Out-in, in-out buyer quality innovation pathways for new product outcome: empirical evidence from the Chinese consumer goods industry

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Abstract:

In today's dynamic environment, quality innovation and new product development (NPD) are the key factors in gaining competitive advantage. However, the quality innovation process is a complex procedure, because it may combine internal and external resource requirements to meet customer expectations. This paper reviews two quality innovation pathways and their respective NPD performances based on the joint supplier-buyer relationship within the fast consumer goods (FCGs) industry. Specifically, we study buyers' quality innovation potential using 'out-in,' which is the identification of quality innovative suppliers, and 'in-out,' which is buyers' quality knowledge transfer ability to suppliers. Our dyadic data from both buyers and suppliers reveal that the supplier's innovation ability and passion is the dominating factor, irrespective of quality innovation pathways, in the context of the Chinese consumer goods industry. However, cooperative attitude and the cost reduction ability of suppliers are the differentiating factors.

1. Introduction

In today's competitive and highly dynamic business environment, the twin issues of quality and innovation have remained the rallying points for all manufacturing firms, with varying successes with respect to customer satisfaction. Innovation in particular has been identified as a critical factor for firms to achieve true competitiveness in the marketplace (Mintzberg, 1993). Drucker (1954) posits that innovation should be regarded as a key strategy by organizations if they wish to establish and maintain their competitive advantages in the market. This explains why firms are striving for quality innovation processes, and again, it is viewed using several lenses, such as transcendent-based, product-based, user-based, operations-based, and value-based (Garvin, 1997).

In this study, we use ‘quality innovation pathway’ as the term for the nature of the process of creation of either completely new products and services or improved versions of prevailing products and services in the market. Similar to product quality, quality innovation pathway can be based on several characteristics, such as performance, features, reliability, conformance, and durability. This study is based on the premise that key factors in producing an innovative product are the nature and levels of quality and the innovative processes pursued by a manufacturer in collaboration with its suppliers, termed ‘quality innovation pathways.’ A manufacturer has the option of pursuing a quality innovation pathway by identifying an innovative supplier that possesses the requisite innovation capabilities. We refer to this quality innovation pathway pursued by a manufacturer or buyer in our context as an ‘out-in’ quality innovation pathway—that is, effectively leveraging the innovation potential of suppliers. Alternatively, the manufacturer or buyer may decide to deliberately develop its supplier through extensive knowledge transfer (KT) and associated training and investments to achieve the desired innovative supplies. The transfer of knowledge and capabilities from the manufacturing firm to an outside supplier is in this study called an ‘in-out’ quality innovation pathway.

From a supply chain perspective, buyers who are able to identify and use suppliers’ full potential and associated resources are more likely to outperform their competitors in the marketplace (Schiele, 2006; Petersen et al., 2005; Samuel et al., 2011; Pulles et al., 2014). Innovative suppliers are, however, very scarce and difficult to identify. It may be necessary for a manufacturer or buyer to embrace and develop a supplier to the level required to achieve the desired innovative capabilities through KT, among other strategies. However, doing this is very challenging, because knowledge is the most important resource that organizations rely on and protect seriously. This is not surprising, given that knowledge remains the key resource for creating and maintaining

competitive advantages (Tsai, 2001). Following Barney's (1991) RBV theory, the knowledge-based view (KBV) identifies knowledge as a key resource to establish sustainable competitive advantage for companies (Conner and Prahalad, 1996).

The challenges above notwithstanding, a manufacturer may need to engage in KT with its supplier to achieve high-quality process and subsequently satisfy customers. In fact, KT is a major driver of organizations' partnership (Chen et al., 2014) and a key contributor to innovation performance and NPD (Dyer, 1996; Schiele, 2006; Chen et al., 2014). Additionally, manufacturers need to contend with the reported nonchalant attitude or outright conflict resulting from the buyer-supplier relationship that ultimately results in ineffective collaboration (Reve and Stern, 1979; Vaaland, 2006). Therefore, excellent supplier collaborative attitude (CA) in which both parties are highly motivated through mutual objectives is critical to any collaborative success.

Despite the unambiguous and significant contributions of buyer-supplier collaboration to innovation and NPD, no past study has investigated the quality innovation pathway performance of firms that have taken a calculated and deliberate decision on KT to their suppliers in pursuit of excellence in quality process and innovation. Previous studies have simply presented generalized competitive benefits of buyer-supplier collaborations (Petersen et al., 2003; Petersen et al., 2005; Pulles et al., 2014), mostly based on the shared complementary heterogeneous resources, skills, and practices of the partners (Clark, 1998; Dowlatshahi, 1998; Clark and Fujimoto, 1991). These studies didn't attempt to further understand how to leverage or build the innovation potential of suppliers and whether there are any differences between 'out-in' and 'in-out' quality innovation pathways, or to identify which of the two options would yield better innovation and NPD performance. The current study attempts to narrow these gaps in the buyer-supplier and B2B cooperative relationship literature by investigating fast consumer goods manufacturers' innovation performance outcome based on both 'out-

in' and 'in-out' quality innovation pathways. The primary research questions of our study are: Does quality innovation pathway outcome between 'out-in' and 'in-out' strategies differ? Which buyer-supplier collaboration factor(s) will substantially influence particular quality innovation pathway and the NPD outcome? These two questions are important as both deal with a key asset of an organization—knowledge—and the associated time required for its effective transfer as key factors that managers cannot afford to lose or waste.

The rest of the paper is organized as follows. The next section reviews previous studies on innovation, strategies to build or slice innovation from suppliers, and their impact on buyers' innovation performance. Section 3 discusses the theoretical model and hypothesis development. The details of the methodology used to answer our research questions are explained in Section 4. The final section describes the major findings and summarizes the contributions, limitations, and scope of our study.

2. Literature Review

Innovation and new product development (NPD) have been widely accepted as key competitive advantages (Dyer, 1996; Inemek and Matthyssens, 2013; Chen et al., 2014). However, there are a lack of generalized definitions for innovation or generally accepted rules on how to measure innovation outcomes. For example, Hult et al. (2004) posit that innovation equals a firm's capability to develop and transfer new ideas, processes, or products into reality. However, Menguc and Auh (2006) view innovation from the point of a firm's willingness to explore new opportunities, while Inemek and Matthyssens (2013) suggest that innovation is essentially creating new ideas, new products or processes, and new methods of operations. Inemek and Matthyssens (2013) go on to suggest that innovative suppliers are those who are eager to create new ideas, new product processes, and new methods of operation as well as willing to invest significant funds into new technologies. Given this background, it is further difficult to

find a study on quality innovation that details how far buyers or manufacturers are able to follow a pathway that could suggest to them a quality pathway to reap the benefits from suppliers. Besides this, few other scholars have looked at diverse standards for evaluating innovation outcomes, especially with respect to NPD, that bothers with cycle time, launch time to market, globalization, and marketing research (Hauschildt, 2004; Wind and Mahajan, 1997).

