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Minkyun Kim, Sangmi Chai

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The impact of supplier innovativeness, information sharing and strategic sourcing on improving supply chain agility: Global supply chain perspective

Minkyun Kim, PhD[a], Sangmi Chai, PhD[b]*

[a]Associate Professor, Sogang Business School, Sogang University, 35 Baebum-ro, Mapo-gu, Seoul, Korea.

[b]Associate Professor, Ewha School of Business, Ewha University, Ewha-Shinsegae Building # 402, 52 Ewhayeodae-gil, Seodaemun-gu, Seoul, Korea.

*Corresponding author. Tel.: 82-2-3277-2780; Fax: 82-2-3277-2776. E-mail: smchai@ewha.ac.kr

Abstract

This study investigates the impact of supplier innovativeness on supply chain collaboration and agility. The paper applies the diffusion of innovation theory to explain how supplier innovativeness has been diffused into the supply chain and how global sourcing moderates the relationship among supplier innovativeness, information sharing, strategic sourcing, and supply chain agility. This research analyzes 272 survey responses from supply and purchasing executives and managers in the manufacturing industry. The research results indicate that supplier innovativeness positively affects information sharing and supply chain agility but has no significant relationship with strategic sourcing. Both information sharing and strategic sourcing play a positive role on improving supply chain agility. This study also offers empirical evidence that impact of supplier innovativeness, information sharing and strategic

sourcing on supply chain agility in domestic sourcing become stronger that in global sourcing. This research provides meaningful insights for academics and industry by filling an important gap in the literatures and showing managers the positive impact of supplier innovativeness in order to facilitate collaborations in the supply chain.

Keywords: Supplier innovativeness, strategic sourcing, information sharing, supply chain agility, global supply chain, diffusion of innovation theory (DOI)

1. Introduction

Innovating in products, organizations, and supply chains is crucial to success and competitive advantage. In supply chains, organizations expect their supply partners to adopt innovation from internal motivation in order to produce various benefits. However, organizations in supply chains also attempt to drive innovation externally, improving the firms' core competencies and performance and reducing investments and Research & Development (Ellis et al., 2012; McIvor and Humphreys, 2004). More importantly, while suppliers play an important role in effective supply chain management, suppliers are becoming increasingly responsible for encouraging innovation and innovativeness practices such as product and new product development and alliances for fostering innovation, design, and process innovation (Azadegan and Dooley, 2010).

Buyer firms in the supply chain attempt to encourage suppliers to adopt innovation, but supplier innovativeness faces many challenges, such as customer power in the supply chain, cultural and geographical differences, increased business risks, and coordination costs (Henke and Zhang, 2010). The responsibilities that which organization is in charge for driving innovation in the supply chain have created issues between suppliers and buyers

regarding that innovation results that benefit supply chain relationships. In addition, forcing innovation on outsourcing companies via buyer companies generates the risk of losing control and crucial knowledge and of reducing capacity (Jean et al., 2012). Suppliers recognize the drawbacks of adopting innovation in the supply chain, which appear to be greater than the benefits suppliers and buyers could hope to gain.

Supplier innovativeness is defined as suppliers' ability to develop new processes or introduce new products (Azadegan and Dooley, 2010). Supplier innovativeness generates various benefits for manufacturers. Supplier innovativeness positively impacts manufacturers' performance in cost, quality, delivery, flexibility, and product development (Azadegan, 2011). Supplier innovation helps improve manufacturers' product technology (Gianiodis et al., 2010). Supplier innovative capability has a significant purchasing role in product development (Wynstra et al., 2003). Supplier innovativeness also increases information processing capability and information fit in the supply chain (Stock and Tatikonda, 2004). Manufacturers with innovative suppliers are better able to respond to changes in environments (Swink and Mabert, 2000). Supplier innovativeness provides various benefits to manufacturers. By examining these benefits throughout the whole supply chain, this research investigates the impact of supplier innovativeness on supply chain collaboration activities such as information sharing, supply chain procurement like strategic sourcing, and supply chain agility.

Supplier innovativeness has expanded throughout the whole supply chain system. However, this innovativeness has been adopted by suppliers as well as buyers and manufacturers at different rates. Therefore, this study applies the diffusion of innovation theory (DOI) to explain the impact of supplier innovativeness in the supply chain. According to Rogers (1995), innovations have been transferred in the system, and individuals are now

willing to adopt them. He divides innovators into early adopters, early majority, late majority, and laggards according to their adoption speed. Following this theory, this research applies the information system diffusion model to establish a research framework for the impact of supplier innovativeness on the supply chain system with information sharing, strategic sourcing and supply chain agility.

Prior studies have discussed the impacts of supplier innovativeness on firms. Several studies show the positive link between supplier innovativeness and manufacturers' performance and relationship performance (Azadegan and Dooley, 2010; Chiesa et al., 2004; Jean et al., 2012; Stock and Tatikonda, 2004). Unlike the previous research, this study attempts to fill the gap in the literature by investigating the role of supplier innovativeness in the whole supply chain, including aspects such as supply chain agility, buyer–supplier relationship, and supply chain collaboration and cooperation. This study examines the relationships among those supply chain practices based on the diffusion model to identify the antecedents of improved supply chain agility in terms of information sharing and strategic sourcing. More importantly, this research also asks how global sourcing influences information sharing and strategic sourcing to improve supply chain agility.

This research contributes to both scholarship and industry. First, this study fills a gap in the operations and supply chain management literature by setting up a research model of the impact of supplier innovativeness on supply chain practices based on the diffusion of innovation theory. Second, the study applies this research framework to global sourcing by investigating its moderating effects on the relationships among supplier innovativeness, information sharing, strategic sourcing, and supply chain agility. Finally, this study informs managers that the impact of supplier innovativeness is positively diffused throughout the

supply chain and that manufacturers need to help their suppliers adopt innovation in order to improve supply chain collaboration and agility.

2. Theoretical background and literature review

2.1. Theoretical background

The diffusion of innovation theory explains how innovations are diffused into systems through communication channels (Rogers, 1995). This process involves a time lag because the adoption of innovation focuses on the individual level (Rogers, 1995); thus, the communication channel needs to be an interpersonal one, in order to develop the necessary perceptions of innovation. More importantly, this individual innovativeness positively impacts the intention to use new technology (Agarwal and Prasad, 1998). Rogers (1995) described the pattern of innovation adoption as an S-shaped curve. The diffusion of innovation theory focuses on individual-level innovation adoption. However, this study focuses on firm-level adoption, and specifically on suppliers' innovativeness in the supply chain. This research applied the diffusion of innovation theory as a conceptual model. Supplier innovativeness in supply chain played as a technological innovation for firms driving to adopt and implement supply chain agility successfully. More importantly, supplier innovativeness is close associated with implementing supply chain agility via information sharing as well as strategic sourcing in our conceptual model. In our conceptual model, for helping to implement supply chain agility successfully, supplier innovativeness not only affect supply chain agility directly but also makes an impact on information sharing as technical complexity and strategic sourcing as a relative advantage to investigate how to improve supply chain agility based on the diffusion of innovation theory by establishing a conceptual model.

