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STRATEGIC ALLIANCE FORMATION AND THE EFFECTS ON THE

PERFORMANCE OF MANUFACTURING ENTERPRISES FROM SUPPLY CHAIN

PERSPECTIVE

Abstract

This study examines the antecedents of strategic alliance formation in manufacturing firms in China, the alliance effect on innovation capability and dyadic quality performance, and how these two organizational capabilities are related to the supply chain performance of Chinese manufacturing enterprises in Shanghai. We perform a series of statistical techniques including logistic regression analysis, multivariate analysis of variance, and multiple regression analysis for assessing the hypothesized relationships. Our findings indicate that relational stability and effective communication are significant antecedent factors influencing strategic alliance formation among Chinese manufacturing enterprises. Such alliance formation is found to benefit innovation capability and dyadic quality performance, which are significant contributors to the supply chain performance of Chinese manufacturers. We provide important theoretical and practical implications on these antecedents and consequences of strategic alliance formation leading to supply chain performance in the Chinese manufacturing context.

1. Introduction

In recent years, considerable studies by operations management researchers have

examined the importance of cooperative alliances. These studies have stressed the

advantages due to alliances through which enterprises are able to enhance cooperative

behavior and resolve competitive conflicts (Anand and Khanna, 2000), obtain greater

learning benefits (Sampson, 2002), develop innovative products (Grenadier and Weiss,

1997), deal with turbulence and market uncertainty (Andersen and Buvik, 2001), and

improve technical skills (Eisenhardt and Schoonhoven, 1996). Since the entry of China into

the World Trade Organization (WTO), Chinese manufacturers have been experiencing

pressures to compete or cooperate with foreign organizations from developed countries,

for example, through managing their global supply chains. The intensified competition and

sophisticated performance requirements in international markets are causing Chinese

manufacturers to improve their supply chain performance (Zhu, Sarkis and Lai 2011).

Servicing as a production plant of global importance, Chinese manufacturers need to address the supply chain performance concerns and increase their international competitiveness.

There are many international manufacturing joint ventures in China particularly in the automobile manufacturing sector such as Bayerische Motoren Werke AG (BMW) with Brilliance China Automotive Holdings Ltd and Nissan with Dongfeng. Traditionally, joint venture is a market entry approach where firms looking for new market often provides inputs such as goods, services, and financial investments, while the local partners arrange labor and access to domestic networks. Enterprises increasingly adopt this type of arrangements working together in a supply chain to benefit from scale economy in manufacturing and distribution. A similar approach on strategic alliance is a more long-term oriented mode of inter-firm relationships, where the involved partners share capabilities, knowledge and resources with a common goal of strengthening the competitive position of partners in the alliance (Soosay et al., 2008). Nevertheless, strategic alliance is a different from joint venture in three ways where the former require independence of the parties, sharing of benefits among the involved parties, and continuous involvement in key strategic areas such as technology and market development (Monczka et al 1998). While joint venture is a different form of alliance with resources investment by

the involved parties to create a new enterprise for joint management, such alliances require proper supplier management to gain success in China (Zhang and Goffin 2001). Although the importance of supplier commitment in support of logistics operations has been recognized in the literature (Wong et al., 2012), research on strategic supplier alliance and supply chain performance for Chinese manufacturers, especially that consider the antecedent factors such as relational stability, effective communication, and operational collaboration is still in its infancy. Further, it is unclear how dyadic quality performance and innovation capability in the alliance contribute to supply chain performance. Understanding these relationships will allow both Chinese manufacturers and policy makers to formulate and implement appropriate strategies to serve the global supply chain, where Chinese manufacturers play an important part.

Scholars are paying attention to the improvement of supply chain performance in line with the growing interest on developing strategic alliances in the supply chain (Goffin et al., 2006). According to Simchi-Levi et al (2008), supply chain management (SCM) is "a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandises is produced and distributed at the right quantities, to the right conditions, and at the right time, in order to minimize systemwide costs while satisfying service level requirements." There are several important goals of SCM where the

involved enterprises commonly seek to reduce inventory risks, accelerate product delivery time, and lower manufacturing costs in the hope of expanding market share, increasing return on assets, upgrading product quality, and enhancing customer service. These different supply chain parties work cooperatively together to tackle uncertain business environment conditions characterized by rapid product obsolescence and fast-evolving customer needs. One way to generate profitability is to cooperate with both upstream and downstream partners through which the entire supply chain is empowered for higher customer responsiveness, greater flexibility to tackle changing market conditions, better customer service and satisfaction, increased customer retention, and more effective marketing (Horvath, 2001). However, these supply chain performance goals are still far from being achieved by many enterprises due to different reasons. Among them, imbalanced information and lack of resources have been the causes leading to unproductive cooperation in the supply chain (Feldmann and Muller, 2003).

On the other hand, the mismatch between global supply and demand in localities gives rise to opportunistic behavior, where enterprises may seek to maximize their self-interest at the expense of other supply chain partners. As a result, overall supply chain performance in terms of cost and service improvements can be compromised (Simatupang and Sridharan, 2002; Fisher, 1997). "Channel conflict" between supply chain partners has

been used to describe the problems encountered by the involved parties (Rosenberg and

Stern, 1970). Prior studies have suggested that cooperation in the form of alliances is a

potential strategy to ease channel conflict and hence improve performance in a supply chain

because it requires a reasonably open exchange of information to promote success for both

sides of the allied parties (Weitz and Jap, 1995). The resulting information transparency is

valuable for matching demand and supply conditions and reducing inventory wastes in the

supply chain (Wong and Lai, 2009). Empirical studies have found that cooperation in the

form of alliances enable firms to share financial risk, improve service quality, increase

productivity, and reduce costs (e.g., Gunasekaran et al., 2008).

Although the literature tends to support that cooperative alliance is beneficial for

performance, it remains unclear what factors influence the strategic alliance formation with

suppliers and whether such alliance can lead to better organizational capability and hence

performance outcomes in the supply chain. Specifically, the objectives of this study relate

to the following research questions: Do antecedent factors pertaining to relational stability,

communication, and operational collaboration affect strategic alliance formation with

suppliers in a Chinese manufacturing context? If so, how can the innovation capability,

dyadic quality performance and subsequent supply chain performance be accounted for by

the alliance formation? Answers to these questions can help fill the research gap in the

business logistics literature on the antecedent-alliance-performance relationships in the Chinese manufacturing context. Practical insights are provided to managers seeking to enhance supply chain performance through nurturing strategic alliance formation with suppliers. Managers will better understand how the various antecedent factors are conducive to the formation of alliance relationship with partners and the consequent performance outcomes in Chinese manufacturing context.

2. Theoretical Background and Hypotheses Development

There are several advantages for firms to establish strategic alliances and reap performance gains. Gulati (1995, 1998) has considered alliance as "any independently initiated interfirm link that involves exchange, sharing or co-development". It is through the strategic alliance formation that firms can benefit from the economic exchange which can be attributed to better operational collaboration and sharing via effective communication leading to co-development in innovation capability and quality performance.

