ($t_{statistic}$= 1.691*)

H5a: Relational governance mechanisms will positively impact environmental performance.	Partially supported for shared values ($t_{statistic}$= 2.103**) and loyalty ($t_{statistic}$= 2.158**)
H5b: Relational governance mechanisms will positively impact environmental governance.	Not supported
H5c: Environmental governance mechanisms will mediate the relationship between relational governance and environmental performance	Not supported
H5d: Environmental governance mechanisms will mediate the relationship between relational governance and supply chain performance	Not supported
H5e: Environmental governance mechanisms will mediate the relationship between relational governance and innovation performance	Not supported
H6d: When implementing relational governance mechanisms, environmental governance will improve environmental performance.	Supported ($t_{statistic}$= 6.582***)
H6e: When implementing relational governance mechanisms, environmental governance will improve supply chain performance.	Not supported
H6f: When implementing relational governance mechanisms, environmental governance will improve innovation performance.	Supported ($t_{statistic}$=3.290***)
H7c: When implementing relational governance mechanisms, environmental performance will lead to improved supply chain performance.	Supported (H7c: $t_{statistic}$=2.172**)
H7d: When implementing relational governance mechanisms, environmental performance will lead to improved innovation performance.	Supported ($t_{statistic=}$4.235)

H8b: When implementing relational governance mechanisms, supply chain performance will lead to improved innovation performance.	Supported ($t_{statistic=}3.833$***)

7. DISCUSSION

7.1Overview

Overall, we observe that both relational and formal practices impact innovation performance of a firm more significantly in comparison to supply chain performance measures in a buyer-supplier relationship. Given the increasing emphasis on environmental regulations, we also assessed whether it impacted performance measures. Both managerial and academic implications of our results are discussed below.

7.2Managerial implications

Our results suggest that communication plays a key role in a buyer-supplier relationship. Social communication positively impacted supply chain performance and innovation capabilities of the firm. This sheds light on the emphasis of developing a camaraderie which involves enquiring of each other's welfare and meeting outside of work at least between boundary spanners of the firm. This study demonstrates the importance of not just having professional communication but also having interactions outside of work and fostering a relationship grounded on shared values and loyalty with the supplier.

Another interesting observation is the complementary role between formal and relational governance and that one cannot completely replace another in a

buyer-supplier relationship. We made this observation even during our preliminary analysis where one practitioner noted that both formal and relational governance work synergistically with each other. Task related communication shared a positive relationship with social communication and shared values of relational norms. This suggests that both formal and social communication share a mutually positive relationship with each other.

Having similar goals and ambition will have a mutual positive association with how short-term and long-term goals of relationship are communicated formally amongst partners. The way a buyer monitors the supplier's performance and how both parties handle contingency situations share a mutually positive association with shared values between partners. Just like any healthy relationship, if conflicts are handled efficiently in a respectful manner, it will share a positive association with trust between partners, social communication, shared values, and loyalty between firms. This suggests the importance of handling conflicts quickly and easily in an efficient manner.

The way conflicts are handled between buyer and supplier had a significant impact on improving innovative capabilities of the buying firm. This suggests that managers should have effective and quick conflict management practices to ensure that buying firm will excel in its innovative capabilities. It is easier and faster to decide how to improve product or process design of firms or

even improving the capability of developing new products if both parties have efficient conflict management tactics.

When implementing environmental regulations and expecting cooperation from the key supplier on that front, it is essentially important to figure out if the buyer and supplier share similar values and vision. The findings in this study suggested that when buyer and supplier shared similar values and had a sense of loyalty toward one another, it directly impacted environmental performance of firms. If two firms have similar vision and ambition when achieving sustainability, it will naturally have an impact on the environmental performance of the firm. It is essential for buyers to select suppliers who share the same enthusiasm for manufacturing in an environmentally friendly manner.

Loyalty is assessed by the buyer's desire to continue the relationship for a long time. When having a desire to have a long-term relationship, business partners are not short sighted by just focusing on profit. They will focus factors like environmental performance given the increasing demand for environmentally conscious products amongst both buyers and customers.

When looking at shared values, we also observed that it significantly impacted innovation capabilities of the firm. This suggests that when selecting a supplier, the buyer should be aware of whether they have similar goals, vision, and ambition for a long term alliance. Social communication practices also improved innovation capabilities which is possible as some aspects of work, new

idea development will overflow in social communication between business partners outside of work. Some of the practitioners did suggest that meeting outside work for golf or lunch involved discussion about football games, news and also sometimes problem solving and idea generation about creative aspects of work like new product development and enhancing current process capabilities.