The DOI has been heavily applied in the context of information systems. IS environment, IS organizational characteristics, and IS task context have been investigated as antecedents of total quality management adoption (Ravichandran, 2000). ERP adoption was more effective in using diffusion model in North America automotive business network (Hajji et al., 2016). While various factors have been identified, technical compatibility, technical complexity and relative advantage are considered consistent and significant factors in innovation implementation success (Bradford and Florin, 2003; Cooper and Zmud, 1990; Crum et al., 1996). This research establishes a conceptual model based on the diffusion of innovation theory to offer insights into supply chain agility. Supplier innovativeness is an antecedent of supply chain agility as a technical compatibility, in which innovativeness is consistently perceived as an existing value that requires implementation. In other words, supplier innovativeness is necessary technical tool to achieve the value coming from implementation of supply chain agility. Information sharing is a technical complexity factor that represents the belief that a system can be used without any physical or mental effort while implementing supply chain agility. In order to improve supply chain agility, information sharing is considered as an essential technical method, leading to saving time and cost in supply chain. Finally, strategic sourcing is an antecedent of relative advantage that represents the attempt to implementing supply chain agility. Strategic sourcing is considered as supply chain practices and strategy that can gain competitive advantage against competitors.

2.2. Literature review

2.2.1. Information sharing

Information sharing is considered very useful for promoting collaboration and cooperation in

the supply chain. Information sharing builds better partnerships and promotes integration between suppliers and manufacturers in the supply chain, leading to better performance (Du et al., 2012; Khan et al., 2016). Prior studies discuss the significant role of information sharing in supply chain management from two perspectives: the antecedents of information sharing and the supply chain factors it affects. Information technology usage in the supply chain promotes information sharing. Electronic data interchanges facilitate information in the supply chain, resulting in information and relational alignment (Tan et al., 2010). Other factors also impact information sharing in the supply chain. Trust plays a positive role in supply chain information sharing in China (Cai et al., 2010). Connectedness positively affects information sharing between suppliers and manufacturers while dysfunctional conflicts affect it negatively (Cheng, 2011).

The literature discusses the positive impacts of information sharing in the supply chain. Information sharing regarding the demand between manufacturers and retailers always benefits the manufacturers, who can react to fluctuations in demand (Cavusoglu et al., 2012). An information sharing culture can generate many positive impacts on supply chain collaboration and improve operational performance and customer satisfactions (Fawcett et al., 2011). Information sharing between suppliers and manufacturers also has a positive relationship with logistic integration, especially for inventory management (Prajogo and Olhager, 2012). This study focuses on two kinds of information sharing in the supply chain: connectivity and willingness. Connectivity represents the technological capability of connections in the supply chain, and willingness refers to the level of openness to sharing relevant information in the supply chain (Fawcett et al., 2007). Thus, this research investigated the impact of information sharing focusing on two main characteristics:

connectivity and willingness within an organization and between suppliers and manufacturers.

2.2.2. Strategic sourcing

Strategic sourcing is the process of supplier management and supply network design used to achieve operational and performance objectives (Kocabasoglu and Suresh, 2006). Strategic sourcing has been receiving much attention in the supply chain management literature, emerging as a supply chain practice that managers can use in many ways. Kocabasoglu and Suresh (2006) discussed the traditional purchasing role along with internal coordination as well as collaborative supply chain activities such as information sharing with suppliers and supplier development. A traditional strategic sourcing perspective applied to an air force, as a public service provider, revealed improvements in cost and performance (Apte et al., 2011).

Many studies have investigated the implementation of strategic sourcing as a supply chain practice intended to improve buyer–supplier relationships. Strategic sourcing positively impacts firms' strategic flexibility as well as their supply chain agility (Chiang et al., 2012). Four dimensions of strategic sourcing centricity—learning orientation, performance orientation, planning orientation, and relational orientation—are positively associated with profitability (Eltantawy and Giunipero, 2013). Strategic sourcing has had a positive effect on the buyer–supplier relationship and supplier evaluations as well as on sourcing performance in the US textile and apparel industry (Su, 2013). Thus, while strategic sourcing has been discussed as a helpful supply chain practice, many factors need to be considered for implementation.

2.2.3. Supply chain agility

As market conditions have become increasingly unpredictable and competitive, organizational and supply chain agility has emerged as a key factor for surviving in

competitive markets. Supply chain agility is the ability of a supply chain to react to changes in business environments in a timely manner (Swafford et al., 2006). Braunscheidel and Suresh (2009) expanded this definition by discussing agility in terms of a conjunction among suppliers, customers, and manufacturers. Five dimensions--flexibility, effectiveness, velocity, reliability, and visibility—are used to measure the agility of supply chains (Charles et al., 2010). Gligor and Holcomb (2012a) described supply chain agility in terms of responsiveness, change as opportunity, flexibility, customization, mobilization of core competencies, integration, organizational structure and speed. The study of Gligor et al., (2013) posited four dimensions of supply chain agility, along with second-order constructs: accessibility, decisiveness, swiftness, and flexibility. This study follows Braunshidel and Suresh (2009) because it applies a concept of "supply chain agility" that involves collaborating with suppliers in the relationship between suppliers and buyers.

Many studies have investigated the antecedents of improved supply chain agility. The research of Blome et al., (2013) found that supply- and demand-side competence facilitated supply chain agility, improving operational performance. Information technology amplifies supply chain agility, thus improving firms' performance (DeGroote and Marx, 2013). Supply chain coordination, cooperation, and communication have been empirically revealed as antecedents of improved supply chain agility and positively associated with operational and relational performance (Gligor and Holcomb, 2012b). The study of Gligor et al. (2016) also identifies environmental uncertainty, supply chain and market orientation as antecedents of firm supply chain agility.

3. Research model and hypotheses

Supplier involvement has been deemed important in the development of innovation in the

supply chain. Suppliers play a pivotal role due to their knowledge of and capabilities regarding the products as well as their focus on supply chain members' core competencies (Hamel and Prahalad, 1994; Sobrero and Roberts, 2001). More importantly, suppliers themselves need to use their capability and their will to innovate. They must also consider their relationship with customers in organizing tier innovation processes (Aune and Gressetvold, 2011). Joint product development and cooperative ties between suppliers and buyers foster supplier innovativeness (Inemek and Matthyssens, 2013). Suppliers' role in supply chain innovation has received much attention in academia and industry. However, supplier innovativeness itself and its impact on the supply chain have not been deeply investigated in terms of supply chain management. Based on the diffusion of innovation theory, the role of supplier innovativeness that diffused into the implementation of supply chain agility has been investigated. The supplier innovativeness in the supply chain was spread into the implementation of supply chain agility directly and via information sharing and strategic sourcing. The benefits of supplier innovativeness were shown in the supply chain in various contexts.

The benefits of supplier innovativeness are directly delivered to manufacturers in the supply chain, who can enhance their cost, quality, product development, delivery, and flexibility through supplier innovativeness. Interestingly, supplier innovativeness that uses contrast learning styles with manufacturers can be more beneficial to manufacturer performance (Azadegan and Dooley, 2010). Suppliers' operational innovativeness also positively affects manufacturers' operational performance (Azadegan, 2011). Supplier innovativeness generates opportunities to enhance the responsiveness with which the supply chain fulfills customer requirements, increasing customer satisfactions (Hult et al., 2004).

Suppliers' innovation can also improve new product development performance (Wagner, 2012) as well as relationship performance, measured as the closeness of the relationships in the supply chain (Jean et al., 2012).