Two broad research streams serve to explain the motivations behind establishing cooperative alliances between suppliers and buyers. Firms along the supply chain form strategic cooperative alliances in the hope of acquiring needed resources, learning new

technical skills, and obtaining information (Varadarajan and Cunningham, 1995; Eisenhardt and Schoonhoven, 1996). Grounded on the Social Exchange Theory, this explanation indicates that social relationships are formed and maintained because the partner firms offer reciprocal benefits to one another over time (Gouldner, 1960). To form a strategic alliance with suppliers, buyers and suppliers will establish relationship together particularly if they feel the interdependencies are beneficial for each other. The importance of social exchange in nurturing buyer-supplier relationships has been recognized in the logistics literature (Lai, 2009). If the involved parties fail to reciprocate, the relationships would cease to exist (Lawler, Thye, and Yoon, 2000). On the other hand, Golicic and Menzter (2006) suggested that relationship magnitude comprising trust, commitment, and dependence affects relationship types and how the value of the relationship is perceived. Following this reasoning, prior studies have suggested the important roles of social network and organizational linkages in developing social capital (e.g., Eisenhardt and Schoonhoven, 1996). In cooperative alliances, partner firms are closely integrated through voluntary, informal, and reciprocal bonds with which their resources are exchanged in a mutually beneficial manner (Das and Teng, 2000). Due to the strategic importance of supplier inputs to ensure quality output performance in the supply chain, it appears critical for firms to understand how the social exchange elements including relational stability, communication,

and operational collaboration affect strategic alliance formation with their suppliers, and if so, the supply chain performance benefits. These elements are examined as the antecedent factors influencing strategic alliance formation with suppliers as they engender continued relationship building and foster reciprocity in the relationship building process between the exchanged parties. While a stable relationship is favorable to entice supplier commitment (Lai et al., 2005), communication and operational cooperation are helpful for reducing uncertainty in the exchange (Wei et al., 2012). From the social exchange perspective, these elements suggest an inclination of firms seeking favorable exchange and development of long-term relationship and mutual interest (Leung et al., 2005).

The second explanation is drawn from the Goal Interdependence Theory. According to Deutsch (1949), people's beliefs about how their goals are congruent with their partners' goals affect how they interact with their partners, which in turn affects the group cohesiveness and performance. In particular, when an economic exchange is structured cooperatively, there are positive correlations among team members' rewards. Cooperative alliances in a supply chain are helpful for building shared goals and promoting supportive behavior among partner firms, whereby each individual partner consider the interests of the others. A successful alliance has a long-term orientation characterized with trust, loyalty, and sharing of information, risks, and rewards (Ellram and Cooper, 1990).

These partner firms share past resources (e.g., experiences and know-how on information sharing, inventory systems, IT capabilities) that are beneficial to the entire supply chain due to the better ability of the partner firms to access and utilize these resources for enhancing the effectiveness of supply chain operations (Sheu et al., 2006). When the goals of the firms are consistent, they are better motivated to innovate and satisfy the quality requirements of their exchange relationships for mutual interests. From this goal interdependency perspective, we seek to examine if strategic alliance formation with suppliers is beneficial for innovation capacity and dyadic quality performance, which in turn contribute to alliance performance. Such logic highlights that the sustainability of a strategic alliance relationship can be a vital contributor to supply chain performance allowing involved parties to benefit from the resources of other alliance partners.

This study seeks to contribute to the literature by empirically answer the following two questions: (1) do the characteristics of buyer-supplier relationship (BSR), including relational stability, effective communication and operational collaboration, affect the strategic alliance formation in the relationship? (2) if the alliance formation is beneficial for innovation capability and dyadic quality performance, which in turn contribute to supply chain performance.

2.1 The characteristics of buyer-supplier relationship and strategic alliance formation

Relational stability is pertinent to short-term productivity improvements and attaining long-term competitive advantage in the market place (Stuart, 1997). The ability of an enterprise to improve its supply chain performance can be affected by the quality of relationships formed with other firms in the supply chain (Hsu, 2005), where such organizational stability can be enhanced through the formation of strategic alliance with suppliers. In this study, the formation of supplier alliance means that buyer firms emphasize a long-term orientation and encourage mutual planning and problem solving in the BSR. The alliance is strategically formed as it allows buyer firms continuous and reliable access to required resources such as information, materials, and technology from their suppliers. According to the social exchange theory, buyer firms seek to establish strategic alliance with their suppliers in the hope that the latter can reciprocate with the needed resources over time. Such a long-term oriented BSR in the form of strategic alliance requires a stable relationship in order to realize the potential performance benefits (Lai et al., 2005). Complementing the long-term orientation, stability in a BSR requires the willingness of the involved parties to make short-term sacrifices to maintain the relationship where they feel secure and confident in the relationship (Lai, Cheng, and Yeung, 2005). Yang (2009)

shows that relational stability is a determinant of the success of supplier alliances. Managing inter-organizational relationships in a way to nurture closer linkages and facilitate cooperation is essential for a BSR to succeed (Lai et al., 2008). Firms that have stable relationships with suppliers can better align their interests and goals with those of their suppliers (Leung et al., 2005) and thus have great intent to form strategic alliances with suppliers. In line with this argument, it leads to the hypothesis that:

H1: Relational stability positively affects strategic alliance formation with suppliers.

Effective communication with suppliers refers to information sharing between a focal firm and its suppliers for coordination of business activities in a BSR (Sanders and Premus, 2005). This organizational ability represents knowledge resources of a firm in gaining access to information and knowledge of its partner firms. Effective communication is crucial in enabling data visibility between partner firms, which not only enhances inter-organizational information flow in a BSR (Brown and Magill, 1999) and strengthens the relationship (Wong et al., 2009a), but also provokes cooperation by means of alliances in support of effective economic exchange. The interaction with effective communication is a learning process that increases the intelligence and capability of the BSR by which actions

are improved through better knowledge and understanding. This learning process proceeds in a series of organizational transformations or cultural changes in which all kinds of knowledge are recombined to form something new, resulting in a capacity to create and acquire knowledge, and to upgrade the skills, expertise, and competencies in the BSR. Effective communication has also been recognized as imperative to foster confidence, reduce dysfunctional conflicts, and build successful relationships with suppliers (Teo et al., 2009), thus motivating supplier firms to form a strategic alliance with their partners. Accordingly, we argue that:

H2: Effective communication positively affects strategic alliance formation with suppliers.

Operational collaboration is considered an effective strategy to minimize operational cost which in turn yields business development outcomes (Cousins, 2005). The benefits from operational collaboration serve as strong motivations for enterprises to form a strategic alliance with their key suppliers. Zacharia et al. (2009) suggested that interdependency of knowledge and process, supply chain partner insight, and the level of collaboration between buyers and suppliers in the supply chain affect the outcomes of a collaboration project. Their study results indicate that higher levels of collaboration led to improvements in

operational and relational outcomes, which together led to improvements in asset utilization, competitive position, organizational performance and profitability. Operational cooperation is concerned with the willingness to make changes accommodating the needs of partners (Lai, 2009). In this study, these changes involve sharing operations planning information, developing and sharing forecast demands and sales, linking order management systems, and moving towards joint capacity management systems. Such a long-term oriented relationship can be easily established based on the existing value exchange through operational collaboration. The most advanced supply chain infrastructures (e.g., open connectivity, systems and channel integration, and supply chain collaboration exchanges) are likely to fail if a business does not restructure existing processes to take full advantage of new capabilities and opportunities (Horvath, 2001). Scholars have argued that firms characterized with collaborative behaviors have a higher propensity to develop commitment, learning, common vision, and knowledge sharing (Calantone, Cavusgil, and Zhao, 2002). It is natural for buyer firms emphasizing operational collaboration to establish a strategic alliance with suppliers in the hope of reaping the benefits from a long-term oriented BSR. This situation leads us to hypothesize that:

H3: Operational collaboration positively affects strategic alliance formation with suppliers.

