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# BUILDING IDENTIFICATION TO CO-CREATE SUPPLY CHAIN INNOVATION

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## Abstract

*Supply chain identification is a process of self-categorization which can encourage firms to make more efforts to achieve supply chain goals. It is important for firms to co-create value with customers/suppliers while pursuing supply chain innovation. However, few studies have investigated identification issues from the business-to-business aspects. Therefore, the purpose of this study is to investigate the identification generation among supply chain members, especially focus on the exchange mechanisms of identification. Based on these mechanisms, we develop a research model to explain the influences of the exchange mechanisms on information sharing and supply chain innovation. This empirical study investigates the top 1000 Taiwanese manufacturers issued by Commonwealth magazine of Taiwan in 2012. The results show: (1) The exchange mechanisms, including trust, commitment, communication, and reciprocal relationship have significant effects on information sharing. (2) Information sharing in the value co-creating process has a significant effect on supply chain innovation. Implications are provided based on the results.*

*Keywords: The Exchange Mechanisms of Identification, Value Co-creation, Information Sharing, Supply Chain Innovation.*

# 1 INTRODUCTION

Increasing specialization and demands for shorter product life cycle make it difficult for a single firm to build the infrastructure for new products and services and to quickly bring them to market. In recent years, organizations are constantly seeking to improve core competencies and gain competitive advantage in a diverse and ever-changing marketplace. The proportion of the service sector in GDP increased even in manufacture industry. Service is a core process of economic exchange. Value co-creation, service dominant logic's conceptualization, proposes inviting customer to participate in production process (Vargo & Lusch 2008). It can create new opportunities for configuring all the resources that are necessary to solve a given problem or create new service value for customers. Supply chain network thus becomes a major source of innovation. It is important to understand how to co-create innovation value with one another in supply chain context. Supply chain innovation is one of the important values of co-creation and building supply chain identification can enhance the value co-creating processes.

Building identification is an important factor to maintain relationship. Identification is a perceived oneness with an organization (Dutton et al. 1994). Inter-organizational level of identification is an especially important part in supply chain because there are usually many inter-organizational transactions involving sub components or raw materials in supply chain. To collaborate to achieve mutual benefits, it is important to build supply chain identity, which can create valuable resources and lead to superior supply chain value creation. However, there are a few previous researches discussed the inter-organizational level of identification. This study extends the inherently individual-level concept of identification to the inter-organizational level. The exchange model of goal integration can facilitate organizational identification (Barrett 1970). The exchange model is that partners exchange their time and efforts for incentives provided by organization. Many exchange activities occurs in supply chain, so this study focuses on the exchange model of identification. According to Barrett's (1970) definition of the exchange model, we further proposed four exchange mechanisms of identification here — trust, commitment, communication and reciprocal relationship.

In order to be successful value co-creation, sharing information with each other is an essential process (Lengnick-Hall 1996). When cooperation occurs, organizations often want to make sure projects go smoothly. The more interactions they get, the more information they share with each other. Information sharing can make relevant, accurate and timely information available to the decision-makers (Lee et al. 2000). It involves with the critical information conveying to partners. Information sharing is a good way for them to collaborate and co-creating value. Mutual value is derived from information sharing. It is an important issue for companies to facilitate information sharing and maintain a long-term relationship with partners.

Therefore, the purpose of this study is to examine whether the exchange mechanisms of identification have influence on information sharing with trading members or not. We want to explain the relationship between supply chain identification and information sharing, and investigate the impact of information sharing on supply chain innovation.

## 2 CONCEPTUAL BACKGROUNDS

### 2.1 Value co-creation & Information Sharing

Value co-creation is a central concept in service dominant logic which suggests to invite the customers to participate in production processes (Vargo & Lusch 2008). The role of customers changes from a receiver of goods to a source of business and then to a co-producer of value (Vargo & Lusch 2006, 2008). Prahalad and Ramaswamy (2004) took a more holistic approach to describe the fundamental building models of value co-creation practices: dialog, access, risk management and transparency

(DART). Grover and Kohli (2012) proposed the co-creating value through four layers: assets, knowledge-sharing, complementary capability, and governance layer. The knowledge sharing layer involves the sharing of information and expertise that can inform decision-making and strategies for co-creating new or better products (Dyer & Hatch 2006). Knowledge sharing is generally viewed as arising in part from information sharing, so this study frames the knowledge-sharing to information sharing layer based on the co-creating value model.