The positive impact of supplier innovativeness on performance has been empirically confirmed in the supply chain and operations management literature. Supplier innovativeness promotes focal firms' innovativeness in the supply chain, as supplier efforts to achieve innovativeness are diffused into them. Although supplier innovativeness is negatively associated with suppliers' end-user satisfaction, supplier innovativeness positively impacts end-user satisfaction through focal firms' innovativeness (Kibbeling et al., 2013). Supplier innovativeness also influences product innovation. Supply chain partners' innovativeness motivates focal firms' product innovation strategies, and strategic relationships with supply chain partners enhance focal firms' innovation capability, generating product innovation strategies (Oke et al., 2013).

In the buyer–supplier relationship, supplier innovativeness has a positive influence on the supply chain, beyond improvements in focal firm innovativeness and product innovation, by being diffused throughout the entire supply chain. In supplier innovativeness, openness to innovation engages other parties in the supply chain such as manufacturers in activities such as cooperation, collaboration, and idea generation. Additionally, innovation in the supplier can be utilized to solve problems in the buyer–supplier relationship (Aune and Gressetvold, 2011). Product development collaboration between buyers and suppliers and cooperative ties among supply chain networks are antecedents to supplier innovativeness (Inemek and Matthyssens, 2013). Supplier innovativeness not only amplified the innovation on the products as well as process but provided the opportunities for suppliers and

manufactures having more interactions in the supply chain. Therefore, supplier innovativeness plays a significant role in enhancing the partnership between buyers and suppliers.

By being diffused into the supply chain, innovation enables the supply chain network to be opened-minded to changes in products and processes. For making changes in the products and process with innovation in the supply chain, supplier innovativeness facilitated the communication by exchanging the information. Suppliers' innovativeness orientation is positively associated with information exchanges about product technology, joint teams for problem solving, frequent communication, and discussions between buyers and suppliers (Jean et al., 2010). Dynamism in the supply chain, such as through new product development, product and service innovation, and innovation in operation processes, facilitates information exchange in the supply chain (Zhou and Benton Jr, 2007). Thus, we hypothesize the positive relationship between supplier innovativeness and information sharing below:

H1: Supplier innovativeness positively affects information sharing in supply chain.

Through the diffusion of innovation into purchasing practices between buyers and suppliers, innovation in products and processes affects decision making about sourcing strategies for the supply chain. Changes on products and processes need to be considered in establishing sourcing strategies for the manufacturers. A high degree of product and process innovation with internal sourcing strategies results in better matches between innovation and sourcing strategies (Kotabe and Murray, 1990). Schiele (2012) argued that supplier innovativeness and competence fosters collaborations with buyers, leading to close buyer–supplier relationships. Therefore, supplier innovativeness not only strengthens the relationship between buyers and suppliers but also plays a significant role in sourcing

decisions.

Highly innovative suppliers are supposed to be open to new ideas and experiments on behalf of their buyers (Kibbeling et al., 2013). More importantly, strategic relationships between supply chain partners fortify the positive impact of supply chain partner innovativeness on product innovation strategies (Oke et al., 2013). Innovation also helps supply chain members smooth out their purchasing practices through good relationships between buyers and suppliers. Implementing innovation in business processes such as vendor-managed inventory creates integration and delivery-cost savings in the supply chain (Holmström, 1998). In their technological innovations for products, buyer firms recognize the importance of applying strategic sourcing in their procurements from suppliers in the supply chain (Steinle and Schiele, 2008). Supplier innovativeness helps the manufacturers to set up the directions on their sourcing strategy as well as supply chain relationships. Therefore, supplier innovativeness helps firms implement strategic sourcing based on strong supply chain relationships. We thus posit the positive impact of supplier innovativeness on strategic sourcing below:

H2: Supplier innovativeness positively affects strategic sourcing in supply chain.

Relationship learning, system collaborations, and supplier market knowledge acquisition are required to generate supplier innovation. Supplier innovation generation enables suppliers to establish a good relationship with their customers and buyers (Jean et al., 2012). Schiele (2006) argued that innovativeness in suppliers strengthens relationships with customers by amplifying trust and commitment in the supply chain relationship and also helps suppliers join improvement programs with their customers; innovativeness also encourages suppliers to collaborate with customers. Supplier innovativeness generated

opportunities for suppliers and manufactures working together in new product development and improving the process in the supply chain. Maintaining good relationships and collaborations via supplier innovativeness play a significant role in enhancing responsiveness in the supply chain.

Adding to the findings that supplier innovativeness can help establish good relationships and collaborations in the supply chain, Sharifi and Zhang (1999) established a conceptual framework in which innovation is a driver for manufacturing agility and indirectly improves agility capability. The study of Yusef et al. (1999) pointed out that innovation is one of the factors in exploring competitive bases in order to achieve operational agility in dynamic market environments. Agility focuses on responding to unpredictable changes through innovation (Wadhwa and Rao, 2003). The research of Ren et al. (2003) also emphasized innovation as a competitive dimension that offers the largest values to firms' agility attributes. Supplier innovativeness helped manufacturers to reduce response time toward changes in the market. Therefore, we posit a positive relationship between supplier innovativeness and supply chain agility below:

H3: Supplier innovativeness positively affects supply chain agility

The literature discusses the benefits of sharing information in the supply chain. As supplier innovativeness is diffused into the supply chain, information sharing establishes a linkage of innovativeness with connectivity between buyers and suppliers based on the willingness to share information in the supply chain. Information sharing with and between organizations in the supply chain is positively associated with supplier development support and product quality improvement (Carr and Kaynak, 2007). Information sharing is considered as a foundation between suppliers and manufacturers in establishing sustainable

communication channel. The culture that encourages information sharing improves operational performance as well as supply chain collaborations (Fawcett et al., 2011). Information sharing positive impacts supply chain practices such as supply chain planning, just-in-time production, and delivery practice (Zhou and Benton Jr, 2007). Information sharing can also facilitate integration in the logistic area and help to maintain a smooth and rapid flow of materials and inventories in the supply chain (Prajogo and Olhager, 2012). Therefore, information sharing magnifies and promotes collaboration and integration in the supply chain, positive antecedents of improved supply chain agility (Braunscheidel and Suresh, 2009).

With increased supply chain collaboration and integration, supply chain information sharing increases flexibility, an in the ability to respond to and accommodate variations in performance (Sezen, 2008). Frequent information sharing in the supply chain helped to make a quick decision and response toward the changes of the market. The study of Li et al. (2006) found that timely information sharing offers the opportunity to make appropriate decisions about disruptions in the supply chain by using the directed acyclic supply network (DASN) and impact network (INet) models, resulting in enhanced agility. We thus propose the following hypothesis:

H4: Information sharing in supply chain positively impacts supply chain agility

Studies have examined sourcing practices in supply chain management to establish a linkage with organizational strategies. This research investigates the role of strategic sourcing in improving supply chain agility, starting from the definition of "strategic sourcing" (Chen et al., 2004). In purchasing, building the right relationship and leveraging supply chain partners' strengths can result in an agile supply chain in the electronics manufacturing industry (Mason

et al. 2002). Manufacturers' implementation of strategic sourcing offered benefits of aligning the purchasing strategy with organizational strategy and establishing a close relationship with suppliers. Strategic relationship management between buyers and suppliers is positively associated with buyer and supplier agility via logistic integration (Paulraj and Chen, 2007).