What is clear, however, is that given the complexity of achieving quality innovation and NPD, organizations are employing varied strategies that include global talent hunts, increase in research and development (R&D) budgets, implementation of advanced technologies, and integration of suppliers in their business network for co-creation of innovation. Håkansson and Eriksson (1993) were among the early scholars to integrate innovation and purchasing from a buyer-supplier network perspective when they suggested that new ideas can be derived from close relationships among business networks through exchanged information.

2.1 Identifying innovative suppliers

Suppliers' innovativeness has varied definitions, ranging from their ability to develop new ideas, processes, or products (Burns and Stalker, 1961; Hult et al., 2004) to simply a willingness to explore new opportunities (Menguc and Auh, 2006; Inemek and Matthyssens, 2013). For the purpose of this study, we adopt the definition by Inemek and Matthyssens (2013), which states that supplier innovativeness is "the ability of a supplier firm to generate and implement new ideas, new ways of doing things, or new methods of operation, as well as investments in new products, processes, and technologies."

Numerous studies emphasize the importance of suppliers' innovativeness to buyers' NPD (Schiele, 2006; Pulles et al., 2014; Azadegan and Dooley, 2010). This is because suppliers' capabilities and support are not only important external resources for a

manufacturer or buyer, but they also significantly contribute to a buyer's innovation and innovative capabilities (Pulles et al., 2014; Azadegan and Dooley, 2010). This explains why managers expend extreme care and effort in the identification of innovative suppliers (Rese, 2006; Schiele, 2006).

However, it is difficult to identify or distinguish innovative suppliers, given that suppliers' innovativeness or innovative capabilities are subject to diverse interpretations and can be categorized by multipurpose definitions (Hult et al., 2004; Monnier, 2005). For instance, while some scholars consider a unique performance or functional products as new products (Clark and Fujimoto, 1991; Hsuan 1999), others view buyer-supplier interdependence as an innovative process in itself and a measure for evaluating supplier innovative performance (Wynstra and Pierick, 2000). Schiele (2006) argued that NPD process should not be only for cross-functional team cooperation inside an organization, but also for external collaboration with suppliers. This is because suppliers' resources, including technical assistance as well as new ideas, can significantly enhance a buyer's NPD process (Schiele, 2006). Others studies suggest that suppliers' capabilities facilitate buyers' innovation performance (Clark, 1998; Clark and Fujimoto, 1991) through improved quality, shortened research and development (R&D) time, and reduced cost (Dowlatshahi, 1998; Ragatz et al., 2002).

A number of previous studies, however, have expressed concern about the innovation benefit of buyer-supply integration and/or relationships (Primo and Amundson, 2002; Koufteros et al., 2001; Johnsen, 2009). For example, Johnsen (2009) argued that getting suppliers involved in the NPD process may bring uncertainties into the process, especially for high technological products. Primo and Amundson (2002) opined that long-time cooperative relationship partners are less effective compared to developing new suppliers in terms of revolutionary innovation. Koufteros et al. (2001) suggest evaluating other factors such as supplier location, economies of scale, and tangible and

intangible assets specialization as the influencing factors when considering buyer-supply innovation performance.

In addition to difficulties identifying innovative suppliers, the buyer-supplier relationship does not naturally and unconditionally occur. There is a need for concerted efforts from both parties to cultivate a mutually beneficial relationship with each other. According to Schiele et al. (2012), supplier innovation can only be fully accessed and utilized if the buyer is the supplier's preferred customer. Faced with limited resource allocation choices, suppliers with unique technological advantages or know-how will decide on a partnership based on the level of favorable conditions, such as higher prices (Williamson, 1991) and fair pricing behavior of buyer-supplier (Schiele and Krummaker, 2011). Other buyer-supplier influential factors are trust, prior shared working experiences, historical record of collaboration, and communication efficiency (Schiele, 2006). Basically, suppliers who match with buyers' capabilities and cultures are positively impacted by buyer's product technological performances and overall targets (Petersen et al., 2005). These relational factors help suppliers develop deep relationships, either at the personal or organizational level, and establish bridges with both parties' values and standards regarding product or quality.

Wynstra et al. (2001) contend that close projects or activities should be carried out at different levels and in the cross-functional departments with suppliers to achieve successful integration and NPD. Hoegl and Wagner (2005) investigated 124 buyer-suppliers involved in 28 NPD projects and found that buyer-supplier collaboration plays a significant positive role in terms of product quality, cost control, budget, and timetable management. The key issue, however, is that appropriate supplier's involvement is difficult to measure, as it depends heavily on context and motivations. Compared to relationship, active communication between buyer and supplier is also important when intensity is positively correlated with the quality of their collaboration (Hoegl and

Wagner, 2005).

The other key is determining what kind of buyer's roles or behaviors motivate suppliers to engage in co-creative innovation. For example, when buyers decide to embed supplier technologies or resources in their NPD and when they have a friendly communication environment, that certainly enhances trust-building and may spill out into related innovative activities between the two parties. This argument is supported by the study carried out by Henke and Zhang (2010), who reported that the buyers who help their suppliers be more competitive in their industry in terms of quality and cost are those most likely to realize a win-win situation based on their long-term partnership.

2.2 Knowledge transfer (KT) between buyer and supplier

Knowledge creation, management, and effective deployment have been generally accepted as key resources for a firm's overall creativity and innovative performance. The knowledge-based view (KBV) theory emphasizes that firms could use knowledge to develop continuous competitive advantages in the marketplace (Conner and Prahalad, 1996; Spender and Grant, 1996). Previous studies suggest that integrated knowledge and innovation management can create a strategic and managerial approach with significant impact on a firm's overall innovation performance (Goh, 2006).

To develop competitive advantages, it is evident that buyers have to transfer knowledge both inside and outside their organizations as well as build team values, develop partnerships, and get suppliers involved in innovation and NPD process. Prior studies explained the role of KT in a supply chain context (Ernst, 2000; Mudambi, 2002; Kang, et al., 2010; Li, 2012). According to Kang et al. (2010), buyers generally have higher levels of technologies and capabilities compared with their suppliers, making KT flow more from the buyer to their supplier. For instance, Apple Inc., which is famous for its product innovation and design, outsources its production to China's Foxconn company for cost and quality control with significant KT from Apple. According to Rokkan et al.

(2003), suppliers are keen to invest critical resources requested by buyers knowing that there is a chance of failure cost based on risk-sharing commitment in addition to the opportunity for learning and experiences associated with such investments. In other words, suppliers focus on longer-term partnership development with key buyers to enhance their technological, managerial, and organizational experience over time. Additionally, suppliers need different interdisciplinary structures that can be used to obtain knowledge from buyers (Li, 2012). Similarly, to engage in critical KT to suppliers, buyers prefer suppliers that own special technological advantages or desirable components manufacturing capabilities (Ernst, 2000).