Information sharing refers to the extent that critical information is conveyed to an organization's partners (Mohr & Spekman 1994). The purpose of information sharing is to make relevant, accurate and timely information available to the decision-makers (Lee et al. 2000). Supply chain members often have different critical and private information which is often not shared with others; therefore, asymmetric information may occur in supply chains (Lee et al. 2000). To resolve this problem, organizations often share information, such as the cost structure and production and engineering options, to their supply chain partners. This can help them realize constraints, coordinate actions, and make appropriate adjustments in their preferences for new products (Klein & Rai 2009).

## **2.2 Supply Chain Identification**

Organizational identification is conceptualized as an individual's perception of oneness or belongingness with the organization and their experience of the organization's successes and failures as their own (Ashforth & Mael 1989). When an individual forms a psychological connection with a particular organization by incorporating the attributes that he or she believes define the organization into his or her own self-concept, organizational identification occurs (Dutton et al. 1994). The literature of identifications in organizations is derived from social identity theory. It has been used as a basis for understanding an individual's psychological attachment to an organization (Ashforth & Mael 1989).

Ireland and Webb (2007) propose that identification can build and sustain partnership which is a means to strengthen relationships in a supply chain. According to Ireland and Webb's (2007) research, this study extends the inherently individual-level concept of organizational identification to the inter-organizational level. When business identify more strongly with the partnership in supply chain, their beliefs about the partnership become self-defining (Ashforth & Mael 1989). We define the supply chain identification as the perception of oneness with and belongingness to the partnership in supply chain (Ashforth & Mael 1989).

Barrett (1970) indicates that integrating individual goals and organizational objectives can build organizational identification. The exchange model of integration has been used by organizations to improve identification. Exchange activities are important part in firms' cooperation. There are many exchange behaviors occurs in supply chain. Using Barrett's (1970) definition as a basis for further exploration of identification, our study provides the empirical test of supply chain identification at the firm level. We focus on the exchange mechanisms which should result in different degrees of the integration of goals. We then describe the exchange models of identification mechanisms.

## **2.3 The Exchange Mechanisms**

The exchange mechanisms are those in which the organization offers the individual incentives presumed to be related to his personal goals and, in return, the individual devotes some of his time and energy to helping the organization achieve its objectives (Barrett 1970). The exchange theory argues that individuals or corporate groups seek to maximize their profits while minimizing costs, they often interact for reward or with the expectation of a reward from their interaction with others (Homans 1958). Given Barrett's (1970) theoretical foundation, we explore four exchange mechanisms here — trust, commitment, communication and reciprocal relationship.

Trust is defined as the expectation that the exchange partner seeks mutually beneficial gains, and is able to fulfill responsibilities reliably and confidently (Morgan & Hunt 1994). The organization is often willing to rely on their exchange partner based on trust (Moorman et al. 1993). Lewicki and Bunker (1996) have developed three trust-building processes: calculative processes, predictive processes, and identification processes. Calculative processes refer to the costs and benefits of behavior are rationally compared; predictive processes involve individuals to predict the other's behavior; and identification processes refer to one party identifies with the other party's desires and intentions (Lewicki & Bunker 1996). In this study, we focus on the identification basis of trust development.

Commitment is one of the key concepts of the social exchange theory (Blau 1964). Morgan and Hunt (1994) defined commitment as the belief of an exchange partner that an ongoing relationship with another firm is so important as to deserve maximum efforts at maintaining it. Commitment is viewed as a critical ingredient for building relationships which reflects that the exchange partners are willing to take a long-term orientation of their relationship (Ramasamy et al. 2006). When organizations emphasis on the partnerships, they often try to make the relationship more stable even if they need to make any required sacrifices (Anderson & Weitz 1992). Both suppliers and buyers in supply chain can benefit from the committed relationship (Anderson & Weitz 1992).

Communication refers to the formal and informal sharing of meaningful, timely information between firms (Anderson & Narus 1990). Homans (1958) indicated that it is essential to maintain high communication levels in exchange parties. When trading parties frequently transmit any information, it will improve their exchange activities and reduce conflict (Siguaw et al. 2003). Communication is an important part in the development of supply chain management. When providing products and services, effective communication can help organizations accurately identify mutual demands, recognize mutual benefits, and promote a common understanding about the trading relationships and environment (Shin et al. 2012).