The research of Chiang et al. (2012) showed empirically that strategic sourcing positively affects firms' supply chain agility in a direct relationship. They also confirmed that strategic sourcing indirectly impacts firms' supply chain agility through the firms' strategic flexibility. In their study, strategic sourcing was composed of four dimensions: strategic purchasing, internal integration, information sharing, and supplier development. Strategic sourcing also encourages manufacturers' strategy to be fit with the suppliers' strategy, leading to the collaboration toward changes of business environments. Khan and Pillania (2008) investigated the relationship between strategic sourcing factors and firms' supply chain agility, finding that effective strategic supplier partnerships, greater sourcing flexibility, effective supplier evaluation practices, and higher levels of trust among supply chain members enhanced firms' supply chain agility. Therefore, we formulate the following hypothesis:

H5: Strategic sourcing in supply chain positively impacts supply chain agility

Global supply chain management has emerged as an important topic in academia and industry. Gereffi and Lee (2012) divided the key characteristics of the global supply chain into three aspects: the consolidation of the global supply chain with new geography value creation, especially in China, the significant roles of global retailers and private standards in the agri-food supply chain, and how economic changes affect the market and regionalization of the supply chain. Location is a key feature that supply chain managers must consider when establishing supply chain strategies. More importantly, converting supply chain into

managing global supply chain makes the managers consider various factors such as exchange rate, different culture and economic environments and so on. Thus, decision making regarding facility location is an important factor, as it is a risk-mitigating factor regarding supply chain disruption in global supply chain management (Singh et al., 2012).

Global sourcing is critical to establishing good relationships, promoting collaborations, and improving responsiveness. Prior studies address those issues in terms of supplier location, one of the most important factor in evaluating suppliers' capability and performance in the supply chain (Sarkar and Mohapatra, 2006). In designing global supply chain, supply chain managers need to solve design problems such as internal manufacturing location as well as external supplier location (Meixell and Gargeya, 2005). Geographical location is one of the critical factors in evaluating global suppliers (Chan and Kumar, 2007). By having long distances as well as different business environments in managing global supply chain, it creates different approaches and more efforts for managers dealing with problems in the supply chain. Those differences would generate clear differences on the impact of supplier innovativeness on information sharing, strategic sourcing and supply chain agility in global supply chain. This research investigated how the process of innovation diffusion has been differentiated on the relationship among supplier innovativeness, information sharing, strategic sourcing and supply chain agility depending on the supplier locations.

In global sourcing, the lead times of global suppliers are longer than are those of domestic suppliers (Das and Handfield, 1997). The study of Holweg et al. (2011) emphasized that firms attempting to conduct global sourcing for the first time should consider the differences between domestic and global suppliers in terms of lead times, product complexity,

demand uncertainty, total cost, and customer service level. Supplier location, one of a cluster of supplier dimensions, determines logistics costs as well as local value-added in the supply chain (Reichhart and Holweg, 2008). As one of the important issues in global supply base management, well-functioning, standardized systems require different implementations depending upon supplier location (Handfield and Nichols Jr, 2004). Global sourcing configurations for sourcing, manufacturing, and distribution have moderating effects on the relationship between supply chain improvement programs such as supplier development coordination with suppliers and supplier strategies and performance improvement (Caniato et al., 2013). All these global sourcing issues should motivate supply chain members to take more time to establish and maintain strong relationships in purchasing activities such as strategic sourcing, encourage collaborations in the supply chain, and delay responding in the supply chain. In global supply chain, the level of the impact of information sharing, supplier innovativeness, and strategic sourcing on implementing supply chain agility would be different since supply and purchasing executives and managers establish different strategies from managing domestic supply chain. The characteristics of global sourcing generate differences among the impacts on the relationship among information sharing, supplier innovativeness, strategic sourcing, and supply chain agility. Hence, we propose the following:

H6-1: In global sourcing, the positive impact of information sharing on supply chain agility will be less than that of information sharing on supply chain agility in domestic sourcing.

H6-2: In global sourcing, the positive impact of supplier innovativeness on supply chain agility will be less than that of supplier innovativeness on supply chain agility in domestic sourcing.

H6-3: In global sourcing, the positive impact of strategic sourcing on supply chain agility will

be less than that of strategic sourcing on supply chain agility in domestic sourcing.

Figure 1 describes our research model. It describes a direct relationship among supplier innovativeness, information sharing, strategic sourcing and supply chain agility. Adding to these relationships, our research model also describes a moderating effect of global sourcing on the relationship between supplier innovativeness, information sharing, strategic sourcing and supply chain agility.

[Figure 1 is inserted here]

4. Methodology

4.1. Instrument development

To validate our research model with the data, we developed survey questionnaires with measurement items drawn from the previous literature. All measurement items are modified to fit the supply chain management context. Supply innovativeness is measured as suppliers' capability to develop and adopt innovations (This supplier has introduced more creative and useful products and services in the past five years than have its competitors. This supplier aggressively markets its product innovativeness. The supplier is constantly improving its manufacturing processes). Information sharing is measured as two dimensions: connectivity and willingness to share information in the supply chain (Information systems are highly integrated throughout the supply chain. Information applications are highly integrated within the firm. Adequate information systems linkages exist with suppliers. Frequent and regular communication occurs among supply chain members). Strategic sourcing is measured as the strategic role of manufacturers' procurement function (Purchasing is included in the firm's strategic planning process. The purchasing function has good knowledge of the firm's strategic goals). Supply chain agility is measured as joint planning, demand response,

visibility, and customer responsiveness in the supply chain (Our supply chain is capable of forecasting market demand and responding to real market demand. Joint planning with suppliers is important in purchasing, production and logistics. Improving delivery reliability is a high priority. Improving responsiveness to changing market needs is a high priority. Inventory and demand levels are visible throughout the supply chain). Finally, global sourcing is measured as whether manufacturers use international suppliers. All measurement items with their references are presented in Table 1. After developing the survey items, we conducted interviews with supply and purchasing managers from manufacturing firms in various industries to collect feedback on the measurement items. To ensure reliability and content validity, we then performed a pilot study with a different group of 30 supply and purchasing managers after revising our survey based on the interviews. The results of the pilot study on reliability were good enough to avoid the need to drop any measurement items. We finalized the survey by reflecting on the feedback provided by the supply and purchasing executives and managers. We used a seven-point Likert scale and conducted confirmatory factor analysis using the partial least squares (PLS) technique. Table 2 presents the factor analysis results with the factor loadings of all the measurement items. The results of factor analysis represent that all measurement items of supplier innovativeness, information sharing, strategic sourcing and supply chain agility are grouped nicely to their own constructs based on the factor analysis results. It means that 8 measurements items of supplier innovativeness, 12 measurement items of information sharing, 5 measurement items of strategic sourcing and 6 measurement items of supply chain agility are clearly differentiated with other measurement items and construct according to their factor loading numbers in table 2, which are greater than 0.7.