While knowledge transfer from one subsidiary to another or between subsidiaries and their headquarters is two-way for multinationals, this is not the case for small and medium-sized enterprises (SME) (Mudambi, 2002). On one hand, SMEs are quick to assimilate changes, and are more flexible and faster in responding to market changes than multinationals (Chen et al., 2006). On the other hand, however, SMEs have limited knowledge and skills, have limited market power, are easily affected by their big competitors, and need external knowledge for innovation and creativity (Chen et al., 2006). This is in line with the findings of Handzic (2006), which suggest that for innovation and creativity, SMEs often attend technological exhibitions.

Extant studies suggest that KT does not always work well among supply chain networks due to the stickiness of the knowledge (Kang, et al., 2010; Li and Hsieh, 2009; Jensen and Szulanski 2004). According to Jensen and Szulanski (2004), sticky knowledge is a kind of problem that hinders a firm's flexibility and cripples its competence leveraging ability when there is a KT with an external party. Sticky KT occurs due to differences between senders' and recipients' capabilities in the correct encoding or decoding of information, or when the right clarification questions are not asked about existing ambiguities (Szulanski, 2000).

KT is also influenced by factors such as cultural differences and the nature of the KT (Argote and Ingram, 2000; Gupta and Govindarajan, 2000), willingness to share (Du et al., 2012), and the complexity of the KT process (Marabelli and Newell, 2012), all of which affect the level and quality of KT. On cultural differences, for example, China is a collectivist society with a strict hierarchy between senior managers and staff, because of a Confucian culture that demands respect toward higher authorities. Unlike in Western society, where people have a high degree of freedom to express different ideas or perspectives, the Chinese staff may not speak out when they decode information from higher colleagues. The nature of KT has to do with whether the knowledge is tacit or explicit, as tacit knowledge is complex and not easy to explain across languages (Argote and Ingram, 2000; Gupta and Govindarajan, 2000). The willingness to share information has also been found to be a major barrier to KT (Du et al., 2012). It should be noted that knowledge is not only transferred but can also be translated in the transfer process, introducing complexity to the KT process (Marabelli and Newell, 2012). The review suggests that knowledge or KT itself is not an easy or straightforward process, but consists of several dynamic factors that could substantially influence the quality of innovation process.

2.3 New product development outcome

The new product development (NPD) process is challenging, requires resources, and takes time and concerted effort. NPD time and expected resources always end up in conflict with today's fast-changing business environment, especially with FMCGs, where consumers are constantly looking for new and exciting products. This has necessitated a need for OEMs to engage with competent suppliers to develop innovative products in a short span of time to satisfy consumers' requirements (Schiele, 2006; Pulles et al., 2014; Azadegan and Dooley, 2010). Studies suggests that OEMs/buyers benefit tremendously by using suppliers' full potential and associated resources to outperform their competitors in terms of quality innovation and new product

development (Schiele, 2006; Petersen et al., 2005; Samuel et al., 2011; Pulles et al., 2014). Suppliers support buyers in their new product development process through their unique heterogeneous resources, skills, and practices (Clark, 1998; Clark and Fujimoto, 1991). This is in line with resource-based view (RBV) theory, which posits that competitive advantage differs significantly due to firms' heterogeneous resources that are rare, valuable, not available to access by others, or impossible to duplicate, resulting in different levels of performance (Barney, 1991; Wernerfelt, 1984). The above suggests that OEMs or buyers must not only have strong R&D capabilities but also need to know how to utilize a supplier's capability and specialized skills and ideas to shorten NPD time (Schiele, 2006).

However, buyers should be aware that a supplier might not be willing and passionate about NPD, especially when it comes to sharing their limited and scarce resources, if the buyer is not a preferred customer (Schiele et al., 2012). A buyer's attractiveness to a supplier depends on the buyer's interaction strategies for increasing the supplier's dedication and creative innovation compared to the supplier's other customers (Tóth et al., 2014; Schiele, et al., 2012). Literature indicates that suppliers are only willing to collaborate with buyers who can offer mutual respect and outcomes, unique technological advantages, know-how, and other favorable conditions, such as fair pricing (Williamson, 1991; Schiele and Krummaker, 2011). It is only under these conditions that buyer-supplier collaboration will result in the desired improved or new product innovation and development outcomes.

3. Conceptual model and hypothesis development

Studies have shown that it is highly important for buyers to identify innovative suppliers or suppliers with innovative capabilities to enhance their NPD process (Schiele, 2006; Pulles et al., 2014). However, even when such innovative suppliers are identified, their successful integration into OEMs' NPD process is challenging and not always

successful (Lau et al., 2010; Romano and Formentini, 2012). The key obstacle with buyer-supplier integration is the need for KT and the sharing of complementary technologies for which the supplier may be unwilling or not eager to share if the buyer is not a preferred partner (Lau et al., 2010; Romano and Formentini, 2012). For a supplier to share critical knowledge and resources with a given buyer, clear and tangible benefits, such as cost savings and cost reduction, must be established (Lettice et al., 2010; Romano and Formentini, 2012). In addition, a supplier's attitude toward buyers and buyer-supplier relationships are critically important in innovation and NPD outcomes. This is because a supplier's manufacturing capabilities and R&D resources are limited and must be allocated effectively based on the relationship with buyers. In other words, finding a supplier with good credentials, experiences, and innovative passion is a huge task; getting the supplier to share resources with a buyer is a horrendous one. Therefore, trust development, previous cooperative working experiences, sharing knowledge, and effective communication are key issues for buyers seeking to improve their customer status with their suppliers (Schiele, 2006). Additionally, a healthy relationship between buyer and supplier can generate new ideas and performance on the buyer's NPD (Clark and Fujimoto, 1991).

Based on the literature review, we developed a conceptual model with a set of hypotheses, as shown in Figure 1, to investigate quality innovation and new product outcome (NPO) pathways based on joint supplier-buyer relationships in the context of the fast consumer goods (FCGs) industry. Our study focuses on buyers' quality innovation potential based on: (a) identifying an innovative supplier and integrating such supplier into the firm quality system (out-in) or (b) a buyer deliberately engaging in critical KT to a supplier with a view of benefitting based on the experiences gained by the suppler (in-out). The two situations may occur simultaneously, as buyers prefer suppliers that own special technological advantages or desirable components manufacturing capabilities (Ernst, 2000; Pulles et al., 2014; Azadegan and Dooley,

2010), while suppliers are only willing and passionate about sharing their limited and scarce resources with preferred buyers (Schiele et al., 2012).