In formal governance aspects, contingency planning directly impacted environmental performance of the firm and was partially mediated by environmental regulations. For all the other governance measures, environmental regulatory practices did not mediate the relation between formal and relational governance and environmental performance. 37% of the respondents did not consider environmental governance to be crucial when engaging in a buyer-supplier relationship in an inter-firm context which validates the findings of the results. This suggests that most firms in this sample would consider environmental governance practices as an afterthought where they have to ensure that products meet the required legal standard but it is not a priority in their day-today operations. Thus, environmental governance only mediated the relationship between contingency practices and environmental performance. As we observe a shift toward sustainable product and process development in developed nations, it would be pertinent for managers to communicate this criticality of environmentally compliant practices to suppliers when outsourcing manufacturing functions.

Compliance with environmentally regulatory practices does impact environmental performance and innovation capabilities of the firm even though it did not directly impact the supply chain performance of the firm. This further implicates that managers should focus on emphasizing the criticality of environmental regulations to their supplier if they want to achieve their sustainability goals. This also implies that firms that require to be environmentally friendly should be innovative in managing their process and developing their new products as we observe in the case of solar companies, hybrid car manufacturing, LEED certified manufacturing locations, and even power saving electrical products.

In this study, environmental performance positively impacted supply chain performance and innovative capabilities of a firm. This suggests that certain environmental performance measures like reduction of manufacturing waste, recycling, carbon emissions, and toxic materials could help improve supply chain measures like cost and flexibility. To be environmentally friendly requires thinking ‘outside the box’ when it comes to planning and execution of manufacturing functions. Thus, managers can form partnerships with suppliers who are in agreement with their long-term environment goals and are innovative in the outsourced manufacturing processes.

7.3Academic implications

This study builds on the existing body of knowledge by expanding formal governance measures into four distinct dimensions namely task or goal related communication practices, conflict negotiation, performance monitoring, and contingency practices. This study expands on Lusch and Brown's (1996) formal governance measures, and the analytical results suggest that some of the formal governance and relational governance practices share a positive relationship with each other.

Even though not all of the proposed scales had a significant effect on supply chain performance measures, we observed that both task related communication and conflict negotiation improved innovative capabilities of the firm. Relational governance mechanisms such as social communication practices and shared values also improved innovative capabilities of the firm. When studying the impact of formal and relational governance mechanisms in an inter-firm context, most studies have looked at performance measures such as exchange performance, relationship performance, knowledge acquisition, and quasi-integration (Poppo and Zenger, 2002; Sheng et al., 2006; Lee and Cavusgil, 2006; Liu et al., 2009; Li et al., 2010).

To the best of our knowledge, one significant contribution of this study is it highlights the impact of formal and relational governance mechanisms on

improving the innovative capabilities of a firm. This is a valuable contribution to the existing body of knowledge. Lawson, Petersen, Cousins, and Handfield (2009) in their study on 111 UK firms found that informal socialization had a positive impact on knowledge sharing, supplier and buyer development outcomes, and financial performance. Even though formal socialization did not directly impact knowledge sharing, it improved informal socialization mechanisms. The findings in our study suggest that formal and relational communication significantly improves the innovative capabilities of a firm.

Further, the findings in this study suggest that formal governance mechanisms need not always improve supply chain performance of a firm. This finding is interesting and requires further research as a study by Cousins and Menguc (2006) on 142 UK firms suggested that socialization mechanisms positively impacted supplier operational outcomes. Cousins and Menguc (2006, p.612) captured socialization mechanisms in terms of social events, joint workshops, on-site visits, regular supplier conferences and team building exercises. In another study by Cousins et al. (2006) they found that formal socialization mechanisms did not impact performance outcomes. Our study segregates communication further into formal and relational governance dimensions. In this study, only social communication practices at relational governance level had a significant impact on supply chain performance of the

buying firm while formal communication practices did not significantly impact supply chain performance.

Another contribution of this study is that it examines whether environmental regulatory practices play a mediating role between governance mechanisms and performance. This is an interesting question given firms are emphasizing the importance of environmentally safe governance practices in manufacturing processes. The findings in this study suggest that while contingency planning shares a positive relationship with environmental governance, none of the relational norms share a positive association with environmental governance. On the other hand, relational governance mechanisms such as shared values and loyalty have a direct impact on the environmental performance of the firm.

One of the fascinating findings in this study was trust did not impact supply chain performance, innovative capabilities and environmental performance of the buying firm. This is partly in agreement with Doney and Cannon's (1997) study where they found that when controlling for prior experience and supplier performance, trust did not impact performance measures such as future interactions and purchase choice. The findings in this study are contrary to the previous study conducted by Cousins et al. (2006) using a sample of British manufacturers where trust and informal socialization mechanisms impacted supplier relationship outcomes while formal socialization mechanisms did not

impact relational capital. No additional information was provided about supplier demographics in their study to suggest whether national culture played a role when looking at formal and relational socialization mechanisms and its impact on performance measures. While their study used UK firms in a buyer-supplier context, this study totally comprises of the US and Canadian buyers and 90% of suppliers belong to North America. The need to further investigate the effects of trust in other cultures will shed more light on this research question.