4.2. Study sample

The respondents of our questionnaire consisted of supply and purchasing managers as well as supply executives in manufacturing firms operating in Korea. All these respondents were in executive positions in their company who is able to answer all questionnaires including the recognition of difference between domestic and global sourcing. The sample unit was the manufacturing firm. Its main products were electronic products such as smartphones, TVs, and personal computers, chemicals, construction materials, clothes, automobiles and auto components, energy-related products, and other consumable goods. We measured firm sizes based on the number of employees. The number of firms with fewer than 100 employees represented 5.5% of the total sample; firms with 100 to 1000 accounted for 23.16%; firms with 1000 to 5000 accounted for 36.03%; firms with 5000 to 10000 accounted for 19.12%; firms with 10000 to 20000 accounted for 11.40%; and firms with more than 20000 constituted 4.78% of the total sample.

Surveys were randomly distributed to 1100 supply executives and supply and purchasing managers. We collected 272 responses, for a response rate of 24.73%. In order to find the difference between domestic and global supply chain, the questions were asked to supply executives and supply and purchasing managers regarding whether they have key suppliers in the same nation or different nations. Thus, this research could divide responses depending on their answers indicating they manage global supply chain. Given that the survey was completed by one respondent per supply chain company, Harman's single factor test was performed to test for common method bias. Following Podsakoff and Organ (1986) and Doty and Glick (1998), this study inspected all the eigenvalues through un-rotated factor analysis. The result indicated that neither any single factor nor the first factor represented a

value greater than 20% of the variances in our data. Our data thus do not show a common method bias.

5. Results

5.1. Measurements

A confirmatory factor analysis was conducted by PLS; the results are described in Table 2. We also established our measurement models using PLS. First, Cronbach's alpha and factor loadings were examined to assess the reliability of all constructs in this study. As Table 2 shows, all factor loadings for construct measurements are greater than 0.7 (Fornell and Larcker, 1981). The values of Cronbach's alpha for all measurement items in out constructs are also greater than 0.7 in table 1. Therefore, all measurements indicated strong reliability. To test for convergent validity, we investigated the composite reliability (CR) and average variance extracted (AVE). The numbers of CR must be greater than 0.7 to confirm the internal consistency of construct measurements (Hulland, 1999) and those of the AVEs must be greater than 0.5 (Chin, 1998). All CR and AVE values showed solid convergent validity in table 1. Finally, to assess the discriminant validity of our measurement models, we computed the square roots of the AVEs and then compared those numbers with the correlations of each variable, following Fornell and Larker (1981). As Table 3 shows, the values of the diagonal features, the square roots of the AVEs, are greater than those of the non-diagonal features, the correlation values among all variables in our study (Fornell and Larker, 1981; Hulland, 1999).

5.2. Full effects

We established the structural model through a bootstrapping procedure using the PLS technique. The results provided empirical support for Hypothesis 1. These results empirically

revealed a statistically significant relationship between supplier innovativeness and information sharing, with a path coefficient of 0.394 and a t-score of 3.21 at a 0.01 level of significance. Thus, supplier innovativeness promotes information sharing in the supply chain. Supplier innovativeness positively affects buyers on sharing their information with their suppliers. However, Hypothesis 2 was not supported by our research results; we thus found no statistically significant relationship between supplier innovativeness and strategic sourcing.

Our research results support Hypothesis 3. There is a statistically significant and positive relationship between supplier innovativeness and supply chain agility, with a path coefficient of 0.298 and a t-score of 3.07 at a 0.01 level of significance. Supplier innovativeness is considered an antecedent of improving supply chain agility. The positive path coefficients indicate the positive associations between supplier innovativeness and supply chain agility. The empirical results of our research confirmed Hypothesis 4. The path coefficient was 0.212 and the t-score 2.54 at a 0.01 significant level. We also found that information sharing is another antecedent of increased supply chain agility. Information sharing between buyers and suppliers improves the agility in the supply chain with a positive direction. The results of this research empirically support Hypothesis 5 with a path coefficient of 0.158 and a t-score of 1.75 at a 0.05 level of significance. Strategic sourcing also plays a positive role in improving supply chain agility although the positive impact of strategic sourcing on supply chain agility is not stronger than the relationships among the constructs in this research. Figure 2 summarizes our research results for the full model. Our empirical results support that supplier innovativeness makes a positive impact on facilitating information sharing and improving agility in the supply chain. They also support that

information sharing and strategic sourcing positively influence on improving agility in the supply chain.

[Figure 2 is inserted here]

5.3. Moderating effects

We investigated the moderating effects using a subgroup analysis conducted by PLS based on whether the firm has global suppliers. We divided the manufacturing firms into two groups based on global sourcing and examined the differences in path coefficients between them to determine whether they were statistically significant depending upon their global supply chain. We performed bootstrapping procedures following (Ahuja and Thatcher, 2005; Chin, 1998). To examine the moderating effects of global sourcing in supply chains, this study followed Chin (2000) and Keil et al. (2000).

The subgroup analysis regarding global sourcing revealed a significant relationship among our constructs in each group. In the global sourcing group (157 responses or 57.72% of the total sample), the path coefficients were 0.202 from information sharing to supply chain agility, 0.247 from supplier innovativeness to supply chain agility, and 0.127 from strategic sourcing to supply chain agility, with t-scores of 2.26, 2.91, and 1.73 respectively, indicating statistical significance at the $p < 0.05$ and $p < 0.01$ levels in all the relationships. In the domestic (non-global) sourcing group (115 responses or 42.28% of the total sample), the path coefficients were 0.355, 0.498, and 0.258, with t-scores of 3.20, 4.07, and 1.94, statistically significant at the $p < 0.05$ and $p < 0.01$ levels in all the relationships. In comparing path coefficients of global sourcing and domestic sourcing, the results show that path coefficients of domestic sourcing are greater than those of global sourcing. It indicates that the positive impact of information sharing, supplier innovativeness and strategic sourcing

is stronger in improving supply chain agility when buyers depend on domestic suppliers in sourcing activities.

We found moderating effects on the relationships among our constructs by detecting significant differences in path coefficients between the global sourcing and domestic (non-global) sourcing groups. The t-values for the statistical path comparisons among information sharing, suppler innovativeness, and strategic sourcing were 3.99, 4.22 and 1.88 respectively, statistically significant at the 0.05 and 0.01 levels. The differences between path coefficients of global and domestic sourcing are 0.153 on information sharing, 0.251 on supplier innovativeness and 0.131 on strategic sourcing. In domestic sourcing, the impact of information sharing, supplier innovativeness and strategic sourcing is positively amplified in improving supply chain agility comparing with that of global sourcing. We thus found that global sourcing has a moderating effect on the relationships among information sharing, supplier innovativeness, strategic sourcing, and supply chain agility. Thus, our research results support H6-1, H6-2 and H6-3. Table 4 presents the research results regarding the moderating effects among the constructs. In table 4, the results show higher path coefficients on the relationship among supplier innovativeness, information sharing, strategic sourcing and supply chain agility when comparing between global sourcing group and domestic sourcing group. More importantly, the difference between path coefficients were statistically significant, leading to that global and domestic sourcing make a difference on the relationship between supplier innovativeness and supply chain agility, information sharing and supply chain agility, and strategic sourcing and supply chain agility.