Insert Figure 1 about here

In the model, we have combined the integration of the innovative supplier into the buyer's firm quality system (out-in) with the buyer's deliberate KT to the supplier for subsequent harvest of the supplier's experience and innovativeness (in-out) for easy reference, as shown in Figure 1. Below we provide details of the constructs and derive the hypotheses used in the study.

3.1 Cost reduction (CR) ability of suppliers and buyers' new product outcome

Literature indicates that buyer-supplier joint product development results in substantial project performance improvements in terms of cost, quality, cycle time, and innovation (Petersen et al., 2003; Petersen et al., 2005). Specifically, the use of suppliers' skills and resources enables buyers to expand their resources, skills, and capabilities without the need for huge investment. In other words, collaboration and joint NPD require bilateral investments in related assets by both partners (Inemek and Matthyssens, 2013). This suggests that buyers would prefer suppliers with significant potential contributions for joint NPD collaboration.

Cost reduction is of particular importance in fast consumer goods (FCGs) because of their short life cycle, which promotes fast NPD to enhance buyers' competitive advantage. Cost reductions in FCGs could be achieved through suppliers' knowledge of the customers and skills in simple and popular designs rather than through the R&D development that OEMs often relied on to bring new products to the market. The traditional R&D process requires a longer development period for product launch time. The key in FCGs NPD is quicker product launch to market relative to competitors by sharing costs and related risks with an innovative supplier.

Previous studies suggest that organizational learning results in substantial increases in productivity and cost reduction (Argote, 1999; Azadegan and Dooley, 2010). It is also established that learning is not solely derived from internal sources but may also be sourced or gained externally to the organization (Argote, 1999). Therefore, KT by buyer to supplier constitutes external knowledge gained and/or learning by the supplier. The buyer's KT to the supplier has been demonstrated to directly impact the supplier's financial performances in terms of cost reduction (Wang and Wang, 2012). The buyer's KT promotes new ideas and creative activities, and emboldens the adoption of new technologies on the supplier's side, which ultimately results in efficiency and NPD performance (Tsai, 2001; Szulanski, 2000).

Essentially, the primary purpose of a buyer's KT to its supplier is to eventually use the acquired capabilities and innovativeness of the supplier for its own effective operational and market performances. This is not surprising, as a buyer's KT to innovative suppliers has been established to positively impact the buyer's cost, innovation, and quality performance (Azadegan and Dooley, 2010; Wang and Wang, 2012). In FCGs, for example, the buyer's KT can simplify the supplier's production process and facilitate shorter production time, enabling both parties to benefit from those improvements. Furthermore, the buyer's KT and sharing may enable the supplier to identify new product or eliminate unnecessary activities and functions, resulting in overall cost reduction and enhanced NPD performance.

Following the above, we hypothesize that:

H1a. Cost reduction ability of suppliers during 'out-in' quality innovation pathway positively supports buyer's new product outcome.

H1b. Cost reduction ability of suppliers during 'in-out' quality innovation pathway positively supports buyer's new product outcome.

3.2 Supplier innovation and passion (IP)

Supplier innovation and passion (IP) refers to the creative enthusiasm and compelling desire of a supplier to achieve improved or new product development success with the buyer. Supplier IP can be demonstrated through the level and quality of interventions as well as the technological capability the supplier is willing to contribute toward the success of the NPD collaboration. Supplier innovation and passion are key factors influencing buyer-supplier relationships (Kang et al., 2010; Du et al, 2012). As a result of their limited size and resources, SMEs' innovation and creativity are essentially based on non-R&D and patents activities (Venckuviene et al., 2014). These low-tech producers' innovation is based on their creative ideas and activities resulting in changes or modifications in design and appearance or applications of products (Venckuviene et al., 2014). Due to FCGs' short life cycles and production lead time characteristics, small and medium enterprises' (SMEs') quick creative abilities for new and popular designs provide the critically important resources and expertise required to compete in today's highly dynamic market environment. Suppliers of FCGs are generally SMEs with limited capabilities, know-how, and resources. Their OEM buyers, however, have more advantages in R&D capabilities, know-how, and financial wherewithal as well as on a managerial level and in market share (Kang et al., 2010). Literature suggests that SMEs need external know-how for their innovation and creativity (Handzic, 2006; Chen et al., 2006; Li, 2012). This implies that small suppliers tend to learn new ideas and know-how application for their creative process from big buyers. The above suggests that buyer-supplier co-creation potential highly depends on what both parties bring to the collaboration. Given that the OEMs have the know-how, technology, R&D capabilities, and stronger market share compared with their smaller suppliers, a major contribution expected from the supplier will be their willingness to fully share their creative ideas and experiences with their OEM buyers in a NPD process. Following these arguments, we posit that:

H2a. Supplier innovation and passion during ‘out-in’ quality innovation pathway positively supports buyer’s new product outcome.

H2b. Supplier innovation and passion during ‘in-out’ quality innovation pathway positively supports buyer’s new product outcome

3.3 Supplier’s collaborative attitude (CA) and buyer’s new product outcome

Collaboration with SMEs category suppliers may not immediately result in NPD for the buyers. Supply chain studies indicate that ineffective collaboration or outright conflict in collaborations are major impediments to successful buyer-supplier relationships (Reve and Stern, 1979; Vaaland, 2006). Literature further suggests that the probability of ineffective collaboration or outright conflict between buyer and supplier gets magnified with costly consequences when the parties involved are highly interdependent (Vaaland, 2006). For example, Vaaland (2006) reported severe conflict in the collaboration between Esso (buyer) and oil-drilling firm Smedvig (seller) with respect to the coordination and communication relating to the construction of a ship vessel that ultimately ended in a costly lawsuit and termination of the business. Therefore, buyer-supplier behavior and collaboration quality will result in different levels of co-creation outcomes. We explore buyer-supplier effective collaboration from three aspects. At the beginning, communication and trust are built through quality information sharing. Buyer may offer key knowledge to supplier as a sign of sincere purpose of cooperation. The establishment of trust through high-quality information exchange represents the basic foundation for both parties to commit to the established business objectives. The buyer then embeds the supplier’s team in their NPD process to motivate the creative passion and innovative capability of suppliers in the collaborative project co-creation. Following the above, we hypothesize that:

H3a. Supplier’s collaborative attitude during ‘out-in’ quality innovation pathway positively supports buyer’s new product outcome.

H3. Supplier's collaborative attitude during 'in-out' quality innovation pathway positively supports buyer's new product outcome.