According to social exchange theory, relationships are formed and maintained because the partner firms offer a mutually contingent exchange benefits to one another over time (Gouldner 1960). Bensaou (1997) indicated that reciprocal relationship is the level of fairness that the participating firms perceive about sharing risk, burdens, and benefits. Developing reciprocal relationships is providing favors or making allowances for each other and enhancing cooperation (Villena et al. 2011). Organizations tend to reciprocate helping behaviors and consider the needs of the partner firms (Blau 1964, Villena et al. 2011). When organizations perceive that risk sharing and profit distribution are reciprocal, each partner will maintain the cooperative relationship (Kim et al. 2010).

## **2.4 Supply Chain Innovation**

Innovation implies a new way of doing something to system, process, policy, product or service, that is, the adoption of an idea or behavior (Zaltman et al. 1973). Drucker (1985) viewed innovation as the tool or instrument used by organizations to exploit change as an opportunity, which can help the firm improve the production. Hagedoorn and Cloudt (2003) indicated that innovation is a composite construct, including new product, new project, new schedule, and new processes; that is, innovation can lead to a result of renewal and improvement efforts. Innovative firms are often willing to forgo old habits, and more receptivity to try new ideas (Panayides & Venus Lun 2009).

Innovation in supply chain involves many changes, such as product, process, and service; it can reduce cost, improve end-of-chain customer satisfaction and can even enhance efficiency (Roy et al. 2004). Panayides and Venus Lun (2009) proposed innovative firms explore new opportunities proactively rather than exploit current strengths, it will enhance their operational performance. Innovation facilitates supply chain integration in supply chain management and provides links with chain members to improve the supply chain performance (Chang et al. 2012). Bello et al. (2004) indicated that supply chain innovations combine new logistic technologies and marketing procedures to improve operational efficiency and enhance service effectiveness. It enables the firm to leverage the

capabilities of innovative partners and offer a greater variety of valuable, rare, inimitable and differentiated products (Hagedoorn & Cloudt 2003). With high level of innovative ability, it is easy for companies to face new challenges and cope with difficulties (Hagedoorn & Cloudt 2003). Therefore, firms will possess better respond to environmental changes because innovation can help them to gain competitive advantage in market (Corsten et al. 2011).

### **3 THEORETICAL FRAMEWORK AND HYPOTHESES**

#### **3.1 Theoretical framework**

This study proposes a research framework to investigate the influences of the exchange mechanisms of identification on information sharing and supply chain innovation. First, we assume that the exchange mechanisms of identification positively influence information sharing. Second, information sharing positively influences the supply chain innovation.

#### **3.2 Research Hypotheses**

Trust is an essential ingredient for successful exchange relationships which assures members will fulfill both current and future expectations of behavior (Coleman 1988). It makes information sharing with exchange party more open and honest, and mitigates the information asymmetry (Dyer & Chu 2003). Trust facilitates the process of identification between chain members; one party identifies with the other party's desires and intentions make cooperation easily (Lewicki & Bunker 1996). Cai et al. (2010) indicated that firm's trust in their supplier have effect on their activities of information sharing because the exchange partners have sufficient confidence that the other party will use the important information properly based on trust. Trust in trading partners contributes to superior information sharing and improves the ability of coordination and joint efforts to minimize inefficiencies (Dyer & Chu 2003). Hence, we propose the following hypothesis:

*H1: Trust is positively associated with information sharing.*

Organizations often make effort on maintaining the relationships with their partners because they desire a long-term relationship (Morgan & Hunt 1994). When firms commit to build long-term relationship with chain members, it represents firms value the relationship and identify with the partners (Anderson & Weitz 1992). Base on identification, firms are willing to make some sacrifices to commit to a stable relationship (Anderson & Weitz 1992). Malhotra et al. (2005) proposed that information sharing has multiple levels depending on the depth of the supply chain committed relationship. Organizations seek to building long-term and positive partnership and the willingness to put in the effort to ensure long-term continuance (Ramasamy et al. 2006). Arnold et al. (2010) provide empirical support for the importance of commitment indicating that committed to a supply chain partner increases, and thereby, the level of information sharing will increase. Hence, we propose the following hypothesis:

*H2: Commitment is positively associated with information sharing.*

Communication plays an important role in exchange relationship. It provides a balanced, two-way, multilevel contacts and message services link between the supply chain partners (Cao & Zhang 2011). When there are more effective communication between trading partners, information sharing increases, and partners get to know each other better, which then fosters mutual identification (Dutton et al. 1994). Coleman (1988) noted that enhancing the degree of communication within the network will facilitate the exchange of information. Ramasamy et al. (2006) indicate that the level of communication has a positive impact on knowledge transfer. Hence, we propose the following hypothesis:

*H3: Communication is positively associated with information sharing.*

Chiu et al. (2006) noted that the exchange partners perceived that their exchange activities are fair and beneficial for each other. Developing a reciprocal relationship can provide a kind of informal control within the trading network; furthermore, it can reduce uncertainty and trading risk (Erridge & Greer 2002). Building reciprocal relationship is an element of identification. Blau (1964) indicated that firms identify with partners when they tend to reciprocate more. Reciprocity is one of the factors that drive the exchange information (Chiu et al. 2006). Villena et al. (2011) proposed that there's a reciprocal relationship between the suppliers and buyers will facilitate the exchange of know-how. Hence, we propose the following hypothesis:

*H4: Reciprocal relationship is positively associated with information sharing.*

Innovation is the degree of firms introducing inventions into the market, which implies more willingness to face new challenges (Hagedoorn & Cloudt 2003). Supply chain members often share information with each other to reduce the bullwhip effect (Lee et al. 2000). Constant information sharing in supply chain helps firms to learn how customer needs evolve during the innovative process. Information sharing during design can not only improve product quality but also support more rapid product innovation (Cannon & Perreault 1999). Information exchange is beneficial to firms' innovation because of information resulting from embedded buyer-seller tie (Chang et al. 2012). It is an important source of ideas for innovation because information exchange between buyer and seller can provide relevant knowledge for innovation (Walter & Ritter 2003). Proir researches indicated that higher degree of diverse information sharing between firms leads to the higher degree of innovation (Chang et al. 2012). Hence, we propose the following hypothesis:

*H5: Information sharing positively associated with innovation.*

## **4 RESEARCH METHODOLOGY**

### **4.1 Data Collection**

The empirical research for this study was undertaken by questionnaire survey. The subjects of this study come from the purchase department managers in manufacturing companies. The study delivered 993 questionnaires to selected companies which are the top 1000 Taiwanese manufacturers issued by Commonwealth magazine of Taiwan in 2012. The valid receiving questionnaires are 193, and the valid receiving rate is about 19.44%.

### **4.2 Measures**

This study adopted survey measurement items from past studies based on relevant literature. We use multiple item measures and all constructs are measured by the five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). These measurement items and definitions are adapted from the past studies (see Appendix 1). We then described the instrument used for the measurement of various research variables.

Trust was measured using a six-item scale adapted from Ramasamy et al. (2006) and Corsten et al. (2011). This measure describes trust as the willingness to rely on a trading partner in whom one has confidence (Moorman et al. 1993). A four-item scale is used to measure commitment adapted from Nyaga et al. (2010). The chosen items assess the belief of a trading partner that an ongoing relationship with another firm is so important as to deserve maximum efforts at maintaining it (Morgan & Hunt 1994). Communication was measured using the scales developed and validated by Cao and Zhang (2011). In line with the literature of Cao and Zhang (2011), this measure used in this study asked the contact and message transmission process among supply chain partners in terms of frequency, direction, mode, and influence strategy. Reciprocal relationship was measured with a three-item scale adapted from Kim et al. (2010). This measure used to assess the extent of reciprocity between partners; that is, the degree of fairness that the participating companies perceive about sharing

risk, burdens, and benefits (Bensaou 1997). Previous research measures information sharing in a variety of ways. Research indicates that firm shares different types of information with their partner, such as inventory planning, cost structures, and decision-making processes (Klein & Rai 2009). We define information sharing as the diversity of the firm sharing information between supply chain partners, and a four-item scale is used to measure it adapted from Malhotra et al. (2005) and Arnold et al. (2010). A six-item scale is used to measure supply chain innovation adapted from Sadikoglu & Zehir (2010) and Panayides & Venus Lun (2009). This measure assesses the extent of adoption new ideas or behavior and introduce new product into market (Zaltman et al. 1973).

## **5 RESULTS**

This study conduct measure validation and model testing using SmartPLS version 2.0. Bootstrap re-sampling procedure was performed to assess the statistical significance of the path coefficients.