2.2   *Linking Strategic alliance formation, innovation capability, and dyadic quality performance*

The suppliers through an alliance will become part of a well-managed chain and thus have a lasting effect on the competitiveness of the entire supply chain (Choi and Hartley, 1996). There are several types of value derived from a BSR in an alliance including operational performance improvements, integration-based improvements, supply capability-based improvements, and financial performance outcomes (Terpend et al., 2008). The ability of an enterprise to improve its supply chain performance can be affected by the quality of relationships formed with partners and suppliers (Lai, 2002). A stable collaboration alliance gives companies the advantage of surpassing competitors in this information age and globalized business world (Gunasekaran, Lai, and Cheng, 2008). This advantage is reflected in the ability of a firm to develop innovative new products and conform to quality requirements for both suppliers and buyers (Koufteros, Cheng, and Lai, 2007). A stable alliance formation is crucial to success for dyads because both organizations can

concentrate on their core business and benefit from extra opportunities to venture out into other markets (Anslinger, 2004).

Innovation capability is concerned with the ability to translate and exploit knowledge for successful generation, acceptance, and implementation of new ideas, processes, products, and services (Thompson, 1965). This ability requires enterprises to recognize the value of new, external information, assimilate it and apply it to benefit the end customers (Cohen and Levinthal, 1990). The formation of supplier alliances is highly desirable for achieving this goal as it allows buyer firms to build knowledge and skill base, improve creativity through investing in research and development (R&D), identify and create new values for customers, harness organizational intelligence and manage technology to increase innovation. A stable relationship with suppliers in an alliance also facilitates close working relationships and transparent flows of information in the BSR such that buyer firms can obtain the right quality of products or services at the right prices to innovate, while suppliers can provide a quality supply profitably.

Dyadic quality performance refers to the quality conformance of the involved parties in a BSR meeting the mutually agreed-upon quality requirements and expectations in their economic exchange (Shin, Collier, and Wilson, 2000). It is concerned with the relationships of buyers and suppliers in providing quality products and services for their

end customers (Yadav and Goel, 2008). The success of a BSR depends not only on efficiency from optimizing resources, but also on the effectiveness of partner firms in performing mutually beneficial activities such as satisfying the end customer requirements at the lowest possible cost. Conformance to quality is essential for developing cooperation, whereas a strategic alliance formation underpins the ability of buyers and suppliers to satisfy their mutually accepted quality requirements in the economic exchange relationship (Lai, Cheng, and Yeung, 2005). Shin, Collier, and Wilson (2000) suggested that high levels of trust and mutual cooperation evident in long-term relationships will enhance the quality performance of the involved partner firms. Furthermore, both buyers and suppliers in a strategic alliance can eliminate waste and errors by means of effective collaboration, thus achieving superior quality performance (Lai and Cheng, 2009). Strategic long-term relationships with key suppliers have a positive effect on exchange of tacit information and thereby improve the quality of the products offered by the firms (Wong, Lai, and Ngai, 2009). Thus, the following hypotheses are proposed:

H4: Strategic alliance formation positively affects innovation capability.

H5: Strategic alliance formation positively affects dyadic quality performance.

2.3   Innovation capability & dyadic quality performance and supply chain

performance

The traditional view, that enterprises with clear organizational boundaries limited

relationships with partner firms in the supply chain are no longer valid in today's volatile

business environment. As such, a close working relationship with an emphasis on supply

chain performance is a popular approach in contemporary logistics management (Lai, Ngai,

and Cheng, 2002). Indeed, effective management of a supply chain has been increasingly

recognized as a critical factor in developing product differentiations and building

competitive advantages. This SCM concept demands effective linkages with other firms in

the supply chain and the challenge for firms to achieve a competitive edge is effective

management of supply chain performance. Innovation capability and dyadic quality

performance are important elements for enterprises as they strive to improve performance

in the supply chain.

Enterprises with innovation capabilities are typically first movers in a competitive market.

Innovation has been described as successful to the extent that it leads to a competitive

advantage and consequent superior profitability (Roberts and Amit, 2003). Possession of

innovation capability to develop and implement new ideas highlights the organization's ability to devise solutions to business problems and challenges, which provide a basis for enterprises to succeed in the future. This ability, particularly in terms of investing in new systems and implementing new processes will streamline information and product flows in the supply chain. A positive relationship between firm innovation capability and firm performance has been identified in prior literature (Thornhill, 2006; Yeung, Lai, and Yee, 2007). Li and Calantone (1998) stated that innovation is crucial for firms to obtain competitive advantage over their competitors and survive. Prior literature (Ireland, Hitt, Camp, and Sexton, 2001) indicates that organization's ability for creating and sustaining a competitive advantage is strongly related to developing innovations that are difficult to imitate, being consistent with market conditions, exploiting the timing of industry events, and making best use of the unique capabilities of the enterprises. While difficulty exists to predict which innovations will succeed, innovation capability serves as a primary driver of growth and wealth creation. Hence, we consider firm innovation capability as the single most important characteristic a firm needs in order to sustain growth and maintain a competitive advantage in the supply chain. From the social exchange theoretical perspective, sharing innovation is beneficial for partner firms in the supply chain as they

learn, reciprocate, and grow together. The innovation capability can in turn contribute to supply chain performance. Accordingly, we suggest that:

H6: Innovation capability positively affects supply chain performance.

To achieve growth sustainably, quality products and processes are essential, where the related activities require innovation. Capon, Farley, and Hoenig (1990) found the performance impact of innovation. Furthermore, innovation can accelerate corporate growth and identify external opportunities for firms (Canals, 2001). The innovation capability has been considered a key factor for preempting competition (Clark and Fujimoto, 1990) and a primary source of organizational renewal (Dougherty, 1992). Several prior studies have identified the strategic importance of quality that should not be confined for management within a single firm, which should span among firms in the supply chain (e.g., Tan, Kannan, Handfield, and Ghosh, 1999; Lai and Cheng, 2005). High dyadic quality performance can improve a BSR (Yang et al., 2009), which in turn contributes to supply chain performance. Enterprises emphasizing quality should have higher ability to manage and coordinate interactions with their partner firms and better

learning capability in strategic alliance. The dyadic quality improvement creates a win-win situation in which customer satisfaction is increased and thus market share and profitability are greatly improved. Therefore, we hypothesize that:

H7: Dyadic quality performance positively affects supply chain performance.

3. Research Method

3.1   Sample and Data Collection

In this study, we targeted the greater Shanghai area for our data collection because it is the largest and most developed city in China. Shanghai is also China's largest manufacturing base, which holds different sectors. We sent the questionnaires to the top 500 manufacturing firms in this greater area. Many researchers conducted their studies relating to manufacturing here since this region is one of the best of China's manufacturing industry and has huge numbers of firms for a favorable setting of the study.

The subjects, or key informant for this study were firm chief executive officials, general managers and senior managers (Kumar, Stern, and Anderson, 1993) because the key informant approach has been widely employed in empirical studies (e.g., Sen and

Egelhoff, 2000; Zhu, Geng, and Lai, 2010) as these top management decision makers had

the knowledge of the firm, access to strategic information, and familiarity with the

environment of the firms (Aguilar, 1967).

The original survey instrument was developed in English. One of the authors

translated it into Chinese, and the Chinese version was translated back into English by

another professor proficient in both Chinese and English. Comparative study was

conducted between the original version and the translated version to ensure the content

consistency and equivalency. A group of experts comprising three academics and four

executives in the field of SCM review the questionnaire to improve the questionnaire such

that respondents find less difficulty in completing the questionnaire (Greenley, 1995).

Their comments and suggestions helped us refine the survey items and improve the design

of the survey. We also modified some wordings and expressions because they confused the

respondents in our expert review.

The survey was targeted at different sectors including electronics, mechanical

engineering, telecommunication, chemicals, pharmaceuticals, construction, automobile

manufacturing, new materials and energy, and others, which basically offer a fair

representation of the manufacturing industry. In a four-week interval, we conducted

follow-up phone calls to the respondents who had failed to return the survey instrument.