4. Research Methodology

4.1 Research setting and data collection

In this study, we investigate the fast consumer goods manufacturing sector. Fast consumer goods (FCGs) in this study refers to all daily household cleaning items (such as microfiber wipes for window cleaning, floor cleaning mops and polish, indoor and outdoor dust prevention carpets, cellulose sponges, and plastic brushes for bowl and pan cleaning in the kitchen and bathroom). These products have relatively short life cycles and generally affordable prices, with most suppliers of these products being SMEs. Additionally, the majority of these products are low-tech and available in a wide range of brands that are close substitutes, with similar functions and price range. These characteristics significantly reduce the switching cost of buyers from one brand to another. Therefore, to be competitive in this low-tech products industry, firms must be highly innovative and have NPD capabilities in addition to high-quality products. Literature opined that innovation for low-tech exporters does not result from only R&D investment or numbers of patents, but also from their creative activities (Venckuviene et al., 2014).

For detail and clarity, our conceptual model (Figure 1) has been split into its two distinct pathways: (a) out-in and (b) in-out buyer-supplier quality innovation pathways. In addition to providing clarity, the decision to split the model into two stems from the nature of the dyadic data collected from our respondents (FCGs suppliers and their multinational buyers), in which some of the variables used are distinctively different based on the respective pathway perspectives. For example, the construct for innovation and passion (IP) for the 'out-in' pathway is different from that of 'in-out' because, for 'out-in,' the measures capture the supplier's unique capabilities that influence the

OEM's business decision and willingness to unreservedly embrace the supplier (see Figure 1a and Appendix 1). However, for the 'in-out' pathway (Figure 1b), IP examines the impact of the buyer's KT, investment, and other supportive acts to create innovative suppliers (see Appendix 1b).

Our dyadic data were collected using large-scale email surveys sent to FCGs suppliers and multinational buyers based in Zhejiang Province, which has huge FCG suppliers and multinational buyers based in China. The suppliers and buyers were selected randomly based on the information available on directory, with the multinational buyers and the suppliers' interest in participating in the study. First, a standard protocol of pilot testing was conducted among four firms to ascertain their understanding of our questionnaire items and to capture the firms' view of the clarity of the items included in the questionnaire. This was validated by academic experts in the field of buyer-supplier relationships to make sure it was free from ambiguities. To begin with, all scale items were adopted from published studies (see Appendixes 1 and 2). Before participation, we received consent from respondents that clearly indicated their participation was voluntary and that they had the right to withdraw from participating at any time if they felt uncomfortable completing the questionnaire. Participants were also informed that all the information they provided would be confidential and only used anonymously for the study. Participants were managers or employees with over three years of working experience in related buyer-supplier NPD process. This is in line with Frohlich and Westbrook (2001)'s argument that managers at senior positons are fully aware of their companies' clients and suppliers' relationship, company strategies, and performance. Finally, out of 345 questionnaires distributed, 257 completed questionnaires were returned, of which 47 were unusable due to missing data. A total of 210 useful returned surveys from both supplier and buyers, representing a response rate of 61%, were used for our analysis. Most of the firms surveyed are wholly owned private companies with extensive exporting collaborative experiences of between six to

ten years with multinational firms operating in China. The profiles of the respondents are presented in Table 1.

Insert Table 1 around here

We assessed the survey non-response bias according to Armstrong and Overton (1997)'s recommendation of comparing early and late responses, and found no significant differences between the early and late responses. Finally, based on the sample of 210 valid questionnaire responses, the study analyzed the two models 'out-in' and 'in-out' quality innovation pathway models using the partial least square (PLS) estimation approach feature available in SmartPLS 3.0 software.

4.2 Survey instrument development

The measurement scales used in this study were all taken from previous studies. The out-in model on supplier innovation and passion (IP) is measured by five variables adapted from Pulles et al. (2014) and Du et al. (2012) respectively. The measures capture suppliers' soft capabilities (SSC) that influence buyers' business decisions, willingness to share (SHR) critical resources, and innovation performance over a number of years of being involved with the buyer. Supplier cost control and reduction (CR) is measured by supplier's financial performance (SPF) indicators adapted from Azadegan and Dooley (2010) and Wang and Wang (2012). The final part concentrates on supplier cooperative attitude (CA) with respect to supplier's effect involvement in several collaborative ventures with its buyer and supplier professionalism. The indicators for CA are adapted from Pulles et al. (2014).

Similarly, our 'in-out' model measurements on KT and cost reduction (CR) impact of buyer's KT to supplier is measured by two key indicators: KT financial performance (KTFP) (Wang and Wang, 2012; Chen et al., 2014) and KT innovation performance (KTIP) in bringing about innovation and/or NPD, all adapted from Chen et al. (2014).

Supplier cooperative attitude (CA) is measured using three indicators on supplier-buyer reliable information exchange (RIE) adapted from Li (2012), Karine et al. (2011), and Du et al. (2012). Supplier innovation and passion (IP) is measured with indicators adapted from Karine et al. (2011) and Li (2012). Finally, buyer innovation performance indicators were adapted from Li (2012). All items were measured by 7-point Likert scale (1 = strongly disagree, 7 = strongly agree) in accordance with literature that suggest the scales produce a better mean score (Dawes, 2008; Hair et al., 2013).

4.3 Construct reliability and validity

According to Hair et al (2013), model reliability could be tested using internal Cronbach's alpha, composite reliability, convergent validity or average variance extracted (AVE), and discriminant validity. The reliability of our measures was assessed using Cronbach's alpha. The Cronbach's alpha values of our key constructs for both models in this study ranges from 0.841 to 0.924, a much higher value than the recommended acceptable value of 0.70 (Nunnally, 1978). This indicates high reliability in the constructs used in our models. Despite this, we also tested composite reliability of our constructs, since its score is superior to the Cronbach's alpha score of internal consistency within a construct as it uses the item loadings of causal model (Fornell and Larcker, 1981). The composite reliability results for our two models range from 0.869 to 0.952, which again is higher that the recommended value of 0.70 (Fornell and Larcker, 1981; Gefen et al, 2000), further confirming adequate reliability and validity of models' constructs.

In general, if a measurement model has multiple constructs, it is necessary to test for construct discriminant validity by examining its average variance extracted (AVE), which is defined as the grand means value of the squared loading of the indicators associated with the construct (Hair et al., 2013, p103). It is recommended by Fornell and Larcker (1981) that AVE values exceeding 0.50 indicating the construct explains 50% or more of latent variables, The AVE should also exceed all inter-construct

correlations for each construct (Fornell and Lacker, 1981; Koufteros et al., 2001). The discriminant validity results of our two models range from 0.574 to 0.765, exceeding the recommended value (Fornell and Larcker, 1981), indicating that adequate reliability. Tables 2 through 7 present the discriminant validity results for our 'out-in' and 'in-out' models respectively.

Insert Tables 2 - 7 about here

The results illustrate that the square root of AVE is larger than the correlation among all latent variables scores in terms of corresponding row and column values. The results indicate no variable shares more variance with other variables than with its own, suggesting adequate levels of discriminant validity.