### **5.1 Measurement Model**

Construct reliability is measured using Cronbach's alpha and composite reliability (CR). Reliability is tested by internal consistency (0.7 being generally required). Two items of communication is discarded on reliability grounds. The other measurement scales are found to have satisfactory internal consistency. Cronbach's alphas of all constructs range from 0.811 to 0.917, and CRs range from 0.884 to 0.939. All scores were over the cutoff of 0.7 (Fornell & Larcker 1981, Nunnally & Bernstein 1994). Convergent validity is assessed by the factor loadings (0.7 being generally required) and the average variance extracted (AVE) (0.5 or greater being required). Because we have deleted two items of communication while testing reliability, the factor loadings of the other items are larger than the recommended score of 0.7 (Johnson et al. 2006). The AVEs range between 0.656 and 0.837, and all met the accepted criterion of 0.5 (Jöreskog & Sörbom 1981) (see Table 1). Therefore, the measurement items in this study meet the requirements of convergence validity. Discriminant validity is measured using the square root of AVE for a construct was larger than its correlation with other constructs (Chin 1998). The diagonal (the square root of AVE) elements are shown to be larger than off-diagonal elements in the latent variable correlation matrix (see Table 2). Thus, the questionnaire of this study was found to demonstrate adequate discriminant validity.

### **5.2 Structural Model**

This study examined structural model and hypotheses to evaluate the explanatory power of the constructs, path coefficients and the significance of the paths with SmartPLS 2.0. The results of the models are shown in Figure 1. 51.4% of the variance in information sharing and 35.8% of the variance in innovation can be explained by the variables in this research model. The bootstrap method is used to evaluate the path coefficients through re-sample. All proposed path are significant. The path coefficients from four dimensions of the exchange mechanisms to information sharing are supported, as trust is 0.282 ( $t = 4.733$ ,  $p < 0.001$ ), commitment is 0.165 ( $t = 2.786$ ,  $p < 0.01$ ), communication is 0.347 ( $t = 6.948$ ,  $p < 0.001$ ), and reciprocal relationship is 0.131 ( $t = 2.076$ ,  $p < 0.05$ ). The path coefficient from information sharing to innovation is supported, as information sharing is 0.598 ( $t = 13.324$ ,  $p < 0.001$ ). Therefore, hypotheses from 1 to 5 are valid.



Construct	Code of Construct	AVE	Composite Reliability	Cronbach's Alpha
Trust	TR	0.647	0.917	0.891
Commitment	MT	0.656	0.884	0.824
Communication	CO	0.728	0.889	0.811
Reciprocal relationship	RC	0.837	0.939	0.903
Information sharing	IS	0.711	0.908	0.864
Innovation	IN	0.708	0.936	0.917

Table 1. The results of the internal consistency and convergent validity

	TR	MT	CO	RC	IS	IN
TR	0.805					
MT	0.455	0.810				
CO	0.433	0.326	0.742			
RC	0.565	0.533	0.451	0.915		
IS	0.581	0.476	0.582	0.535	0.843	
IN	0.405	0.277	0.495	0.438	0.598	0.841

Table 2. The results of discriminant validity

Note: the main diagonal shows the square root of the AVE

#### The exchange mechanisms

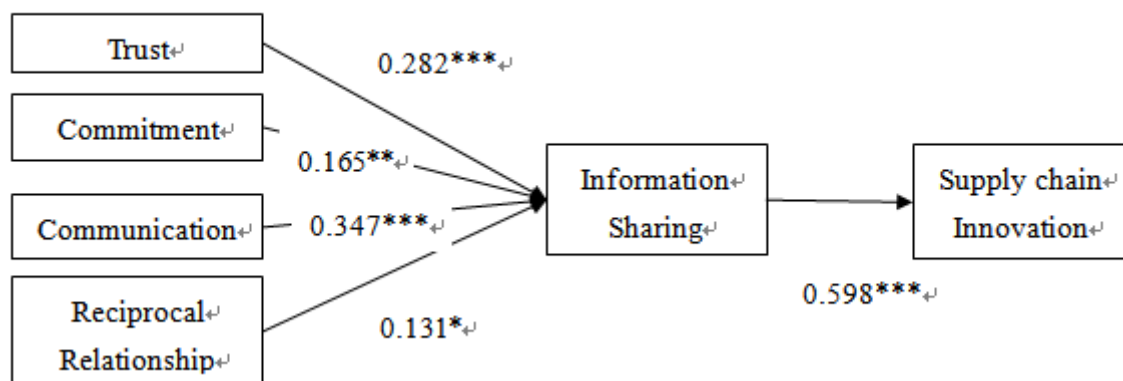


Figure 1. The results of PLS model

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

## 6 CONCLUSION

In this study, we extend the organizational identification concept in individual-level to the inter-organizational level. We found that the exchange mechanisms of identification, including trust, commitment, communication, and reciprocal relationship, have significantly positive effects on information sharing. The four types of exchange mechanisms can explain 51.4% of variance in information sharing. This is consistent with previous studies (Ramasamy et al. 2006, Arnold et al. 2010, Cai et al. 2010, Villena et al. 2011). This may be because the firm often relies on their trading partners in supply chain. They have confidence in chain members' ability to take the right steps. They trust chain members will achieve both current and future expectations. There existed reciprocal