For the sake of reliability and consistency, we compared the responses from firms that

delivered the questionnaires in time with those from late-responding firms. We found that

the responses from these two groups did not differ in terms of number of employees, sales

revenue, and years in business in this study ($p > 0.01$). We also conducted the same

comparison between the responding and non-responding firms and did not discover issues

of non-response bias. We obtained 137 usable questionnaires with an effective response

rate of 27%.

3.2   *Measures and Validation*

All multi-item variables were measured on a seven-point scale to ensure a uniform scale

width. Some items were adapted and re-worded to fit the present context. The variables in

this study were drawn from several sources. For relational stability, the measures were

adopted from Johnson, Sohi, and Grewal (2004), tapping the degree of stability, duration,

and security of the relationship between the buyer and supplier. For effective

communication, the measure developed by Humphreys, Li, and Chan (2004) was used

reflecting the degree of communication with the firm's supplier on product information,

specification and quality requirement, and feedbacks in a timely and frequently manner.

To measure operational collaboration, we adopted the measures from the work of Cousins

(2005), measuring the degree of sharing operations planning information and linking order

management systems, moving towards joint capacity management systems. For strategic

alliance performance, we asked the respondents to indicate whether their firms were

currently involved in any strategic alliance formation activity. The construct was coded

with dummy 0 (no) and 1 (yes). Innovation capability was measured by four items

developed by Calantone, Cavusgil, and Zhao (2002) to reflect the degree of speed of the

buildup of the manufacturers' knowledge and skill base, the extent to which the

manufacturers placed emphasis on creativity through substantial investment in R&D, the

ability of identifying and creating new value of customers, and the degree of harnessing

organizational intelligence and managed technology to increase innovation. Drawing from

the work by Shin, Collier, and Wilson (2000) and Paulraj and Chen (2005), dyadic quality

performance was measured in terms of the degree of supplier conformance quality and

buyer conformance quality to reflect the dyads' capabilities of manufacturing products

which conform to quality specifications. Seven-point Likert scales with end points of

"decreased significantly" and "increased significantly" were used to measure the dyadic

quality performance. As dyadic quality performance addresses the quality conformance of

suppliers and buyers in their economic exchange, the measure of dyadic quality

performance was assessed from buyers' perspective. Supply chain performance was

adopted from Narasimhan and Nair (2005), indicating the degree of performance in terms

of market share, ROA, average selling price, product quality, and customer service levels

as compared to the respondent firm's major industrial competitors. Importance and

frequency of the supply chain relationship have been used as control variables to control

for organizational intention to form strategic alliances with other firms in the supply chain.

Importance of the supply chain relationship was measured by five items drawn from

Anderson and Weitz (1992), reflecting the loyalty, defense, term length, and commitment

and patience to each other in the supply chain. Frequency of the supply chain relationship

was measured by asking respondents to indicate the frequency of the supply chain

relationship. Strategic alliance formation was measured by one item asking if the

respondents have formed a strategic alliance in the supply chain.

We acknowledge that the potential problems of perceptual measures which were

responded by the same individual may have led to common method bias. To detect the

threat of common method variance, we conducted the Harman's one factor test as

suggested by Podsakoff and Organ (1986). Seven factors with eigenvalues greater than one

were extracted from all the measurement items, and they altogether explained 82.7% of the

variance, with the first factor accounting for 27.6% of the variance. Since no single factor

emerged that accounted for most of the variance, common method variance did not appear

to be a problem in this study (Podsakoff and Organ, 1986).

In examining the convergent and discriminant validity of the theoretical constructs,

we performed confirmatory factor analyses on the measurement model. The fit indices

reported in Table 1 suggest a good fit for the model (χ^2 = 909.33 p = 0.00, df = 303,

NFI=0.90, CFI=0.94, IFI=0.94). Table 1 shows the results of this analysis and the

proportion of variance extracted for each measure. Since the proportion of variance

extracted index of each of the constructs is above 0.5 and the indices of any pair of the

constructs are higher than the square of the correlation between that pair of constructs, it

suggests that all measures have both convergent and discriminant validity (Fornell and

Larcker, 1981). All measures had a Cronbach α above 0.70, this indicates a good evaluation

of reliability of these measures (Nunnally, 1972). The results of confirmatory factor

analysis also show that all measures loaded on the expected factors with loadings above

0.50.

Insert Table 1 about here

4. Analyses and Results

To test the research hypotheses, three statistical techniques were utilized, including logistic

regression, multivariate analysis of variance (MANOVA), and multiple regression analysis.

Insert Table 2 about here

First, we performed logistic regression to evaluate the hypotheses on the links

between relational stability, effective communication, operational collaboration, and

strategic alliance formation. The results of the logistic regression analysis in Table 2 shows

that the overall logistic regression model is significant at 0.001 level ($\chi^2 = 42.33$, $d.f. = 5$,

$p < 0.001$). It also suggests that relational stability ($B = 0.71$, Wald $\chi^2 = 7.98$) and effective

communication ($B = 0.85$, Wald $\chi^2 = 5.99$) have significant positive relationships with

strategic alliance formation, which supports hypotheses 1 and 2. Unexpectedly, operational

collaboration is not shown to have significant effects on strategic alliance formation.

Insert Table 3 and 4 about here

To examine whether innovation capability and dyadic quality performance are different between the two groups of strategic alliance formation and without alliance formation, MANOVA is conducted to evaluate whether the vectors of means on the two dependent variables are equal between groups. In order to perform MANOVA, it is required to satisfy the assumption of data normality, which means that the observed variables need to be normally distributed (Gravetter and Wallnau, 2000). The skewness or kurtosis value of a variable greater than 2 or smaller than -2 is considered non-normally distributed (Mardia, 1985). Skewness values for innovation capability, dyadic quality performance, and strategic alliance formation are -0.45, -0.52, -0.38; Kurtosis values for them are -0.13, -0.02, -1.88 respectively, which indicates all variables used in MANOVA fit the assumed data normality. In addition, the histograms of innovation capability and dyadic quality performance show that both dependent variables used in MANOVA are symmetric and distributed normally. Another assumption of homogeneity of the covariance matrices has also been tested with Box's M test. The value of Box's M is 9.44, which is nonsignificant at p=0.01 level.

In the MANOVA model, we entered a set of study variables serving as the dependent variables and strategic alliance formation representing the two groups. Table 2

presents the results of MANOVA analysis. It generally indicates significant overall differences in the dependent variable set as a function of strategic alliance formation (Hotelling's $T = 0.13$, $F = 8.59$, $p = 0.00$; Wilks'$\lambda = 0.89$, $F = 8.59$, $p = 0.00$), that is, strategic alliance formation has had some relationship with the set of dependent variables on innovation capability and dyadic quality performance. In terms of innovation capability, the mean for strategic alliance formation (5.25) is significantly greater than without the formation (4.41). Dyadic quality performance (mean = 4.89) is significantly higher for strategic alliance formation than without the formation (mean = 4.41). Following Hair, Anderson, Tatham, and Black (2010), stepdown test was performed to analyze further the dependent variables, while allowing intercorrelation for them. Table 3 shows that both innovation capability and dyadic quality performance are significantly different, even when controlling for their intercorrelation. The result of this test suggests that strategic alliance formation differs significantly on both innovation capability (stepdown $F = 17.27$, $p < 0.001$) and dyadic quality performance (stepdown $F = 6.96$, $p < 0.01$). Hypotheses 4 and 5 are supported.