8. CONCLUSION

8.1Future research

The sample population was represented by North American industry belonging to US and Canada. Even though in the preliminary testing, US practitioners highlighted the difference between how they handled eastern and western suppliers, we could not capture the differences in this study given the under-representation of eastern supplier base in our sample. The supplier from eastern countries only represented 10% of the survey data. The impact of national culture on governance mechanisms is not thoroughly investigated in governance literature in a supply chain context. With increasing globalization, it is intriguing to see if there is a difference between local and international suppliers in an outsourcing relationship. Would countries high on collectivism like China and India respond more positively to relational governance mechanisms? Additionally would countries high on uncertainty avoidance put more emphasis on formal governance mechanisms? Would countries high on long-term orientation focus on fostering friendships? (Hofstede, 1994). Avery, Swafford, and Prater (2010) investigated the effects of culture on the relationship between social capital and performance.

Liu, Gould, Rollins, and Gao (2014) in their qualitative study inferred a cultural difference between Chinese “guanxi” workers and western workers in

transnational business relationships. While the former relied on personal relationships, the latter focused on more business aspects of the relationship like written legal contracts. One future area of research would be examining the interacting effect of culture on *post hoc* contract management practices and relational norms. Additionally, conducting studies with buyers in developing nations to assess whether governance mechanisms will change across nations in a supply chain context is a potential future area of research. In an international buyer-supplier relationship, factors like government regulations, volatility in supplier market, environmental uncertainty would come into play. Understanding the interacting effects of these factors on formal and relational governance mechanisms would be an interesting area of future research.

Strategy has a crucial role in any inter-firm relationship. One interesting question for future research would be to understand the impact of strategy on formal and relational governance measures. It would be worth researching the moderating effect of low-cost strategy and differentiation strategy when examining the impact of governance on performance measures. Barthelemy (2008) highlighted the importance of governance structure in franchise chains when predicting financial performance of firms. Investigating the impact of formal, relational, and environmental governance on buyer financial performance is an interesting area of future research.

Another important aspect would be understanding the importance of how both partners foresee the future of their relationship and whether this would impact the execution of formal and relational governance mechanisms and compliance with environmental contingency practices. The expectation of continuity can be defined as the *"degree to which parties expect the relationship to continue indefinitely"* (Heide and Miner, 1992, p. 275). In their study, Heide and Miner used expectation of continuity as an antecedent to patterns of cooperation in a buyer-supplier relationship. Poppo, Zhou, and Ryu (2008) theorized the antecedents to the expectation of continuity as asset specificity and uncertainty. Their study suggested that both levels of exchange hazards were determinants of whether the relationship would continue or not. For future research, we recommend examining whether these exchange hazards associated with uncertainty could be alleviated to a significant extent by execution of formal and relational governance mechanisms.

Future researchers could investigate the influence of power asymmetry in the execution of formal and relational governance mechanisms. The amount of buyer's purchases from a specific supplier and their dependence on each other can influence opportunistic behavior (Noordewier, John, and Nevin; 1990). Finally, this study focused on formal and relational governance mechanisms from a buyer's perspective alone. Conducting pairwise dyadic empirical studies on

whether formal, relational, and environmental governance improves supplier performance measures is worth researching in future.

Future applications of other theories such as stewardship theory on governance mechanisms is an interesting area of research. While basic assumptions of transaction cost theory focus on bounded rationality and opportunism (Williamson, 1975), it would also be essential to look at inter-firm relationships in the context of stewardship theory. Stewardship theory assumes that suppliers are good stewards of their resources and will not take advantage of their buyer at every given opportunity (Hernandez, 2012). As welfare of the supplier is intertwined with interests of the buyer (Davis et al., 1987; Daily et al., 2003), they can still work as good stewards establishing relational norms such as trust, mutual commitment, and cooperation.

8.2 Limitations

One of the biggest limitations of our study was sample size and a large number of missing observations. We had a total of 4.61% usable surveys. Regarding missing data, 34% of the respondents did not report their gross sales, and we had 69% of missing data about supplier sales information. Given the sensitivity of this information and the large amount of missing observations, we could not objectively capture whether there was a power asymmetry between both partners in the supply chain relationship. Given there was a total of 51 variables

and 12 constructs, and a sample size of 200, we did not have sufficient sample size for model convergence in our combined main model. We analyzed the effects of formal and relational governance measures separately applying transaction cost framework, social capital theory, and resource dependence view.