4.4 Model results and hypothesis testing

Both models shown in Figures 1a and 1b were analyzed using a partial least square (PLS) estimation approach (Wetzer, et al., 2009) with suppliers and buyers data. Structural path coefficients of the 'out-in' model shown in Figure 2 reveal that cost reduction (CR) ability of suppliers during out-in quality innovation pathway (H1a) does not support the buyer's new product outcome. This suggests that the buyer's innovation and new product outcome is not impacted by the supplier's cost reduction ability. Interestingly, innovation and passion (IP) is significantly correlated with buyer's new product performance. Hence, supplier innovation and passion during 'out-in' quality innovation pathway (H2a) positively supports buyer's new product outcome. Similarly, supplier's collaborative attitude during (H3a) 'out-in' quality innovation pathway positively supports buyer's new product outcome.

Insert Figure 1b about here

Our ‘in-out’ model analysis reveals that cost reduction ability of suppliers during ‘in-out’ quality innovation pathway (H1b) positively supports buyers’ new product outcome. This suggests that the buyer’s KT substantially builds supplier capability to reduce cost that ultimately translates into the buyer’s new product outcome. Similarly, a supplier’s innovation and passion (IP) strongly influences the buyer’s new product outcome. This indicates that supplier innovation and passion during ‘in-out’ quality innovation pathway (H2b) positively supports the buyer’s new product outcome. However, the supplier’s collaborative attitude (CA) during ‘in-out’ quality innovation pathway (H3b) does not support the buyer’s new product outcome. This implies the buyer’s new product outcome after KT to a supplier did not experience any significant improvement. Overall, the results show that supplier cost reduction ability (CR) and innovation and passion (IP) play positive roles in buyers’ new product outcome based on KT from buyer to suppliers.

5. Discussion

The study results have partly supported our hypotheses for both ‘out-in’ and ‘in-out’ quality innovation pathways models. In the case of an ‘out-in’ pathway to identify innovative suppliers, our findings suggest that a supplier’s innovation and passion has a positive relationship with the buyer’s new product outcome. This finding is in line with literature that suggests the incorporation of innovative suppliers can substantially influence the innovative capabilities and NPO process of a buyer (Schiele, 2006; Pulles et al., 2014). The finding rests on the premise that suppliers can offer key complementary capabilities and resources such as new ideas, new complementary processes, new methods of operations critical for speedy NPO, and innovation (Inemek and Matthyssens, 2013).

Similarly, suppliers’ cooperative attitude (CA) also benefits buyers’ new product outcome. This finding demonstrates that a supplier’s willingness to fully participate and

to offer all necessary assistance with both physical and non-physical resources in the collaboration is imperative to the success of the NPO process. This is consistent with previous studies that suggest that a collaborative relationship between buyer and supplier overwhelmingly contributes to the buyer's innovation performance (Clark, 1998; Clark and Fujimoto, 1991; Takeishi, 2001).

Thus, suppliers with cost reduction ability do not have a significant impact on buyers' innovation and NPO performance. This may be explained by the unclear nature of the source of financial performance or cost reduction ability in the buyer-supplier collaborative relationship. While a number of firms have reported achieving internal manufacturing cost reduction as a result of collaboration with suppliers (Azadegan and Dooley, 2010), Sinclair et al. (2000) found that the cost reductions associated with learning in collaboration were in fact due to R&D and related other activities of the firms they studied. Hence, with the limited study, it is hard to determine the explanation for suppliers' cost reduction during buyer-supplier collaboration.

The results for the 'in-out' pathway are somewhat different from that of the 'out-in' pathway. First, buyer-supplier collaborative attitudes (CA) have no impact on the buyer's new product outcome, unlike in the 'out-in' pathway, where positive impact of supplier's CA to buyer's NPO performance is supported. This particular result may be due to a supplier's limited willingness to share resources with a buyer because of the low attractiveness of the buyer (Schiele, 2012). A buyer's attractiveness to a supplier depends on the buyer's interaction strategies for increasing the supplier's dedication compared to the supplier's other customers (Tóth et al., 2014; Schiele, et al., 2012). This result may also not be unconnected with the uniqueness of buyer-supplier positions in the FCGs industry and the quality innovation pathway taken. For example, compared to identifying innovative suppliers (out-in), 'in-out' quality innovation pathway advocates KT to supplier for innovation and NPO performance. However, for a

successful KT, both parties in the knowledge-sharing should have similar capabilities for effective encoding and decoding of the shared knowledge (Kearns and Sabherwal, 2007). This is not always the case in buyer-supplier relationships, as often OEM buyers have more powers and capabilities than suppliers. Therefore, if buyer and supplier are not in equal positon to influence each other and buyer is unable to suitably motivate supplier, this will have a negative effect on CA. Unlike the 'out-in' pathway, the supplier's cost reduction ability (CR) significantly and positively impacts the buyer's innovation and NPO. The supplier's CR ability results from the relative ease of modifying FCGs without risk to intellectual property or patent rights for both buyer and suppliers because of the low-tech products involved in the FCGs industry. Finally, innovation and passion (IP) of supplier is also positively correlated with buyer's NPD because of the non-R&D innovation activities of suppliers. This is in line with literature that states SMEs' innovation and creativity are essentially based on non-R&D and patents activities (Venckuviene et al., 2014), as such innovations lead to quicker new product development and shorter production lead time.

6. Conclusion

This study investigated two quality innovation pathways for buyers' innovation and new product outcome (NPO) within the fast consumer goods (FCGs) industry. The study results show that, while supplier's innovation capability and passion are common factors that influence buyer's innovation and NPO, cooperative attitude and cost reduction ability of suppliers are the key differentiating factors between 'out-in' and 'in-out' NPO pathways that lead to better market performance outcome for buyers in the context of the Chinese FCGs industry. Essentially, the study suggests that while other factors, such as CA and CR, are important, buyers should focus their attention on suppliers' innovation capability and passion if they wish to achieve innovation and relatively rapid new product outcome. FCGs firms need to be flexible and adaptable in applying mixed strategies of innovative pathways by maintaining and using suppliers'

innovation capabilities. This can be achieved through buyer's KT to supplier or by the identification of innovative suppliers that are passionate to collaborate in NPO to enhance their innovation and market competitiveness.

This study is not without its limitations. First, the study focused only on buyer-suppliers in the FCGs industry. The study must be extended to buyer-suppliers in other industries to establish the accuracy of our findings. Second, all our observations were from firms located in Zhejiang Province in China, limiting the national generalizability of the study. The study also did not consider the role of culture in buyer-supplier collaboration and its impact on their innovation and NPD performance. Finally, even within the innovation and NPO performance, this paper only considers CA, CR, and IP as its constructs; other studies might wish to expand on this by considering additional constructs that could impact a buyer's innovation and NPO performance. These limitations, however, do not negate the essence of the study, as it has given manufacturing managers clear decision-making support on quality innovation pathways using either out-in or in-out models for innovation performance.