relationships between the firm and supply chain members. The firm often tried to maintain the relationships with chain members. A long-term relationship will be beneficial for performance, so the firm is more willing to commit to building relationships. There are frequent contacts and message between chain members and the degree of communication is high in the exchange process. This can improve the level of sharing of different types of information which will result in greater opportunities for co-creation value.

In light of information sharing's influence on supply chain innovation, this study found the analytical result consists with what we expect. The model can account for 59.8% of variance in supply chain innovation. The results show that information sharing has a positive effect on innovation. Our findings demonstrate that firms will try to share different types of information to promote the supply chain innovation. The bullwhip effect often occurs in supply chain because members do not share their private information with each other. Asymmetric information occurs in supply chains. Orders sent to the manufacturer and supplier create larger variance than the sales to the end customer. The bullwhip effect leads to low utilization of the distribution channel. In order to resolve the problem, firms seek to share different types of information, such as ordering information, shipping information, and transportation schedule. While the level of information sharing increases, it helps the ability of innovation. The more they have innovative abilities, the more they have the ability to cope with new challenges. It promotes the co-creation value and leads to a mutual beneficial situation.

Identification plays an increasingly important role in supply chain. The findings of this study provide evidence that the exchange mechanisms of identification do effect on the information sharing between chain members. In supply chain, firm should trust their trading parties. Committed to a long-term, reciprocal relationship, and develop a multilevel communication channel to promote the degree of information sharing. With the growing level of information sharing, the supply chain members have ability to innovation. This study broadens the academic literature on supply chain identification. Previous research on identification has a few applied the inherently individual-level concept to the inter-organizational level. We extend the identification on firm level. This study empirically examined the effect of information sharing on supply chain innovation. Our findings provide the chain members a direction to build exchange mechanism to improve the degree of information sharing and facilitate the innovation. There are a number of limitations in this study. First, the data collection of this study is the purchase department managers in manufacturing companies. Future research should investigate different departments or industries. Second, this study measures four mechanisms of the exchange model. There may exist other mechanisms of identification. Future research improves the domain coverage of different mechanisms of identification.

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## Appendix . Questionnaire Items

Dimensions	Measure items
Trust	Your suppliers are frank in dealing with you.
	Promises made by your suppliers are reliable.
	Your suppliers are knowledgeable about the products.
	Your firm believes in the information your supplier provide to you.
	Your supplier usually keeps its promises that it makes to your firm.
Commitment	Your firm is confident that your supplier is telling the truth.
	Your firm expects this relationship to continue for a long time.
	Your firm is committed to your supplier.
	Your firm expects this relationship to strengthen over time.
Communication	Considerable effort and investment has been undertaken in building this relationship.
	Your firm and suppliers have frequent contacts on a regular basis.
	Your firm and suppliers have open and two-way communication.
	Your firm and suppliers have informal communication.
	Your firm and suppliers have many different channels to communicate.
Reciprocal relationship	Your firm and suppliers influence each other's decisions through discussion rather than request.
	Your firm shares risks with suppliers.
	Your firm shares burdens with suppliers.
Information sharing	Your firm shares benefits with suppliers.
	Your firm shares details of upcoming product or service related changes with your suppliers.
	Your firm shares information related to market demand trends, forecasts and future plans with your suppliers.
	Your firm shares information on demand shifts and changes in customer preferences with your suppliers.
Innovation	Your firm shares process information needed to support changes in product features or volumes with your suppliers.
	Your firm frequently tries out new ideas in the supply chain context.
	Your firm is creative in the methods of operation in the supply chain.
	Your firm often introduces new ways of servicing the supply chain.
	Your firm's new process introduction in the supply chain has increased over the last 5 years.
	The number of new products/services in your firm has increased in the last 5 years.
Your firm is the first one offering new products/services in the supply chain.	