Another limitation was that the survey data was collected using telephone calls. Given the nature of phone interviews and length of the survey, first 100 interviews would be considered as a learning curve for interviewers. Even though single method bias results suggested that it did not pose a significant threat to the study, it would be essential to collect additional data using both telephone interview and online surveys to provide external validity and robustness to the results.

8.3 Conclusions

Overall, despite several limitations with our sample size, this study highlights the importance of formal measures such as task and goal related communication and conflict management in improving a firm's innovative capabilities. The study sheds light on the importance of post hoc contract management practices to ensure compliance with environmental regulations, achieving goals, and managing conflicts. This differentiates itself from past studies as most studies focus on the existence of a contract in a buyer-supplier relationship. This study examines execution of transactional and relational

mechanisms to ensure contract is followed through and it positively impacts performance measures of a firm. Thus, it builds the existing body of knowledge by identifying what governance mechanisms works and what does not work in a buyer-supplier relationship. This should ensure firms to identify effective formal and relational governance mechanisms in a supply chain context, propose effective management of contractual obligations and ensure a smooth ongoing relationship with their suppliers.

This study further shows the conjunctive effect of environmental governance along with formal and relational governance and its impact on environmental performance of firms. Communication both at formal and relational level impacts innovative capabilities of the firm. Environmental performance impacts both supply chain and innovation performance of the firm in an inter-firm relationship. It is important to formally and relationally govern your supplier in a buyer-supplier relationship. When focusing on environmental objectives, it is important to hire a supplier who shares similar enthusiasm for environmental sustainability. In summary, these formal and relational controls should enable manufacturing firms to execute their formal and relational mechanisms effectively, strategically manage their suppliers, and thus improve performance.

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APPENDIX A

SURVEY

Survey questions are shown below

Indicator	Survey questions	
GENDER	Enter respondent's gender please	1 = Male 5 =Female d =Don't know
	SECTION I	
JOB TITLE	>q21< To start, we have just a few questions about you and your company. *Can you please tell me your current job title?*	1 = specify d =don't know r =refused
DIRECT INVOLVEMENT WITH SUPPLIER	>q22< *Are you directly involved in working with key suppliers?*	1= yes 5 =no d =don't know r =refused
INDUSTRY	>q23< *What is the primary industry in which your products compete?*	1= specify d =don't know r =refused
>q1_intr< We want to ask questions about ONE of your key suppliers with whom you have frequent interaction within the past year and who delivers a key component used in your final product. Please think of who that supplier is, and keep them in mind when you answer the questions in the survey.		
FREQUENCY	>q1a< *Which of the following BEST describes how frequently you contact this key supplier*: is it many times during a week, a few times in a month, every other month, quarterly, or about once a year?	1 =many times during the week 2 = a few times in a month 3 = every other month 4 =quarterly 5 =about once a year r =don't know, not sure, it varies over the course of the year, refused etc.
CRITICALITY	>q1b< *How would you rate the criticality of the outsourced component where 5 means very critical and 1 means not critical at all.* INTERVIEWER: if respondents asks for/requires elaboration: if a delay by the supplier would halt production, cause you to lose customers, or cause shortages in the supply change, you would say 5, AND, if the delays would have no real effect on your operations in the short run you would say 1.	1-5=Interviewer enter number from 1 to 5 r=volunteers not sure how to answer

YEARS	>q2< *Approximately how many years has your company been doing business with this supplier?*	0 = less than one year 1=1-97 Interviewer enter number of years d = don't know, not sure, it varies over the course of the year, refused, etc.
COUNTRY OF KEY SUPPLIER	>q3< *In which country is your key supplier located*? Interviewer if Respondent lists a city or region make sure you ask for the country. If Respondent notes that they are located in more than one country ask for the country from which the supplier most often provides key components to your company.	1 =Write in name of country d =don't know r =refused
#EMPLOYEES_ SUPPLIER	>q4a< *How many employees does your supplier's company have?* Interviewer: if required we want the best estimate of the number of full time employees. If R indicates that the supplier has multiple locations ask for the number of employees at the location that most often supplies their company.	1-9997= write in number of employees d= don't know r= refused
GROSS SALES_SUPPLIER	>q5< *What are your supplier's APPROXIMATE annual gross sales in US Dollars?* Is it less than one million, between 1 million and 5 million, between five and ten million, between 10 and 50 million, between 50 million and 100 million, between 100 million and 500 million, between 500 million and one billion, or more than one billion dollars? Interviewer: you can stop reading when the respondent answers	1=Less than $1 million 2=$1 million to less than $5 million 3=$5 million to less than $10 million 4=$10 million to less than $50 million 5=$50 million to less than $100 million 6=$100 million to less than $500 million 7=$500 million to less than $1 billion 8=more than $1 billion d= Respondent cannot or will not provide an answer
%OF TOTAL PURCH	>q6a< *Thinking about the key component you purchase from this supplier, about what percentage of your company's total purchases of this particular item is purchased from them?*	1-100 = Enter percent d = Not sure (If not sure, skip to question 7)
#SUPPLIERS	>q6b< *How many other suppliers provide this item to you?*	1-97=Enter number of other suppliers d=Not sure