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Tables and Figures

Table 1: Respondents' Profile

Characteristics	Index	Percent
Ownership	Chinese privately owned	54.5
	Joint Venture	27.3
	Wholly foreign	18.2
	State-owned	0
Years in operation	<5	9.0
	6~10	45.6
	11~20	36.4
	>=20	9.0
Number of Employees	<50	16.7
	51~100	25.0
	100~300	25.0
	301~500	16.7
	500~1000	8.3
	>1000	8.3
Annual sales (Million USD dollars)	<1	0
	1~5	54.5
	6~10	18.2
	11~20	18.1
	>21	9.0
Business Orientation	Export oriented	18.2
	Local and export	81.8

Table 2: Construct reliability for ‘out-in’ quality innovation pathway model

Item	Loading	Composite reliability	Average Variance extracted	Cronbach’s Alpha
Buyer New Product Outcome (BNPO)				
BIP1	0.840	0.942	0.765	0.924
BIP2	0.907			
BIP3	0.903			
BIP4	0.894			
BIP5	0.825			
Supplier Innovation and Passion (SIP)				
SHR2	0.845	0.869	0.574	0.824
SHR4	0.803			
SCO1	0.822			
SCO2	0.831			
SIP4	0.817			
SSC3	0.618			
SSC4	0.679			
Supplier Cost Reduction(CR)				
SFP1	0.708	0.890	0.671	0.850
SFP2	0.794			
SFP4	0.882			
SFP5	0.881			
Supplier Cooperation and Attitude (CA)				
SPS1	0.877	0.881	0.712	0.815
SCO1	0.822			
SCO2	0.831			

Table 3: Discriminant Validity for ‘out-in’ quality innovation pathway model

Fornell-Larcker Criterion for Correlation Matrix				
	CA	**CR**	**IP**	**NPO**
CA	0.844			
CR	0.481	0.819		
IP	0.550	0.525	0.758	
NPO	0.088	-0.076	-0.187	0.875

Table 4: Construct relationship significance of ‘out-in’ model

Relationship of constructs	NPO	
	P value	T value
CA - NPO	0.063	1.863
CR-NPO	0.748	0.321
IP-NPO	0.015	2.446

Table 5: Construct reliability for 'in-out' quality innovation pathway model

Item	Loading	Composite reliability	Average Variance extracted	Cronbach's Alpha
Buyer New product outcome (NPO)				
BIP1(NPO1)	0.877	0.904	0.759	0.841
BIP4 (NPO4)	0.880			
BIP5 (NPO5)	0.855			
Cooperative Attitude (CA)				
SBC1 (CA1)	0.833	0.934	0.670	0.918
SBC2 (CA2)	0.884			
SBC3 (CA3)	0.805			
SBC4 (CA4)	0.791			
SBR1	0.819			
SBR2	0.790			
SBR4	0.805			
Innovation and Passion (IP)				
MI3 (RIE3)	0.852	0.897	0.743	0.828
MI4 (RIE4)	0.863			
MI5 (RIE5)	0.872			
Cost Reduction (CR)				
KTFP1	0.843	0.952	0.666	0.944
KTFP2	0.788			
KTFP3	0.824			
KTFP4	0.770			
KTFP5	0.808			
KTP1(KTIP1)	0.830			
KTP2(KTIP2)	0.842			
KTP3(KTIP3)	0.848			
KTP4(KTIP4)	0.862			
KTP5(KTIP5)	0.735			

Table 6: Discriminant validity for 'in-out' quality innovation pathway model

Fornell-Larcker Criterion for Correlation Matrix				
	CA	**CR**	**IP**	**NPO**
CA	**0.862**			
CR	0.756	**0.816**		
IP	0.766	0.814	**0.819**	
NPO	0.724	0.837	0.703	**0.871**

Table 7: Construct relationship significance of ‘in-out’ model

Relationship of constructs	NPO	
	p Value	t Values
CA	0.842	0.200
CR	0.000	5.408
IP	0.064	1.854

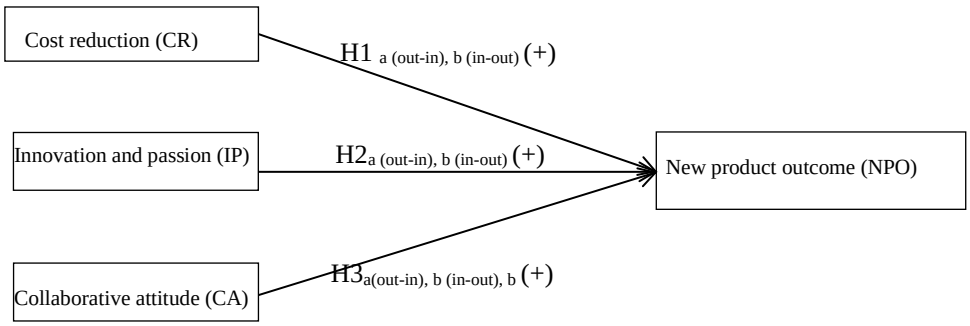

Fig. 1: (a) ‘Out-in’ and (b) ‘in-out’ quality innovation pathways conceptual model