6. Discussion and Conclusion

Our research provides useful implications for both academic researchers and managers in the

industry. We applied the diffusion of innovation theory (DOI) to explain how supplier innovativeness is diffused into the supply chain. This study established a conceptual model to examine the relationship between supplier innovativeness and supply chain management practices such as information sharing and strategic sourcing in buyers' perspective. It also establishes a research framework regarding the role of supplier innovativeness on improving supply chain agility directly and indirectly through information sharing between buyers and suppliers and buyers' procurement activities. IN addition, this research provides implications that how buyers, manufactures' applies their suppliers' innovativeness on improving supply chain agility by identifying antecedents of supply chain agility. We considered supply chain agility as an implementation feature of the DOI—the endpoint of supplier innovativeness diffusion. More importantly, we filled a gap in the supply chain and operations management literature by applying a DOI approach instead of the learning and knowledge orientation approach that prior studies have applied (Azadegan, 2011; Azadegan and Dooley, 2010; Azadegan et al., 2008). This study explains the impact of supplier innovativeness on various aspects of supply chain management, such as supply chain collaboration, relationships, and agility using the DOI, adding significantly to supply chain and operations management research.

More importantly, this study established associations between supplier innovativeness and information sharing as a supply chain collaboration, between supplier innovativeness and strategic sourcing as a supply chain relationship, and between supplier innovativeness and supply chain agility as supply chain responsiveness. By investigating the impact of supplier innovativeness on achieving the effectiveness in managing supply chain, this research emphasizes the importance of supplier innovativeness to managers. Therefore, we have

provided a comprehensive research framework with empirical evidences for supplier innovativeness regarding its impact on managing supply chains in various contexts.

This study fills a gap in the supply chain and operations management literature by investigating the impact of supplier innovativeness on information sharing in the supply chain. By dividing information sharing into two dimensions, connectivity and willingness (Fawcett et al., 2007), we confirmed that supplier innovativeness strengthens information-sharing connectivity in the supply chain and enhances the willingness of supply chain members to share information. Suppliers' efforts to adopt innovativeness create many opportunities to share information and communicate in the supply chain. This result provides meaningful insights for managers regarding the adoption of supplier innovativeness for processes and products because innovativeness motivates information sharing and establishes connectivity in the supply chain. Information sharing generates frequent communications between buyers and suppliers. Frequent communications with suppliers drives positive impacts on the supply chain for both suppliers and buyers. Manufacturers who work with innovative suppliers can enjoy the benefits of the suppliers' innovativeness as well as their information-sharing willingness and infrastructure, leading to more supply chain collaboration. Therefore, when supply and purchasing managers select suppliers, they need to consider supplier innovativeness as a key indicator because innovative suppliers already have a commitment as well as a culture that is suitable for supply chain collaboration (Fawcett et al., 2011). They also need to recognize the benefits of supplier innovativeness on providing opportunities for collaboration between buyers and suppliers. Additionally, when supply and purchasing managers set up their supply chain strategy, they need to encourage suppliers to facilitate innovativeness and thus cultivate supply chain collaboration.

Although studies have investigated many antecedents of supply chain agility (Blome et al., 2013; Braunscheidel and Suresh, 2009; Cai et al., 2012; Gligor and Holcomb, 2012b), no research has examined the effect of supplier innovativeness on supply chain agility. By examining the role of supplier innovativeness in supply chain agility, we show that supplier innovativeness can improve supply chain responsiveness to market changes. Supplier innovativeness leads to positive changes on products as well as process in the supply chain. Innovativeness in suppliers can spread into buyers and other members of supply chain by accelerating the manufacturers' innovations. Thus, supplier innovativeness can be powerful if used in strategies for enhancing supply chain agility. When faced with multiple issues regarding innovation and agility in supply chain management, managers can work with suppliers to adopt innovativeness and thus improve supply chain agility at the same time (Power et al., 2001). To improve supply chain agility, supply and purchasing managers promoted innovativeness for their suppliers and also select suppliers with innovativeness and evaluate suppliers with using innovativeness as important criteria. On the other hand, supplier innovativeness does not have a statistically significant relationship with strategic sourcing with its internal factors—the status of purchasing and internal coordination and the role of purchasing in supply chain management (Kocabasoglu and Suresh, 2006). We provide managers with helpful hints about supplier innovativeness, which can influence supply chain relationships but has little impact on manufacturers' procurement activities. If this research emphasizes the aspect of supply chain relationship factor in the survey measurement of strategic sourcing, the results might turn out to be statistically significant.

Prior studies found that information sharing increases collaboration and integration in the supply chain (Fawcett et al., 2011; Prajogo and Olhager, 2012). Through collaboration,

information sharing in the supply chain offers flexibility and fosters appropriate decision making about disruptions in the supply chain (Li et al., 2006; Sezen, 2008). Adding to this literature, this study empirically confirms the positive relationship between information sharing and supply chain agility. Information connectivity as well as willingness to share information can help supply chain members react quickly to market changes. Information sharing also can cultivate joint planning, conducted by exchanging information and communicating frequently, and improve supply chain visibility. Therefore, when managers establish a supply chain strategy for implementing supply chain agility, information sharing plays a critical role in reducing the reaction time to changes and increases collaboration. Information sharing gives an opportunity for managers making a decision based on right information. Thus, information sharing helped managers to make a quick decision toward changes of the market by having frequent communications with suppliers. More importantly, managers dealing with dynamic markets or demands should implement information sharing as a significant and positive antecedent of improved supply chain agility.

Although the research of Chiang et al. (2012) examined and confirmed the positive associations between strategic sourcing and supply chain agility, this study make a contribution by differentiating among measurements of strategic sourcing and supply chain agility. Consistent with prior study, strategic sourcing with a traditional purchasing role relating to organizational strategy is good enough to be positively associated with supply chain agility. This result informs managers that they need not worry about the external dimensions of strategic sourcing like supplier development when implementing strategic sourcing to improve supply chain agility. Supply and purchasing managers should consider making linkages between their firm's procurement activities and its strategy. Additionally, the

study of Chiang et al. (2012) used only customer responsiveness, demand response, and joint planning as supply chain agility measurements, but we added visibility (Braunscheidel and Suresh, 2009).

As the global supply chain emerges as a very important issue, managerial choices between global and domestic sourcing become increasingly critical. Although the difference between domestic and global sourcing has been investigated, this study focuses on how supply chain management practices as well as supplier innovativeness make a different impact on improving supply chain agility in opposite sourcing contexts. Our empirical evidence confirmed the differences by finding moderating effects. Our research results provide insights that managers could consider the possible effects of global sourcing on the relationships among supply chain practices depending on whether their firms have global suppliers. Our research suggests that manufacturing firms should consider their global sourcing options when establishing a supply chain strategy for improving supply chain agility. In addition, supply and purchasing should recognize the differences between domestic and global sourcing and consider different factors in managing supply chain and establishing supply chain strategy. More importantly, our research results support that domestic sourcing enable supplier innovativeness as well as supply management practices to be more effective on improving supply chain agility comparing with global sourcing. Since recent trends put more weights on global sourcing, managers need to spend more efforts and control on managing global supply chain to improve supply chain agility. They also need to pay more attention on mitigating supply chain risk in the global supply chain context to improve supply chain agility.