CONTRACT	>q7< *Do you have a formal, written contract with this supplier?*	1=Yes 5=No d=Not sure
>q8_intr< ***For the next questions please tell me if you strongly disagree, somewhat disagree, are neutral, somewhat agree, or strongly agree.*** Still thinking of the supplier you based your previous answers on, and thinking about the **formal** and **professional** aspects of your relationship, to what extent do you agree or disagree with the following statements, where formal means purely professional context or professional aspects of the buyer-supplier relationship.		
FGOV1	>q8a< *The supplier and your company have periodic reviews to discuss the overall progress of tasks*. Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree? Interviewer: if asked periodic reviews are regular reviews that happen weekly, monthly, quarterly, etc.	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r= don't know, not sure, it varies over the course of the year, refused etc.
FGOV2	>q8b< *The supplier and your company clarify who will perform each task.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV3	>q8c< *The supplier and your company discuss your long term plans.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r= Respondent volunteers not sure/depends/cannot answer, etc.
FGOV4	>q8d< *When you communicate with your supplier, you talk about current tasks and job responsibilities.*	1= strongly disagree 2= somewhat disagree 3= neutral

	Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	4= somewhat agree 5= strongly agree r =Respondent volunteers not sure/depends/cannot answer, etc.
FGOV5	>q8e< *The supplier provides you with any updates in cost structure information for the component you purchase from them.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r= Respondent volunteers not sure/depends/cannot answer, etc.
FGOV6	>q8f< *The supplier and your company have periodic discussions on how you can focus your goals in this partnership.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r= Respondent volunteers not sure/depends/cannot answer, etc.
FGOV7	>q8g< *Any changes in the contractual agreement are communicated frequently.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r= Respondent volunteers not sure/depends/cannot answer, etc.
>q9_intr< Still thinking of the same supplier and the **<u>formal</u>** and **<u>professional</u>** aspects of your relationship, to what extent to you agree or disagree with the following statements. Just to remind you we want to know if you *strongly disagree, somewhat disagree, are neutral, do you somewhat agree, or strongly agree.*		
FGOV8	>q9a< *Your company monitors the delivery performance of the supplier for the goals listed in the contract.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r= Respondent volunteers not sure/depends/cannot answer, etc.
FGOV9	>q9b<	1= strongly disagree

	Your company offers the supplier non-financial incentives for achieving goals listed in the contract. Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV10	>q9c< *Your company offers the supplier financial incentives for achieving goals listed in the contract.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV11	>q9d< *Your company imposes penalties on the supplier when the terms of the contract are not fulfilled.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV12	>q9e< *Your company monitors how each party is performing as previously defined in your contracts.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV13	>q9f< *Your company monitors the execution of responsibilities by each party as previously defined in your contracts.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
>q10_intr< Still thinking of the same supplier and the **formal** and **professional** aspects of your relationship, and thinking about negotiating with this supplier.		

FGOV14	>q10a< *It is easy to negotiate with the supplier over sharing the burden of unexpected costs, such as engineering changes.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV15	>q10b< *You have quick negotiations with the supplier over sharing the burden of unexpected costs, such as engineering changes.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV16	>q10c< *It is easy to negotiate with the supplier over sharing the burden of unexpected costs, such as manufacturing changes.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV17	>q10d< *You have quick negotiations with the supplier over sharing the burden of unexpected costs, such as manufacturing changes.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV18	>q10e< *For managing major conflicts, your company communicates with the supplier in person.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV19	>q10f<	1= strongly disagree

	You have scheduled regular interactions with the supplier for resolving conflicts with regard to day-to-day operations. Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV20	>q10g< *In case of crucial issues, your company seeks help from a mutually agreed upon third party.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV21	>q10h< *In case of major disagreements, your company uses a mutually agreed upon arbitrator.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV22	>q10i< *Your supplier contract specifies a resolution mechanism for disputes.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV23	>q10j< *If disputes arise, you generally adhere to the resolution mechanisms specified in your contract.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV24	>q11a< *In dealing with the supplier, your contracts define a strategy in case of an unplanned event.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree

		r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV25	>q11b< *Your company requires non-disclosure agreements when sourcing sensitive information.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV26	>q11c< *In case of an unplanned event, you enforce the terms stated in your contract.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FGOV27	>q11d< *Your company requires non-disclosure agreements when sourcing proprietary work.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
>q12_intr< Please tell us the extent to which you agree or disagree with these statements about communications between your company and the supplier. Please keep in mind both the **informal** or **social** aspects of your relationship, where informal means social context or social aspects of the buyer-supplier relationship.		
SOC1	>q12a< *The supplier and your company share updated information about the product.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SOC2	>q12b< *You and your supplier talk about your outside of work interests.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat	1= strongly disagree 2= somewhat disagree 3= neutral