Third, to test the association between innovation capability & dyadic quality performance and supply chain performance, a multiple regression analysis was performed. Table 4 reports the result of the analysis. The overall model fit is significant ($F = 4.29$, $p <$

0.01). In this model, two control variables were included, importance and frequency of supply chain relationship, to control for the organizational intention to form strategic alliance. The results suggest that supply chain performance is significantly related to dyadic quality performance ($\beta = 0.30$, $t = 2.85$, $p < 0.01$), which supports hypothesis 7. However, the results show that the link between supply chain performance and operational collaboration is not significant; therefore, hypothesis 6 does not receive support.

5. Discussion and Implications

Strategic alliances in a partnership are important to integrate supply chain networks due to the emphasis on long-term orientation as well as mutual planning and problem solving. Although the literature is rich in knowledge on strategic alliances in BSR, not much research has assessed the motivations behind strategic alliance formation with suppliers. This study shows that relational stability and effective communication are important characteristics of BSR desirable for the firms to establish strategic alliances with their suppliers, which in turn determine organizational innovation capability and dyadic quality performance for the partners. The findings reinforce the view from the social exchange perspective, that relational stability is a hidden norm of reciprocity to exchange

favor among the partners within a social circle (Dwyer and Schurr, 1987). On the other

hand, research on alliance in SCM has focused mainly on the effectiveness of alliances

(Whipple, Frankel, and Daugherty, 2002). The effect of strategic alliances on

organizational performance (e.g., innovation capability) and product performance (e.g.,

dyadic quality performance) has received limited attention from researchers. There is a lack

of research efforts linking innovation capability and dyadic quality performance with

supply chain performance. Innovation capability and dyadic quality performance are

conducive to improving supply chain performance because innovation capability enables a

firm to develop successful new products and the improved product quality for a BSR brings

profitability. Our study findings supported that supply chain performance is dependent on

dyadic quality performance. However, we found no support for the link between

operational collaboration and strategic alliance formation. One plausible explanation for

the managerial inertia in forming a strategic alliance might be the antagonism existing

among supply chain members due to mutual distrust and relationship difficulties before

and during cooperation, which is often developed in the form of conflict that impedes the

efforts of members to improve the overall supply chain performance in the long run (e.g.,

form a strategic alliance) (Simatupang and Sridharan, 2002). Based on the analytical results,

we found that innovation capability is not significantly related to supply chain performance.

Innovation is a knowledge creation process, which requires organizational investment (e.g.,

R&D) in acquiring tacit and explicit knowledge to foster knowledge creation within the

enterprise. It takes a long time for an innovative product to launch in the market

successfully. Yet, the supply chain performance reflects the short-term indices for market

share, quality, return on asset, and customer service, which serves as a possible explanation

for the insignificant association between innovation capability and supply chain

performance.

5.1   *Implications*

5.1.1   Theoretical contributions

The concept of supplier development and management has been a popular topic in

the literature and we have seen many related studies (e.g. Krause 1999). In this line of

production research on supplier management, there are studies examining knowledge

sharing (Dyer and Nobeoka, 2000), knowledge integration (Grant 1996), knowledge

transfer (Modi and Mabert 2007), and operational capabilities (Wu, Melynk and Flynn,

2010). We complement this important research stream and make several theoretical

contributions to existing literature in production research. First, we conceptualize and

empirically test the links between relational stability, effective communication, operational

collaboration, strategic alliance formation, innovation capability, dyadic quality performance, and supply chain performance. They are important issues that help us to better understand the characteristics of BSR affecting strategic alliance formation and the consequent outcome in the performance of innovation capability, dyadic quality, and supply chain. While there are studies on production research examining supplier involvement and new product development performance (Tavani et al 2013) as well as supply chain risk management (Grotsch et al 2013), research investigating the antecedents and consequences of strategic alliance formation in manufacturing enterprises are surprising scanty. The results of this study respond to the proposed research inquiries as to whether the antecedent factors pertaining to relational stability, communication, and operational collaboration affect strategic alliance formation with suppliers in the Chinese manufacturing context. We also examine how the innovation capability, dyadic quality performance, and subsequently supply chain performance can be accounted for by the alliance formation. Therefore, this study attempted to fill a research gap in the literature on the antecedent-alliance-performance relationships in the Chinese manufacturing context.

Second, we extend the use of Social Exchange Theory and Goal Interdependence Theory to the production research in examining the characteristics of BSR and strategic alliance formation in a supply chain. The research framework of this study was drawn upon

the marriage of Social Exchange Theory and Goal Interdependence Theory, which are used to explain the strategic alliance formation with suppliers. This study contributes knowledge to these two theories and explicitly applies them to ground the research framework in the field of SCM.

Third, the results of this study shed light on the importance of managing relationships in alliances for SCM in terms of ensuring relational stability and effective communication. To nurture a long-term relationship and maintain mutual benefits, firms will need to have stable relationships and effective communication. The significance of relational stability and effective communication is thoroughly examined and recognized in this empirical study in the context of Chinese manufacturers.

5.1.2   Managerial implications

Managers can use our research framework to evaluate the extent to which they have developed adequate relational stability, which are valuable for forming strategic alliances. It may make sense for firms in their alliance for SCM to endeavor to reinforce these elements. In particular, managers are advised to foster stability in a BSR to form a successful strategic alliance with their suppliers. Promoting effective communication with suppliers is another way for managers to build relationships, including providing suppliers

with information that might help them to plan for their needs, providing feedback about their performance, and frequently communicating quality requirements with suppliers.

Second, the findings of this study suggest the importance of establishing strategic alliances to improve dyadic quality performance for both the buyer and supplier should not be ignored by managers seeking market share and profitability for their products. As discussed earlier in this paper, when the goals of the firms are consistent, they are better motivated to innovate and satisfy the quality requirements of their exchange relationships for mutual interests. This informs managers of the strategic role of the alliances with suppliers in improving quality conformance for both buyers and suppliers. Practitioners in economic exchanges in a strategic alliance have common goals and interests, which lead to high dyadic quality and resultant better performance in terms of market share, return on assets, selling price, product quality, and customer service.

5.2 *Limitations and Future Research*

This study was subject to some shortcomings limiting the interpretation of the study results, and we will leave these issues for future studies to complement. First, we used cross-sectional data to test the research model and the hypotheses, which captured the perceptions of manufacturing executives at a point in time. Cross-sectional data failed to capture

continuous relational stability, effective communication, operational collaboration, attainment of dyadic quality performance, and strategic alliance formation. It may be desirable to conduct a longitudinal study to supplement this research endeavor. Doing so will improve understanding on how and why relational stability and effective communication are associated with strategic alliance formation on a temporal dimension.

In addition, this study investigated only the relationships between a few characteristics of BSR in the manufacturing context. Further research can extend this study by including more relevant theoretical constructs. For instance, it would be interesting to include some variables relating to information infrastructure, and intra- and inter-organizational systems adoption to understand their collective association with the strategic alliance formation in a supply chain (Lai, Wong, and Cheng, 2010). Furthermore, learning orientation and knowledge sharing can affect the formation of strategic alliances with suppliers. Future research can consider including these variables to extend this line of research.

Lastly, the data of this study was collected from enterprises based in China, which may possess cultural differences than their western counterparts. Although we tried to reduce such differences by conducting the research in Shanghai, which is considered an international business city, it is possible that the findings of this study cannot be generalized

to companies with a western culture. Future work may consider the cultural dimension on strategic alliance formation and extend this line of study in other industrial contexts such as retailing (Lai, Cheng, and Tang, 2010), shipping and port operations (Lam and Gu 2013), in emerging topics such as reverse logistics and sustainability (Lee and Lam 2012), and collect lager sample size for generaliazability.

REFERENCES

Aguilar, F. (1967). Scanning the Business Environment. New York: Macmillan.

Anand, B. N. and Khanna, T. (2000). "Do firms learn to create value? The case of alliances,"
Strategic Management Journal, 21 (3): 295-315.