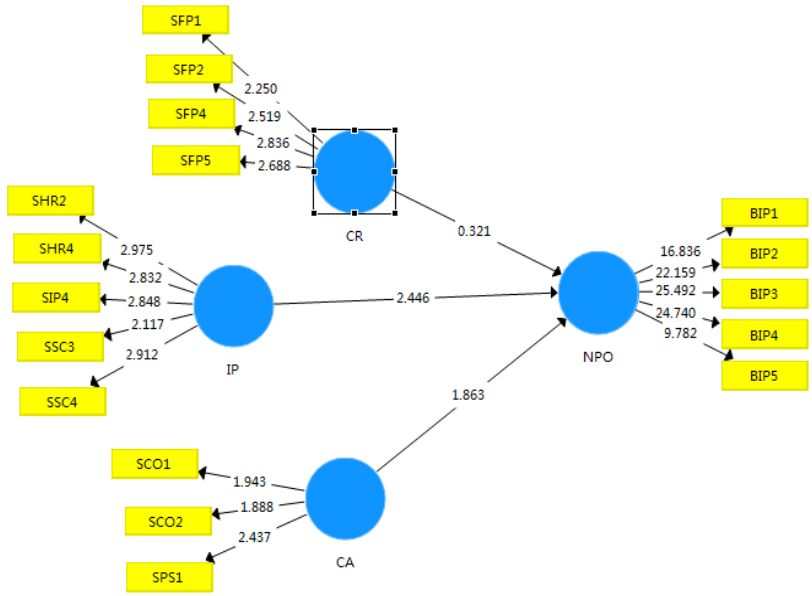

Fig. 1a: 'Out-in' quality innovation path model

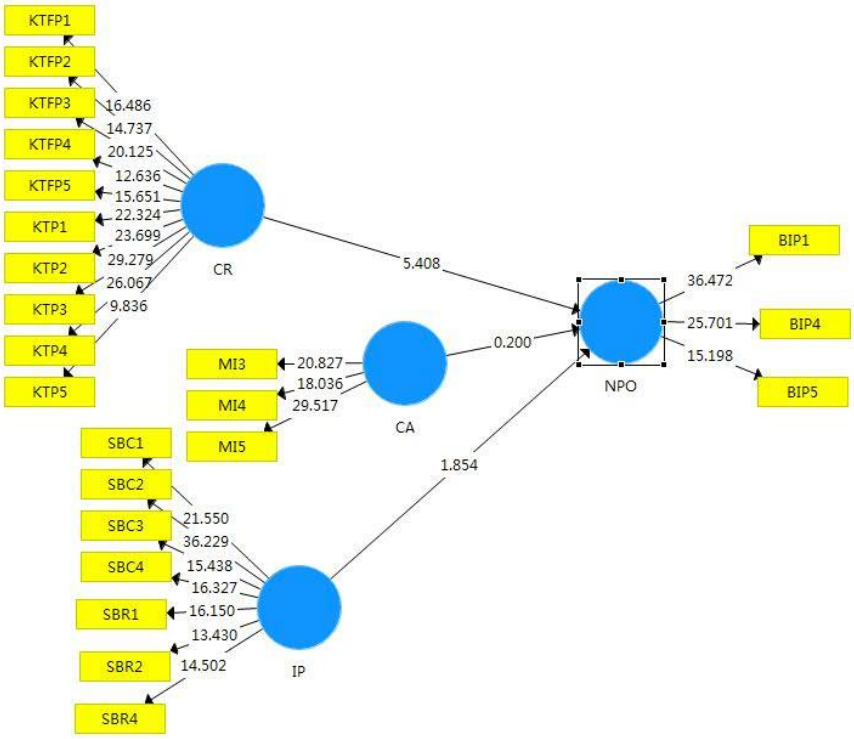

Fig. 1b: 'In-out' quality innovation path model

Appendix 1a: Key items on 'out-in' quality innovation pathway

Constructs	Independent variables	Measures	Adapted from
Innovation & Passion (IP)	SSC 3	We and our partner are able to influence each other's business decisions.	Du et al. (2012)
	SSC 4	We offer training programs for our staff to improve new innovation understanding.	Du et al. (2012)
	SHR2	The level of technological capability the supplier possesses and is willing to use for our products is higher	Pulles et al. (2014)
	SHR4	The supplier is willing to share key technological information.	Pulles et al. (2014)
	SIP4	In comparison with its competitors, our supplier has introduced more creative and useful products and services in the past five years.	Azadegan and Dooley (2010)
Collaborative attitude (CA)	SPS1	Our supplier obtained relevant quality certificates (e.g., ISO 9000)	Pulles et al. (2014)
	SCO1	This supplier is involved in several collaborative ventures, not only with our company.	Pulles et al. (2015)
	SCO2	This supplier's management attaches importance to collaborative customer relationships.	Pulles et al. (2016)
Cost reduction (CR)	SFP1	Average innovation investment of our organization is better as compared to key competitors.	Wang & Wang (2012)
	SFP2	Average profit of our organization is better as compared to key competitors.	Wang & Wang (2012)
	SFP4	Average return on sales of our organization is better as compared to key competitors.	Wang & Wang (2012)
New product outcome (NPO)	BIP1	Knowledge transfer will enhance buyers new product outcome and thereby it increases buyers' market share.	Li (2012)
	BIP2	Knowledge transfer will enhance buyers' new product outcome and thereby increases buyers' market share growth.	Li (2012)
	BIP3	Knowledge transfer will enhance buyers' new product outcome and thereby increases buyers profit growth.	Li (2012)
	BIP4	Knowledge transfer will enhance buyers' new product outcome and thereby increases buyers overall profitability.	Li (2012)
	BIP5	New products outcome can enhance buyers' quality innovative attitude towards their supply chain partners.	Li (2012)

Appendix 1b: Key items on 'in-out' quality innovation pathway

Constructs	Independent variables	Measures	Adapted from
Innovation & Passion (IP)	SBR2	We regularly share SCM practices with our suppliers.	Karine et al. (2011)
	SBR4	We have a high degree of smoothly coordinated business activity with our suppliers.	Karine et al. (2011)
	SBC1	We have a strong sense of loyalty to our supplier, after implementing KT.	Li (2012)
	SBC2	We are willing to dedicate whatever people and resources it takes to satisfy our supplier, after implementing KT.	Li (2012)
	SBC3	Suppliers are likely to invest more for business development after receiving valuable KT.	Li (2012)
	SBC4	We increase interdependency with the supplier after KT.	Li (2012)
Cooperative attitude (CA)	MI3	We exchange more reliable information with our suppliers	Karine et al. (2011)
	MI4	We share our failures and difficulties with supplier's managers to warn them and help them at the same time.	Karine et al. (2011)
	MI5	Supplier's involvement in our new product brainstorming session facilitates enthusiasm.	Karine et al. (2011)
Cost reduction (CR)	KTP1	The transferred knowledge facilitates the innovation ability of our supplier.	Chen et al. (2014)
	KTP2	The transferred knowledge induce many innovation activities at supplier side	Chen et al. (2014)
	KTP3	The transferred knowledge achieved many innovation results at our supplier side.	Chen et al. (2014)
	KTP4	The transferred knowledge shortened our supplier's innovation time period.	Chen et al. (2014)
	KTP5	The transferred knowledge reduced supplier production or management cost.	Chen et al. (2014)
	KTFP1	Our average innovation investment is lower than that of our main competitors.	Wang & Wang (2012)
	KTFP2	Our average profit is higher than that of our main competitors.	Wang & Wang (2012)
	KTFP3	Our growth margin is higher than that of our main competitors	Wang & Wang (2012)
	KTFP4	Our average return on sales is higher than our main competitors' in the last year.	Wang & Wang (2012)
	KTFP5	Our increase in new product sales is higher than our main competitors in the last year.	Wang & Wang (2012)
New product outcome (NPO)	BIP1	Knowledge transfer will enhance buyers new product outcome and thereby it increases buyers' market share.	Li (2012)
	BIP4	Knowledge transfer will enhance buyers' new product outcome and thereby increases buyers overall profitability.	Li (2012)
	BIP5	New products outcome can enhance buyers' quality innovative attitude towards their supply chain partners.	Li (2012)