	agree, or strongly agree?	4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SOC3	>q12c< *You and your supplier have meetings that are purely social.* Interviewer, if asked examples include: playing golf, meeting for lunch, fishing, etc. Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SOC4	>q12d< *You and your supplier talk about things other than product purchasing.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
TRUST1	>q13a< *You know that when the supplier promises you something, they'll come through for you.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
TRUST2	>q13b< *You are not hesitant to deal with this supplier even when the specifications are vague.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
TRUST3	>q13c< *Your company and the supplier are both enthusiastic about pursuing the success of this relationship.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not

		sure/depends/cannot answer, etc.
TRUST4	>q13d< *You know that the supplier will deal with you fairly.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
TRUST5	>q13e< *The supplier does not use the opportunities that arise to profit at your expense.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
TRUST6	>q13f< *You can rely on the supplier to keep the promises they make.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
TRUST7	>q13g< *The supplier is evenhanded in their negotiations with you.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
TRUST8	>q13h< *You expect the supplier to tell you the truth.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
>q14_intr< To what extent do you agree or disagree with the following statements keeping in mind the **informal** or **social** aspects of your		

relationship with your supplier?		
SHARED1	>q14a< *Both parties are committed to the improvements that may benefit the relationship as a whole.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SHARED2	>q14b< *Both parties have the same ambition.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SHARED3	>q14c< *Both parties have the same vision.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SHARED4	>q14d< *In most aspects of the relationship the parties are jointly responsible for getting things done.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SHARED5	>q14e< *Your position on running a business is very compatible with the supplier's position.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
SHARED6	>q14f< *You and the supplier share the same basic business values.*	1= strongly disagree 2= somewhat disagree

	Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
LOYAL1	>q15a< *You would like to work with this supplier for a long time.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
LOYAL2	>q15b< *You would rather stay with this supplier than change to another supplier.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
LOYAL3	>q15c< *You are quite proud to tell others that you work with this supplier.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
LOYAL4	>q15d< *You feel a strong sense of loyalty to this supplier.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVIR_CRUCIAL	>q16a< How crucial are environmental issues to your company when you collaborate with your supplier formally and informally?	1=not crucial 5=very crucial r= Respondent volunteers not sure/depends/cannot

		answer, etc.
ENV1	>q16b1< *You cooperate with your supplier to achieve environmental objectives.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENV2	>q16b2< *You encourage your supplier to develop new source reduction strategies.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENV3	>q16b3< *You cooperate with your supplier to improve their waste reduction initiatives.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENV4	>q16b4< *You work with your supplier for cleaner production.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENV5	>q16b5< *You collaborate with your supplier to provide materials, equipment, parts or services that support your environmental goals.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENV6	>q16b6< *You provide your supplier with design specification that include environment*	1= strongly disagree 2= somewhat disagree

	requirement for purchased items. Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER1	>q16b7< *The supplier has helped reduce your carbon emissions.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER2	>q16b8< *The supplier has helped reduce your manufacturing waste.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER3	>q16b9< *The supplier has helped decrease the consumption of toxic material.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER4	>q16b10< *The supplier has helped decrease the frequency of environmental accidents.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER5	>q16b11< *The supplier has helped increase your energy savings due to conservation and efficiency.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree

		r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER6	>q16b12< *The supplier has helped your company in complying with environmental regulations.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER7	>q16b13< *The supplier has helped your company in limiting environmental impact beyond compliance.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER8	>q16b14< *The supplier has helped your company in preventing and mitigating environmental crises.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
ENVPER9	>q16b15< *The supplier has helped your company in educating the employees and the public about the environment.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
>q17intr< Keeping in mind the **<u>SUPPLY CHAIN PERFORMANCE ASPECTS</u>** of your relationship with your supplier to what extent do you agree or disagree with the following statements.		
COST	>q17a1< *Your supplier has helped lower the total cost of your products.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree

		5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
QUALITY	>q17a2< *Your supplier has helped improve your product quality.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
DELIVERY	>q17a3< *Your supplier has helped increase the reliability of your product delivery time.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
FLEXIBILITY	>q17a4< *Your supplier has helped improve your manufacturing flexibility.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
INNOV1	>q17a5< *Your supplier has helped improve your process design.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
INNOV2	>q17a6< *Your supplier has helped shorten your new product development life cycles.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot

		answer, etc.
INNOV3	>q17a7< *Your supplier has helped improve your capability of developing new products and features.* Do you strongly disagree, somewhat disagree, are you neutral, do you somewhat agree, or strongly agree?	1= strongly disagree 2= somewhat disagree 3= neutral 4= somewhat agree 5= strongly agree r=Respondent volunteers not sure/depends/cannot answer, etc.
Section III		
GROSS SALES	>q24< *What are your company's annual gross sales dollars in U.S. dollars?* Is it less than one million, between 1 million and 5 million, between five and ten million, between 10 and 50 million, between 50 million and 100 million, between 100 million and 500 million, between 500 million and one billion, or more than one billion dollars? Interviewer: you can stop reading when the respondent answers. Only if Respondent says it varies over time ask for sales for 2014.	1= Less than $1 million 2= $1 million to less than $5 million 3= $5 million to less than $10 million 4= $10 million to less than $50 million 5= $50 million to less than $100 million 6= $100 million to less than $500 million 7= $500 million to less than $1 billion 8= more than $1 billion d= Respondent cannot or will not provide an answer
#EMPLOYEES	>q27< *Approximately, how many employees work in your company?*	1-9997= Enter number r= not sure how to answer

APPENDIX B

IRB APPROVAL FORMS

September 2, 2015

Nisha Kulangara
Dr. Edmund Prater
Info. Systems & Operations Management
The University of Texas at Arlington
Box 19437

IRB No.:	**2014-0796**
Title:	*Investigation of supply chain governance mechanisms and assessing their effect on supply chain performance in the manufacturing industry*
Approval Date:	**September 1, 2015**
Expiration Date:	September 12, 2016

EXPEDITED CONTINUING REVIEW APPROVAL

The Chair (or designee) of the University of Texas at Arlington Institutional Review Board (IRB) reviewed and approved the status of *continuing / no changes* for the above study for a period not to exceed one year, effective **September 12, 2015** [45 CFR 46.109(e)]. In order for the research to continue, Continuing (annual) Review must be completed within the month preceding the date of approval indicated above. A reminder notice will be forwarded to the attention of the Principal Investigator (PI) at a time sufficient enough to allow for the continuation review to occur. **The approved number of participants for this study is 500 (Do not exceed without prior IRB approval)**

MODIFICATION TO AN APPROVED PROTOCOL:

Pursuant to Title 45 CFR 46.103(b)(4)(iii), investigators are required to, "promptly report to the IRB ***any*** proposed changes in the research activity, and to ensure that such changes in approved research, during the period for which IRB approval has already been given, are **not initiated without prior IRB review and approval** except when necessary to eliminate apparent immediate hazards to the subject." Modifications include but are not limited to: Changes in protocol personnel, number of approved participants, and/or updates to the protocol procedures or instruments and must be submitted via the electronic submission system. Failure to obtain approval for modifications is considered an issue of non-compliance and will be subject to review and deliberation by the IRB which could result in the suspension/termination of the protocol.

ANNUAL CONTINUING REVIEW:

Continuing review of the protocol serves as a progress report and provides the researcher with an opportunity to make updates to the originally approved protocol. Failure to obtain approval for a continuing review will result in automatic *expiration of the protocol* all activities involving human subjects must cease immediately. The research will not be allowed to commence by any protocol personnel until a new protocol has been submitted, reviewed, and approved by the IRB. Per federal regulations and UTA's Federalwide Assurance (FWA), there are no exceptions and no extensions of approval granted by the IRB. The continuation of study procedures after the expiration of a protocol is considered to be an issue of non-compliance and a violation of federal regulations. Such violations could result in termination of external and University funding and/or disciplinary action.

ADVERSE EVENTS:
Please be advised that as the principal investigator, you are required to report local adverse (unanticipated) events to The UT Arlington Office of Research Administration; Regulatory Services within 24 hours of the occurrence or upon acknowledgement of the occurrence.

TRAINING
All investigators and key personnel identified in the protocol must have filed an annual Conflict of Interest Disclosure (COI) and have documented *Human Subjects Protection (HSP)* training on file with this office prior to protocol approval. HSP training certificates are valid for 2 years from completion date.

COLLABORATION:
If applicable, approval by the appropriate authority at a collaborating facility is required prior to subject enrollment. If the collaborating facility is *engaged in the research*, an OHRP approved Federalwide Assurance (FWA) may be required for the facility (prior to their participation in research-related activities). To determine whether the collaborating facility is engaged in research, go to: http://www.hhs.gov/ohrp/humansubjects/assurance/engage.htm

CONTACT FOR QUESTIONS:
The UT Arlington Office of Research Administration; Regulatory Services appreciates your continuing commitment to the protection of human research subjects. Should you have questions or require further assistance, please contact Alyson Stearns at astearns@uta.edu or Regulatory Services at regulatoryservices@uta.edu or 817-272-2105.