Andersen, O. and Buvik, A. (2001). "Inter-firm coordination: international versus domestic buyer-seller relationships," Omega, 29 (2): 207-219.

Anderson, E. and Weitz, B. (1992). "The use of pledges to build and sustain commitment in distribution channels," Journal of Marketing Research, 24: 18-34.

Anslinger, P. (2004). "Creating successful alliances," Journal of Business Strategy, 25 (2): 1-18.

Brown, C. V. and Magill, S. L. (1999). "Reconceptualizing the context-design issue for the information systems function," Organization Science, 9(2): 371-403.

Calantone, R. J., Cavusgil, S. T., and Zhao, Y. (2002). "Learning orientation, firm innovation capability, and firm performance," Industrial Marketing Management, 31, 515-524.

Canals, J. (2001). "How to think about corporate growth?" European Management Journal, 19(6): 587-603.

Capon, N., Farley, J. U., and Hoenig, S. (1990). "Determinants of financial performance: a meta-analysis," Management Science, 36(10): 1143-1159.

Choi, T. Y. and Hartley, J. L. (1996). "An exploration of supplier selection practices across the supply chain," Journal of Operations Management, 14(4): 333-343.

Choi, T. Y. and Rungtusanatham, M. (1999). "Comparisons of quality management practices across the supply chain and industries," Journal of Supply Chain Management, 35: 20-27.

Clark, K. B. and Fujimoto, T. (1990). "The power of product integrity." Harvard Business Review, 68(6): 107-118.

Cohen, W. M. and Levinthal, D. A. (1990). "Absorptive capacity: a new perspective on learning and innovation," Administrative Science Quarterly, 35 (1): 128-152.

Cousins, P. D. (2005). "The alignment of appropriate firm and supply strategies for competitive advantage," International Journal of Operations & Production Management, 25(5), 403-428.

Cousins, P. D. and Crone, M. J. (2003). "Strategic models for the development of obligation based inter-firm relationships: a study of the UK automotive industry," International Journal of Operations and Production Management, 32(12): 1447-1474.

Das, T. K. and Teng, B. S. (2000). "A resource-based theory of strategic alliances," Journal of Management, 26 (1): 31-61.

Daugherty, P. J., Stank, T. P., and Rogers, D. S. (1996). "Third-party logistics services providers: purchasers' perception," International Journal of Purchasing and Materials Management, 32 (2): 23-29.

Deutsch, M. (1949). "A theory of cooperation and competition," Human Relations, 2 (2): 129-152.

Dougherty, D. (1992). "A practice-centered model of organizational renewal through product innovation," Strategic Management Journal, 13: 77-92.

Dwyer, F. R., Schurr, P. H., and Oh, S. (1987). "Developing buyer--seller relationships," Journal of Marketing, 51 (2): 11-27.

Dyer, J. H. and Noboeka, K. (2000). "Creating and managing a high-performance knowledge-sharing network: the Toyota case", Strategic Management Journal, 21 (3), 345-367.

Dyer, J. H. and Singh, H. (1998). "The relational view: Cooperative strategy and sources of Inter organizational competitive advantage," Academy of Management Review, 23 (4): 660-79.

Eisenhardt, K. M. and Schoonhoven, C. B. (1996). "Resource-based view of strategic alliance formation: strategic and social effects in entrepreneurial firms," Organization Science, 7 (2): 136-150.

Ellram, L. M. and Cooper, M. C. (1990). "Supply chain management, partnerships, and the shipper-third party relationship," International Journal of Logistics Management, 1 (2): 1-10.

Feldmann, M. and Muller, S. (2003). "An incentive scheme for true information providing in supply chains," Omega, 31 (2): 63-73.

Fisher, M. L. (1997). "What is the right supply chain for your product?" Harvard Business Review, 75(2): 105-116.

Fornell, C. and Larcker, D. F. (1981). "Evaluating structural equation models with unobservable variables and measurement error," Journal of Marking Research, 18, 39-80.

Goffin, K., Lemke, F., and Szwejczewski, M. (2006). "An exploratory study of close supplier-manufacturer relationships," Journal of Operations Management, 24 (2), 189 -209.

Golicic, S. L. and Mentzer, J. T. (2006). "An empirical examination of relationship magnitude," Journal of Business Logistics, 27 (1), 81-109.

Gouldner, A. W. (1960). "The norm of reciprocity: a preliminary statement," American Sociological Review, 25 (2): 161-178.

Grant, R. M. (1996). "Prospering in dynamically-competitive environments: organizational capability as knowledge integration", Organization Science, 7 (4), 375-387.Gravetter, F. J. and Wallnau, L. B. (2000). Statistics for the Behavior Sciences (5th ed.). Belmont, CA: Wadsworth.

Greenley, G. (1995). "Market orientation and company performance: Empirical evidence," British Journal of Management, 40: 33-46.

Grenadier, S. R. and Weiss, A. M. (1997). "Investment in technological innovations: an option pricing approach," Journal of Financial Economics. 44 (3): 397-416.

Grotsch, V. M., Blome, C., Schleper, M. C. (2013) "Antecedents of proactive supply chain risk management - a contingency theory perspective", International Journal of Production Research, 51 (10), 2842-2867.

Gulati, R., (1995) Does familiarity breed trust? The implications of repeated ties for contract choice in alliances. Academy of Management Journal, 38, 85-112.

Gulati, R., (1998) Alliances and networks. Strategic Management Journal, 19, 293-317.

Gunasekaran, A., Lai, K. H., and Cheng, T. C. E. (2008). "Responsive supply chain: a competitive strategy in the networked economy," Omega, 36 (4), 549-564.

Hair, J.F., Anderson, R.E., Tatham, R.L., and Black, W.C. (2010). Multivariate data analysis. Seventh edition. Prentice Hall: New Jersey.

Hertz, S. (2001). "Dynamics of Alliances in Highly Integrated Supply Chain Networks," International Journal of Logistics, 4 (2): 237-256.

Horvath, L. (2001). "Collaboration: the key to value creation in supply chain management," Supply Chain Management: An International Journal, 6(5): 205-207.

Humphreys, P. K., Li, W. L., and Chan, L. Y. (2004). "The impact of supplier development on buyer-supplier performance," Omega, 32(2): 131-143.

Ireland, R. D., Hitt, M. A., Camp, S. M., and Sexton, D. L. (2001). "Integrating entrepreneurship and strategic management actions to create firm wealth," Academy of Management Executive, 15 (February): 49-63.

Johnson, J. L., Sohi, R. S., and Grewal, R., (2004). "The role of relational knowledge stores in interfirm partnering," Journal of Marketing, 68: 21-36.

Kotabe, M., Martin, X., and Domoto, H. (2003). "Gaining from vertical partnerships: knowledge transfer, relationship duration, and supplier performance improvement in the U.S. and Japanese automotive industries," Strategic Management Journal, 24: 293-316.

Koufteros, X. A., Cheng, T. C. E., and Lai, K. H. (2007). "Black-box and gray box supplier integration in product development: antecedents, consequences and the moderating role of firm size," Journal of Operations Management, 25 (4), 847-870.

Krause, D. R. (1999) "The antecedents of buying firms' efforts to improve supplier,"
Journal of Operations Management, 17 (2), 205-224.

Kumar, N., Stern, L. W., Anderson, J. C. (1993). "Conducting interorganizational research
using key informants," Academy of Management Journal, 36(6); 1633-51.

Lai, K. H. (2004). "Service capability and performance of logistics service providers,"
Transportation Research Part E, 40 (5): 385-399.

Lai, K. H. (2009). "Linking exchange governance with supplier cooperation and
commitment: a case of container terminal operations," Journal of Business Logistics,
30 (1), 243-363.