Interestingly, in the relationships between information sharing and supply chain agility, supplier innovativeness and supply chain agility, and strategic sourcing and supply chain agility, the path coefficients of domestic sourcing are greater than those of global sourcing. Thus, firms with domestic suppliers, information sharing, supplier innovativeness, and strategic sourcing become more effective in improving their supply chain agility. Working with domestic suppliers would magnify the positive impact of information sharing, supplier innovativeness, and strategic sourcing in enhancing supply chain agility. When managers search for suppliers, they need to find domestic suppliers if they maximize the impact of supplier innovativeness, information sharing and strategic sourcing in improving supply chain agility with minimum cost. Therefore, this study indicates that managers need to consider sourcing locations in their supply chain when searching for supply chain practices for enhancing supply chain agility. More importantly, managers with global supply chains should implement complete connectivity and be more willing to share information with their supply chain members in order to improve supply chain agility. In global sourcing, buyers need to have proactive approach in sharing information with suppliers by adopting new information technology and having frequent communications in order to improve supply chain agility. Additionally, suppliers should pursue innovativeness to improve supply chain agility if the firms need to conduct sourcing from global suppliers. The speed of spreading supplier innovativeness in improving supply chain agility becomes slower in global sourcing than in domestic sourcing, Managers should think of a plan that can spread supplier innovativeness to the buyers quickly. Finally, strategic sourcing in global supply chains must be done by managers who make decisions carefully—ones who can overcome the complexity and risks in global supply chains and bring the positive impacts of supplier innovativeness,

information sharing, and strategic sourcing to supply chain agility. In selecting global suppliers, managers should not consider cost as first priority when improving supply chain agility. They need to consider various factors in establishing purchasing strategies. To summarize the moderating effect of global supply chain on the relationship among supplier innovativeness, information sharing, strategic sourcing and supply chain agility, supply and purchasing managers need to spend more efforts on managing supply chain relationship in the context of global supply chain for increasing the impact of antecedents such as supplier innovativeness, information sharing and strategic sourcing on improving supply chain agility.

This research has some limitations due to the special characteristics of empirical studies. First, it used the perspectives of buyers and manufacturers and collected survey responses from a focal firm in the supply chain. Therefore, when this research attempts to investigate the role of supplier innovativeness in improving supply chain agility, it applies only buyers, manufactures' perspective not suppliers' perspective based on the data that we collected from only buyers, manufacturers. To overcome this limitation, we included executives and high-level managers in the purchasing departments, who were capable of answering all the survey questions confidently. Future studies might investigate the impact of supplier innovativeness on manufacturing firms as well as suppliers in the supply chain by surveying both supply and purchasing executives in manufacturing firms and marketing executives working for suppliers at the same time leading to applying both buyers and supplier's perspective regarding the impact of supplier innovativeness. Second, this research applies only to the manufacturing industry. Further studies using our research model and methodology could examine service industry firms such as healthcare and airline companies. Third, our samples were collected from Korean manufacturing firms. This geographical

limitation prevents a generalization to the international manufacturing industry. Future studies could apply our research model to the US, Chinese, or European industry.