Sincerely,

Christopher Ray

Digitally signed by Christopher Ray
DN: postalCode=76019, o=The University of Texas at Arlington, street=701 South Nedderman Drive, st=TX, l=Arlington, c=US, cn=Christopher Ray, email=chrisray@uta.edu
Date: 2015.09.02 14:11:11 -05'00'

Christopher Ray, PhD, ATC, CSCS
Associate Professor, Department of Kinesiology
UT Arlington IRB Chair

APPENDIX C

LETTER TO POTENTIAL RESPONDENTS

Dear *Supply Chain/Purchasing Professional,*

The University of Texas Arlington and York University, Toronto, are undertaking a study to identify and benchmark effective formal and relational governance mechanisms in outsourcing relationships. This research is conducted with select group of supply chain/purchasing professionals in the North American manufacturing industry.

As a purchasing/supply chain professional your input is highly valued. Your responses will provide us deeper insight on how formal, relational and environmental governance practices are implemented by US and Canadian firms. We hope to discern how governance choices impact a firm's performance.

We will soon follow up with a brief phone call to see whether you are willing to participate in this research. Completing the survey via phone will take about 25 minutes. If you agree to participate we will send you copy of the survey results. The results will enable you to benchmark your practices and performance against those of other manufacturing firms. Those insights may allow you to improve existing or establish new best practices when collaborating with suppliers.

Your responses will be kept strictly confidential and used only for scholarly purposes. No individual responses will be reported or published as a result of this research; data will be used to establish underlying relationships ad be reported only in summary form (e.g., means, variances, etc.). To protect your confidentiality, the surveys will not require information that will personally identify you. Your participation is strictly voluntary.

Thank you in advance for your help with this research project. If you have any questions please call us at (817) 908 0924 or email me at nisha.kulangara@mavs.uta.edu.

Sincerely,

Nisha Kulangara

Nisha Paul Kulangara
Lead Researcher
University of Texas at Arlington
Department of Information Systems and Operations Management
P.O. Box 19437
Arlington, TX 76019-0437
nisha.kulangara@mavs.uta.edu

APPENDIX D

CONTENT ADEQUACY TEST RESULTS

Factors	Items	Loadings			
		Factor 1	Factor 2	Factor 3	Factor 4
Communication Practices	The supplier gives me information about the overall progress of tasks	0.711			
	We have periodic reviews to discuss the overall progress of tasks	0.783			
	The supplier and I clarify who will perform each task	0.794			
	The supplier and I discuss our long term plans	0.712			
	When we communicate, we talk about current tasks and job responsibilities	0.791			
	I discuss with the supplier the strategic fit of this contractual relationship	0.62			
	Supplier provides us with any updates in cost structure information for the component we purchase from them	0.703			
	I talk to the supplier about future plans for this business relationship	0.616			
	We have periodic discussions on how we can focus our goals	0.663			
	Any changes in the contractual agreement are communicated frequently	0.661			
Performance monitoring	My company monitors the delivery performance of the supplier for the goals listed in the contract		0.587		
	My company offers the supplier incentives (in the form of prestige or status like best supplier of the month) for achieving goals listed in the contracts		0.792		

	My company offers the supplier financial incentives (like profit sharing, price cuts, more business) for achieving goals listed in the contracts	0.759		
	My company monitors how each party is performing as previously defined in our contracts	0.708		
	My company monitors the execution of responsibilities by each party as previously defined in our contracts	0.716		
Conflict Management	It is easy to negotiate with the supplier over sharing the burden of unexpected costs, such as engineering changes		0.891	
	We have quick negotiations over sharing the burden of unexpected costs, such as engineering changes		0.881	
	It is easy to negotiate with the supplier over sharing the burden of unexpected costs, such as manufacturing changes		0.863	
	We have quick negotiations over sharing the burden of unexpected costs, such as manufacturing changes		0.841	
	For managing major conflicts, my company communicates with the supplier in person			
	We have scheduled regular interactions for resolving issues between the buyer and supplier			
Contingency Practices	In case of crucial issues, my company seeks help from a mutually agreed upon third party			
	In case of major disagreements, my company uses a mutually agreed upon arbitrator			
	For managing conflict with regard to daily operations, my company communicates with the supplier electronically			
	In dealing with the supplier, our contracts define a strategy in case of an unplanned event (Example: Act of God, Catastrophic event, contract termination)			0.583
	My company imposes penalties on the supplier when the terms of the contract are not fulfilled			
	My company requires non-disclosure agreements when sourcing sensitive information			0.708

In case of an unplanned event (Example: Act of God, Catastrophic event, contract termination), we enforce the terms stated in our contract	0.565
My company requires non-disclosure agreements when sourcing proprietary work	0.752