Lai K. H., Bao, Y., and Li, X. (2008). "Channel relationship and business uncertainty:
evidence from the Hong Kong market," Industrial Marketing Management, 37 (6),
713-724.

Lai, K. H. and Cheng, T. C. E. (2005). "Effects of quality management and marketing on
organizational performance," Journal of Business Research, 58 (4), 446-456.

Lai, K. H. and Cheng, T. C. E. (2009). Just-in-Time Logistics, Gower Publishing, Surrey,
England.

Lai, K. H., Ngai, E. W. T., and Cheng, T. C. E. (2002). "Measures for evaluating supply chain performance in transport logistics," Transportation Research Part E, 38 (6), 439-456.

Lai, K. H., Wong, C. W. Y., and Cheng, T. C. E. (2010). "Bundling digitized logistics activities and its performance implications," Industrial Marketing Management, 39 (2), 273-286.

Lai, K. H., Cheng, T. C. E., and Tang, A. K. Y. (2010). "Green retailing: factors for success," California Management Review, 52 (2), 6-31.

Lai, K. H., Yeung, A. C. L., and Cheng, T. C. E. (2005). "Relationship stability and supplier commitment to quality," International Journal of Production Economics, 96 (3), 397-410.

Lam, J. S. L. and Gu, Y. (2013). "Port hinterland intermodal container flow optimisation with green concerns: a literature review and research agenda", International Journal of Shipping and Transport Logistics, 5 (3), 257-281.

Lamming, R. and Hampson, J. (1996). "The environment as a supply chain management issue," British Journal of Management. 7 (1): 45–62.

Lawler, E., Thye, S., and Yoon, J. (2000). "Emotion and group cohesion in productive exchange," American Journal of Sociology, 106: 616-657.

Lee, C. K. M. and Lam, J. S. L. (2012). "Managing reverse logistics to enhance sustainability of industrial marketing", Industrial Marketing Management, 41 (4): 589-598.

Leung, T. K. P., Lai, K. H., Chan, R. Y. K., and Wong, Y. H. (2005). "The roles of xinyong and guanxi in Chinese relationship marketing," European Journal of Marketing, 39 (5), 528-559.

Li, S., Nahan, B. R., Nathan, T.S., and Rao, S. (2006). "The impact of supply chain management practices on competitive advantage and organizational performance," Omega, 34 (2), 107-124.

Li, T. and Calantone, R. J. (1998). "The impact of market knowledge competence on new product advantage: conceptualization and empirical examination," Journal of Marketing, 62(4): 13-29.

Mardia, K. V. (1985). Mardia's test of multinormality. In S. Kotz & N. L. Johnson (Eds.), Encyclopedia of statistical science. New York: Wiley.

Modi, S. B. and Mabert, V. A. (2007). "Supplier development: improving supplier performance through knowledge transfer", Journal of Operations Management, 25 (1), 42-64.Mone, M. A., McKinley, W., and Barker, V. L. (1998). "More on

organizational decline and innovation: are small entrepreneurial firms a special case?"

Academy of Management Review, 23(3): 388-390.

Moore, K. R. (1998). "Trust and relationship commitment in logistics alliances: A buyer

perspective," International Journal of Purchasing and Material Management, 34 (1):

24-37.

Monczka, R. M., Petersen, K. J., Handfield, R. B. and Ragatz, G. L. (1998). "Success

factors in strategic supplier alliances: the buying company perspective", Decision

Sciences, 29 (3): 553-573.

Morgan, R. M. and Hunt, S. D. (1994). "The Commitment-Trust Theory of Relationship

Marketing," Journal of Marketing, 58, 20-38.

Narasimhan, R. and Nair, A. (2005). "The antecedent role of quality, information sharing

and supply chain proximity on strategic alliance formation and performance,"

International Journal of Production Economics, 96, 301-313.

Newman, R. G. and Rhee, K. A. (1990). "A case study of NUMMI and its suppliers,"

International Journal of Purchasing and Materials Management, 26(4): 15-20.

Noordewier, T. G., John, G., and Nevin, J. R. (1990). "Performance outcomes of

purchasing arrangements in industrial buyer-vendor relationships," Journal of

Marketing. 54(4): 80-93.

Nunnally, J. C. (1972). Educational measurement and evaluation. McGraw-Hill: New York.

Paulraj, A. and Chen, I. J. (2005). "Strategic supply management and dyadic quality performance: a path analytical model," Journal of Supply Chain Management, 41(3): 4-18.

Podsakoff, P. M. and Organ, D. M. (1986). "Self-reports in organizational research: problems and prospects," Journal of Management, 12 (4): 531-544.

Roberts, P. W. and Amit, R. (2003). "The dynamics of innovative activity and competitive advantage: the case of Australian retail banking, 1981 to 1995," Organization Sciences, 14(2): 107-122.

Rosenberg, L. J. and Stern, L. W. (1970). "Toward the analysis of conflict in distribution channels: a descriptive model," Journal of Marketing, 34(4): 40-46.

Sampson, R. C. (2002). "Experience, learning and collaborative returns in R&D alliances," http://papers.ssrn.com.

Sanders, N. R. and Premus, R. (2005). "Modeling the relationship between firm IT capability, collaboration, and performance," Journal of Business Logistics. 26(1): 1-23.

Sen, F. K. and Egelhoff, W. G. (2000). "Innovative capabilities of a firm and the use of technical alliances," IEEE Transactions on Engineering Management, 47(2), 174-183.

Sheu, C., Yen, H. R., and Chae, B. (2006). "Determinants of supplier-retailer collaboration: evidence from an international study," International Journal of Operations and Production Management, 26 (1/2), 24-49.

Shin, H., Collier, D. A., and Wilson, D. D. (2000). "Supply management orientation and supplier/buyer performance," Journal of Operations Management, 18(3): 317-333.

Simchi-Levi, D., Kaminsky, P. and Simchi-Levi, E. (2008). Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies, Third Edition, McGraw-Hill.

Soosay, C. A., Hyland, P. W. and Ferrer, M. (2008). "Supply chain collaboration: capabilities for continuous innovation," Supply Chain Management, 13 (2), 160-169.

Stuart, F. (1997). "Supply chain strategy organizational influence through supplier alliances," British Academy of Management, 8(3), 223-236.

Stump, R. L. and Heide, J. B. (1996). "Controlling supplier opportunism in industrial relationships," Journal of Marketing Research, 33 (4), 431-442.

Tan, K. C., Kannan, V. R., Handfield, R. B., and Ghosh, S. (1999). "Supply chain management: an empirical study of its impact on performance," International Journal of Operations and Production Management, 19(10): 1034-1052.

Tavani, S. N. Sharifi, H., Soleimanof, S. and Najmi, M. (2013). "An empirical study of firm's absorptive capacity dimensions, supplier involvement and new product development performance", International Journal of Production Research, 51 (11), 3385-3403.

Teo, T. S. H. and Lai, K. H. (2009). "Usage and performance impact of electronic procurement," Journal of Business Logistics, 30 (2): 125-140.

Terpend, R., Tyler, B. B., Krause, D. R., and Handfield, R. B. (2008). "Buyer-supplier relationships: derived value over two decades," Journal of Supply Chain Management, 44 (2): 28-55.

Thornhill, S. (2006). "Knowledge, innovation and firm performance in high- and low-technology regimes," Journal of Business Venturing, 21: 687-703.

Thompson, V. A. (1965). "Bureaucracy and innovation," Administrative Science Quarterly, 5: 1-20.

Varadarajan, P. R. and Cunningham, M. (1995). "Strategic alliances: a synthesis of conceptual foundations," Journal of the Academy of Marketing Science, 23 (4): 282-296.