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Figure 1. Research Model

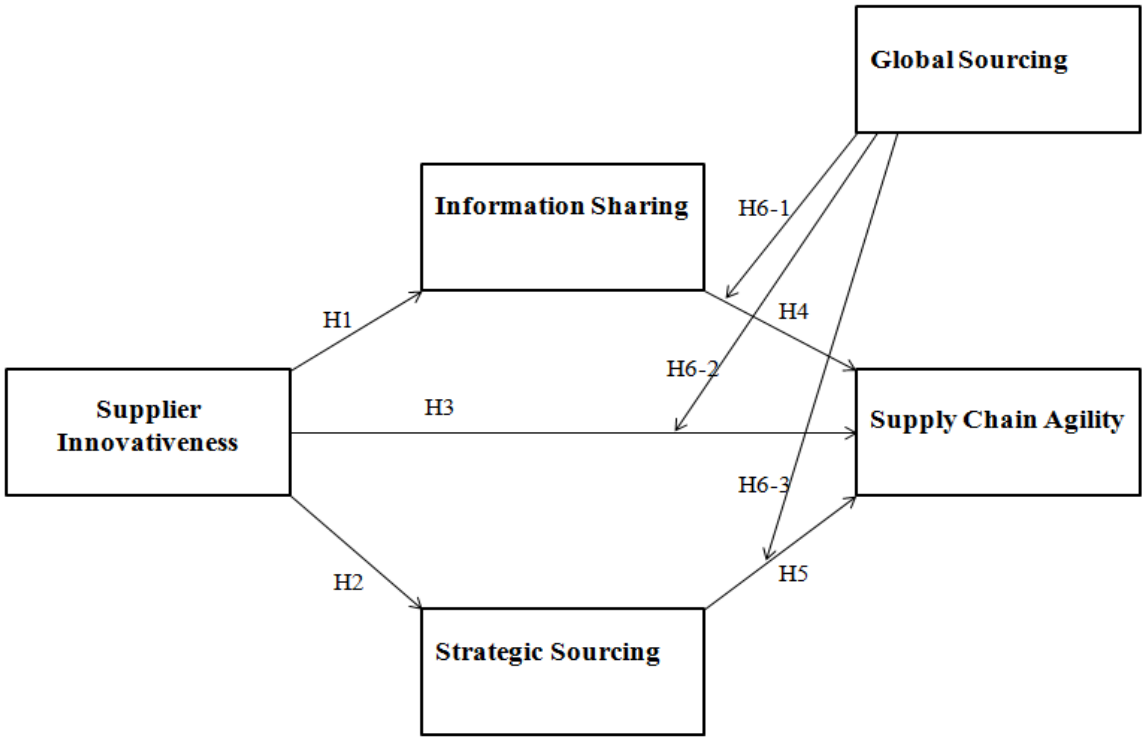

Figure 2. Research Results of Full Effects

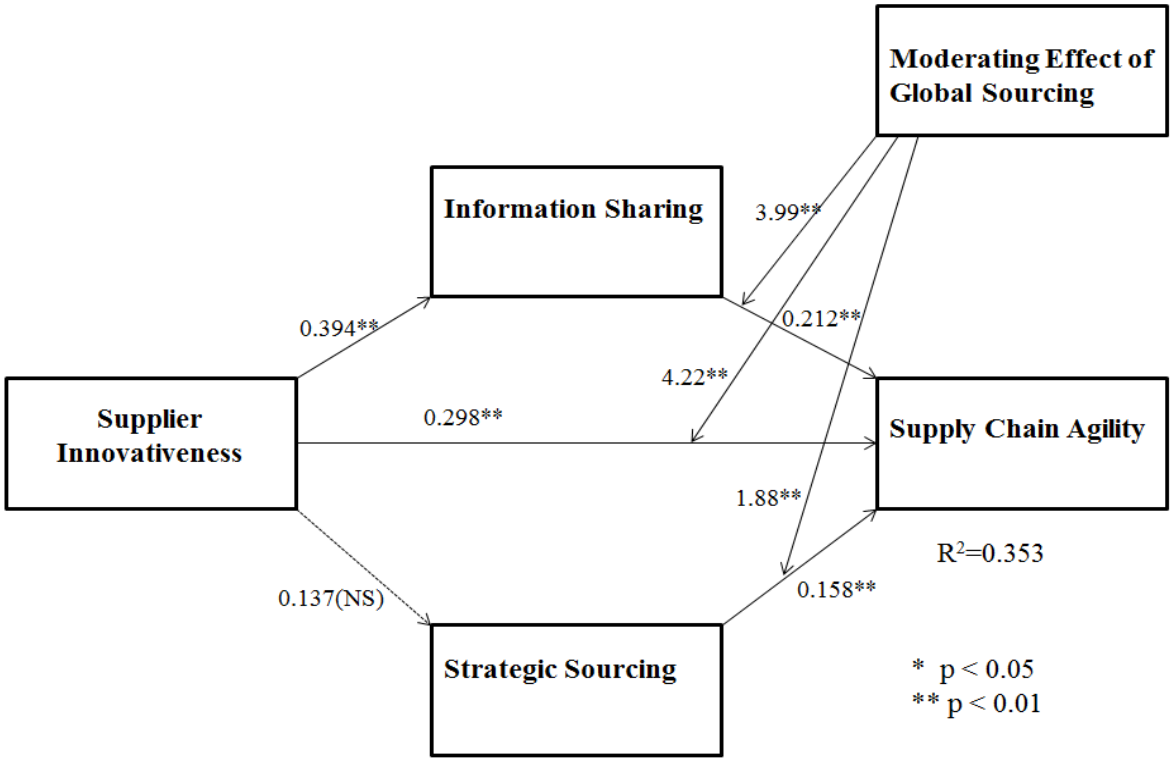

Table 1. Measurement items with reliability

Construct	Measurement Items	Cronbach's Alpha	Average Extracted Variance (AVE)	Composite Reliability (CR)
Supplier Innovativeness (Azadegan and Dooley, 2010; Hult et al., 2004; Wang and Ahmed, 2004) To what extent do you agree with following statements as they related to your firm's supplier innovativeness? (1=strongly	In new product and service introductions, this supplier is often first-to-market. This supplier has introduced more creative and useful products and services in the past five years than have its competitors. This supplier aggressively markets its product innovativeness. In new product and service introduction, this supplier is at the leading edge of technology. The supplier is constantly improving its manufacturing processes. The supplier changes production	0.905	0.808	0.924

disagree,7=strongly agree)	methods at a great speed in comparison with its competitors.			
	During the past five years, the supplier has developed many new management approaches (excluding manufacturing processes).			
	When the supplier cannot solve a problem using conventional methods, it improvises with new methods.			
Information sharing in supply chain	Information systems are highly integrated throughout the supply chain.	0.916	0.723	0.929
(Carr and Kaynak, 2007;	Information applications are highly integrated within the firm.			
Fawcett et al., 2007; Zhou and	Adequate information systems linkages exist with customers.			
Benton Jr, 2007)	Adequate information systems linkages exist with suppliers.			
To what extent do you agree with following statements as they related to your firm's information sharing in supply chain?	Current information systems satisfy supply chain communication requirements.			
	Frequent and regular communication occurs among supply chain members.			
	A willingness to share information among supply chain members.			
(1=strongly disagree,7=strongly agree)	Use of cross-functional teams.			
	Sharing of technical expertise with suppliers.			
	Senior level managerial interaction among supply chain members			
	Sharing of technical expertise with customers.			
	Use of supply chain teams with members from multiple firms.			
Strategic sourcing	Purchasing is included in the firm's strategic planning process	0.884	0.704	0.828
(Chen et al., 2004;	The purchasing function has good knowledge of the firm's strategic goals.			
Kocabasoglu and Suresh, 2006)	Purchasing performance is measured in terms of its			

	contributions to the firm's success.			
To what extent do you agree with following statements as they related to your firm's strategic sourcing? (1=strongly disagree,7=strongly agree)	The purchasing professionals' development focuses on elements of the competitive strategy.			
	The purchasing department plays an integrative role in the purchasing function.			
Supply chain agility (Braunscheidel and Suresh, 2009; Swafford et al., 2006)	Our supply chain is able to respond to changes in demand without overstocks or lost sales.	0.833	0.752	0.868
	Our supply chain is capable of forecasting market demand and responding to real market demand.			
To what extent do you agree with following statements as they related to your firm's supply chain agility? (1=strongly disagree,7=strongly agree)	Joint planning with suppliers is important in purchasing, production and logistics.			
	Information integration with suppliers, logistic service providers, and customers in the supply chain is important.			
	Improving our level of customer service is a high priority.			
	Improving delivery reliability is a high priority.			
	Improving responsiveness to changing market needs is a high priority.			
	Inventory and demand levels are visible throughout the supply chain			

Table 2. All factor loadings with factor analysis

	SI	IS	SS	SCA
SIa	**0.874**	0.293	0.312	0.139
SIb	**0.801**	0.455	0.470	0.078
SIc	**0.855**	0.477	0.343	0.076
SId	**0.872**	0.319	0.417	0.169
SIe	**0.864**	0.335	0.224	0.113

SIf	**0.867**	0.162	0.252	0.086
SIg	**0.786**	0.282	0.375	0.052
SIh	**0.767**	0.298	0.275	0.178
ISa	0.319	**0.854**	0.138	0.199
ISb	0.387	**0.800**	0.172	0.256
ISc	0.361	**0.866**	0.177	0.151
ISd	0.359	**0.776**	0.259	0.252
ISe	0.296	**0.840**	0.079	0.211
ISf	0.463	**0.832**	0.194	0.323
ISg	0.436	**0.741**	0.192	0.348
ISh	0.414	**0.754**	0.234	0.264
ISi	0.445	**0.839**	0.213	0.369
ISj	0.391	**0.769**	0.224	0.305
ISk	0.368	**0.845**	0.189	0.366
ISl	0.375	**0.807**	0.295	0.340
SSa	0.157	-0.056	**0.864**	-0.061
SSb	0.236	-0.036	**0.815**	0.009
SSc	0.257	-0.071	**0.804**	0.015
SSd	0.254	-0.035	**0.973**	0.143
SSe	0.196	-0.084	**0.894**	0.004
SCAa	0.344	0.450	-0.077	**0.878**
SCAb	0.32	0.427	-0.066	**0.817**
SCAc	0.201	0.252	-0.006	**0.789**
SCAd	0.146	0.189	-0.084	**0.876**
SCAe	0.141	0.218	-0.044	**0.821**
SCAf	0.254	0.306	0.082	**0.806**
SCAg	0.275	0.271	0.066	**0.769**
SCAh	0.326	0.378	-0.063	**0.782**

Table 3. Correlation Matrix: Discriminant Validity

Variables	SI	IS	SS	SCA
SI	**0.899**			
IS	0.393	**0.850**		
SS	0.137	0.278	**0.839**	
SCA	0.398	0.02	-0.045	**0.867**

SI = Supply innovativeness; IS = Information sharing; SS = Strategic sourcing; SCA = Supply chain agility

*The number in bold is the square root of the AVE.

Table 4. Research Results of Moderating Effects

Constructs	Global sourcing Subgroup $R^2 = 0.384$ (157)		Domestic Sourcing Subgroup $R^2 = 0.303$ (115)		Statistical Comparison of Paths
	Standardized Path Coefficient	T-Value	Standardized Path Coefficient	T-Value	T-Value
Information sharing → Supply chain agility	0.202	2.26*	0.355	3.20**	3.99**
Supplier innovativeness → Supply chain agility	0.247	2.91**	0.498	4.07**	4.22**
Strategic sourcing → Supply chain agility	0.127	1.73*	0.258	1.94*	1.88*

* = .05 significance,
** = .01 significance