Wei, H. L., Wong, C. W. Y., and Lai, K. H. (2012)_ "Linking inter-organizational trust with logistics information integration and partner cooperation under environmental uncertainty", International Journal of Production Economics, 139 (2), 642-653.

Weitz, B. A. and Jap, S. D. (1995). "Relationship marketing and distribution channels," Journal of the Academy of Marketing Sciences, 23 (4): 305-320.

Whipple, J. M., Frankel, R., and Daugherty, P. J. (2002). "Information support for alliances: performance implications," Journal of Business Logistics, 23 (2): 67-82.

Wong, C. W. Y., Lai, K. H., Lun, Y. H. V., and Cheng, T. C. E. (2012). "A study on the antecedents of supplier commitments in support of logistics operations", International Journal of Shipping and Transport Logistics, 4 (1), 5-16.

Wong, C. W. Y., Lai, K. H., and Cheng, T. C. E. (2009). "Complementarities and alignment of information systems management and supply chain management," International Journal of Shipping and Transport Logistics, 1 (2): 156-171.

Wong, C. W. Y., Lai, K. H., and Ngai, E. W. T. (2009). "The role of supplier operational adaptation on the performance of IT-enabled logistics under environmental uncertainty," International Journal of Production Economics, 122 (1): 47-55.

Wu, S. J., Melnyk, S. A. and Flynn, B. B. (2010). "Operational capabilities: the secret ingredient," Decision Sciences, 41 (4), 721-754.

Yadav, O. P. and Goel, P. S. (2008). "Customer satisfaction driven quality improvement target planning for product development in automotive industry," International Journal of Production Economics. 113(2): 997-1011.

Yang, J., Wang, J., Wong, C. W. Y., and Lai, K. H. (2008). "Relational stability and alliance performance in supply chain," Omega, 36 (4): 600-608.

Yang, J., Wong, C., Lai, K. H., and Ntoko, A. (2009). "The antecedents of dyadic quality performance and its effect on buyer-supplier relationship improvement," International Journal of Production Economics 120: 243-251.

Yang, J. (2009). "The determinants of supply chain alliance performance: an empirical study," International Journal of Production Research, 47 (4): 1055-1069.

Yeung, A. C. L., Lai, K. H., and Yee, R. W. Y. (2007). "Organizational learning, innovativeness and organizational performance: a qualitative study," International Journal of Production Research, 45 (11), 2459-2477.

Zacharia, Z. C., Nix, N. W., and Lusch, R. F. (2009). "An analysis of supply chain collaborations and their effect on performance outcomes," Journal of Business Logistics, 30 (2): 101-124.

Zhang, L. and Goffin, K. (2001). "Managing the transition" - supplier management in international joint ventures in China, International Journal of Physical Distribution and Logistics Management, Vol. 31, No. 2, pp.74-95.

Zhu, Q. H., Geng, Y., and Lai, K. H. (2010). "Circular economy practices among Chinese manufacturers varying in environmental-oriented supply chain cooperation and the performance implications," Journal of Environmental Management, 91 (6), 1324-1331.

Zhu, Q. H., Sarkis, J., and Lai, K. H. (2011). "An institutional theoretic investigation on the links between internationalization of Chinese manufacturers and their supply chain management," Resources, Conservation and Recycling, 55 (6), 623-630.

Table 1. Construct measurement and confirmatory factor analysis

Measures	Standardized loading
Relational stability (α = 0.87; proportion of variance extracted:0.79)	
1. Unstable/stable.	0.89
2. Short-term/long-term	0.90
3. Insecure/secure.	0.88
Effective communication (α = 0.91; proportion of variance extracted:0.72)	
1. We provide this supplier with any information that might help them to plan for our needs.	0.79
2. We provide this supplier with feedback about how they are performing periodically.	0.85
3. We communicate the specifications and quality requirements clearly and accurately to the supplier.	0.90
4. The communication between us occurs at different levels of management and cross-functional areas.	0.83
5. Exchange information between this supplier and our firm takes place timely and frequently.	0.87
Operational collaboration (α = 0.80; proportion of variance extracted:0.67)	
1. Share operations planning information.	0.56
2. Develop and share forecast demands and sales.*	
3. Link order management systems.	0.99
4. Move towards joint capacity management systems.	0.85
Innovation capability (α = 0.87; proportion of variance extracted:0.69)	
1. Our knowledge and skill base is building up at the right pace.	0.77
2. Our firm placed emphasis on creativity through substantial investment in R&D.	0.73
3. Our firm is able to identify and create new value for customers.	0.93
4. Our firm has harnessed organizational intelligence and managed technology to increase innovation.	0.88
Dyadic quality performance (decrease-increase) (α = 0.82; proportion of variance extracted:0.78)	
1. Supplier conformance quality.	0.98
2. Buyer conformance quality.	0.78
Supply chain performance (α = 0.79; proportion of variance extracted:0.51)	
1. Please indicate the level of your firm's performance in terms of market share as compared to your major industrial competitors.	0.56
2. Please indicate the level of your firm's performance in terms of return on assets as compared to your major industrial competitors.	0.71
	0.75

3. Please indicate the level of your firm's performance in terms of average selling price (higher performance means higher average price) as compared to your major industrial competitors.	0.83
4. Please indicate the level of your firm's performance in terms of overall product quality as compared to your major industrial competitors.	0.68
5. Please indicate the level of your firm's performance in terms of overall customer service levels as compared to your major industrial competitors.	
Importance of the SC relationship ($\alpha = 0.91$; proportion of variance extracted:0.70)	0.87
	0.71
1. We have a strong sense of loyalty to the supply chain.	0.87
2. We defend the supply chain when others criticize it.	0.91
3. Our supply chain relationship is a long-term alliance.	0.82
4. We are committed to each other in the supply chain.	
5. We are patient with each other in the supply chain when someone makes mistakes.	1.00
Frequency of the SC relationship	
Please indicate the frequency of the supply chain relationship.	1.00
Strategic alliance performance	
Does your firm have a strategic alliance formation in the supply chain? (Y/N)	

Model Fit Index
$\chi^2 = 909.33$ ($p = 0.00$), $df = 303$, NFI=0.90, CFI=0.94, IFI=0.94

*This item has been deleted due to the reliability.

Table 2. Strategic alliance formation: Logistic regression analysis

Variables	B	Wald χ^2
Control variables		
Importance of the SC relationship	0.21	0.38
Frequency of the SC relationship	0.12	0.29
Independent variables		
Relational stability	0.71**	7.98
Effective communication	0.85*	5.99
Operational collaboration	0.27	1.62
Constant	-10.22***	21.26
Model χ^2	42.33***	
d.f.	5	

N	137

*p < 0.05; ** p < 0.01; *** p < 0.001

Table 3. MANOVA results[a]

Dependent variable	Strategic alliance formation (N = 80) Mean	Without strategic alliance formation (N = 55) Mean	Stepdown F-ratio
Innovation capability	5.25	4.41	17.27***
Dyadic quality performance	4.89	4.41	6.96**

[a] Multivariate test (Wilks' λ): F-value = 8.59, p = 0.00.

** p < 0.01; ***p < 0.001

Table 4. Supply chain performance: multiple regression results

Variables	Supply chain performance β	t
Control variables		
Importance of the SC relationship	0.22*	2.21
Frequency of the SC relationship	0.01	0.10
Independent variable		
Innovation capability	0.13	1.12
Dyadic quality performance	0.30**	2.85
Constant	3.24***	5.94
Model fit		
R^2	0.14	
Adjusted R^2	0.11	
d.f.	4.00	
F-value	4.29**	

* p < 0.05; ** p < 0.01; ***p < 0.001