國 立 交 通 大 學

管理科學系

博 士 論 文

No.059

信任與共同願景在提升供應商彈性所扮演之角色

The Role of Trust and Shared Vision in Promoting Supplier Flexibility

研 究 生:黃旭鋒

指導教授:朱博湧 教授

中 華 民 國 一百 年一 月

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博 士 論 文

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信任與共同願景在提升供應商彈性所扮演之角色

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國立交通大學管理科學系博士班

摘　　要

本研究旨在探討信任及共同遠景提升供應商彈性(數量、組合、新產品及交貨彈性)之研究架構，研究係以行銷領域之社會機制與供應鏈供應商彈性之文獻為基礎，並以社團法人中華採購與供應管理協會(SMIT)162 個樣本，來驗證社會機制提升供應商彈性之各項假說。研究結果顯示信任會直接影響供應商之數量及交貨彈性，共同遠景亦會直接的影響供應商之組合、新產品及交貨彈性。本研究更進一步發現，在信任與供應商組合、新產品及交貨彈性之關係中，共同遠景扮演中介之角色。在管理實務涵義上，本研究提供管理準則，如何讓供應商能快速回應客戶的需求；在論文原創價值上，本研究對信任及共同願景影響供應商各別彈性，提供一個新的方向。

關鍵詞: 供應鏈、彈性、信任、共同遠景

The Role of Trust and Shared Vision in Promoting Supplier Flexibility

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ABSTRACT

Purpose – This study explores a conceptual framework for trust and shared vision to induce supplier flexibility (i.e., volume, mix, new product, and delivery flexibility).

Design/methodology/approach –The current study is based on marketing research reviews of social mechanisms and supply chain flexibility literature. To explore these issues, this work develops and tests hypotheses with data from 162 members of the SMIT (Supply Management Institute, Taiwan).

Findings –The results show that trust has a direct impact on supplier's volume flexibility and delivery flexibility. Furthermore, the findings indicate that a shared vision has direct impact on supplier's mix, new product, and delivery flexibility. Finally, shared vision plays a mediating role among trust and mix, new product, and delivery flexibility.

Practical implications – This paper contributes to management guidelines on how to align suppliers to respond quickly to customer demands.

Originality/value – The study provides novel insights into trust and shared vision impact on suppliers' respective flexibility.

Key words: Supply Chain; Flexibility; Trust; Shared Vision

誌　　謝

回顧在進入交大管理科學系博士班的動力乃在於家人的全力支持，並自許能作為孩子們的模範，也是人生的自我實現。凡事走過才能體驗其個中滋味，歷經五年半的時間終得以取得博士學位，其心路歷程實刻骨銘心。

感謝指導教授朱博湧老師的指導、東海大學張國雄教授的提攜、捷普綠點邱紹禎副總、曾泰誠廠長、眾多同事們及東海大學 EMBA 同學們的鼓勵，同時也要謝謝永瑞及佳誼在求學過程中的大力協助，使我能於研究之路上持續挺進。另外，這幾年來讓我改變對人性的看法並澈底改變人生價值觀者亦是讓我更堅毅地完成博士學位的力量。

雖在求學的歷程中經歷人生的重大衝擊，但對自己的堅持、自我的實現並無所懊悔，同時也希望兩個兒子黃群、黃安未來在人生的道路上，無論遇到多大的困境，能勇敢去面對並接受挑戰，願將此喜悅與關愛我的人一起分享，並將此榮耀獻給天之靈的楊紹宗老師。

黃旭鋒 謹誌

2011 年 1 月

于 新竹 交通大學管理科學系

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Chapter 1 Introduction

1.1 Research background

Sanchez (1995) indicated that a firm with flexibility could respond effectively to a dynamic environment. Relational contracting literature has identified flexibility as an important relational norm (Heide and John, 1990; Lusch and Brown, 1996; Kaufmann and Dant, 1992; Noordewier, John, and Nevin, 1990). As supply chain management practices extend beyond the boundaries of a single firm, supplier flexibility enhances buyer capabilities to improve performance. Supplier flexibility refers to a supplier's capability to manage production resource and uncertainty to meet a specific buyer demand for modifications. Supplier flexibility for a buyer implies the ability to obtain additional services in response to changes in market demands. Chase *et al*. (2001) summarized that "recent trends, such as outsourcing and mass customization, are forcing companies to find flexible ways to meet customer demand. The focus is on optimizing core activities to maximize the speed of response to changes in customer expectations". Accordingly, understanding how a buyer manages supplier flexibility is an important issue for management and practice.

Social capital, encompassing norms and values, facilitates relationships (Coleman, 1990) and lowers transaction cost (Chiles and McMackin, 1996). In the literature of

inter-organizational relationships, trust exists when a party has confidence in the exchange partner's reliability and integrity (Gulati *et al*., 2000; Morgan and Hunt, 1994; Ring and Van de Ven, 1992). Tsai and Ghoshal (1998) declared that a shared vision embodies collective goals and aspirations of the members of an organization. Following Nahapiet and Ghoshal (1998), shared vision manifests the cognitive dimension of social capital. Fitting the flexibility of inter-organizational relational norm strategy requires a firm to extend cognitive resources "not only to become aware of alternatives, but also to be willing to change behavior based upon an assessment of available alternatives" (Griffith and Myers, 2005, p.258).

1.2 Research Objectives

Relationship marketing refers to all marketing activities directed toward establishing, developing, and maintaining successful relational exchanges (Morgan and Hunt, 1994). The core theme of the relationship marketing perspective is focus on a cooperative and collaborative relationship between firms. Dwyer *et al*. (1987) characterized such cooperative relationships as interdependent and long-term orientated rather than concerned with short-term discrete transactions. The main premise of the resource-dependence theory is the need for heightened inter-firm coordination when task uncertainty and complexity increases (Pfeffer and Salancik, 1978). Heide (1994) claimed that dependence and uncertainty are the key antecedent variables motivating the establishment of

inter-organizational relationships.

1.3 Organization of Dissertation

From a relational contract perspective, trust is an important mechanism for encouraging future exchanges (Hewett and Bearden, 2001). Shared vision as a social mechanism facilitates cooperative actions (Li, 2005). However, little is known about social mechanism effectiveness to motivate supplier flexibility from either an empirical or a theoretical standpoint. With the growing importance of purchasing as a frontier source of supply chain improvement, this research examines the consequences of social mechanisms on supplier flexibility, including volume, mix, new product, and delivery flexibility. The remainder of this article is divided into three parts. First, this paper reviews the literature on flexibility and social mechanisms, and presents the conceptual framework. Next, this study develops specific hypotheses about potential antecedents and outcomes of supplier flexibility. Finally, the conclusions summarize the research findings and implications of this study, and this paper discusses limitations and future research directions.

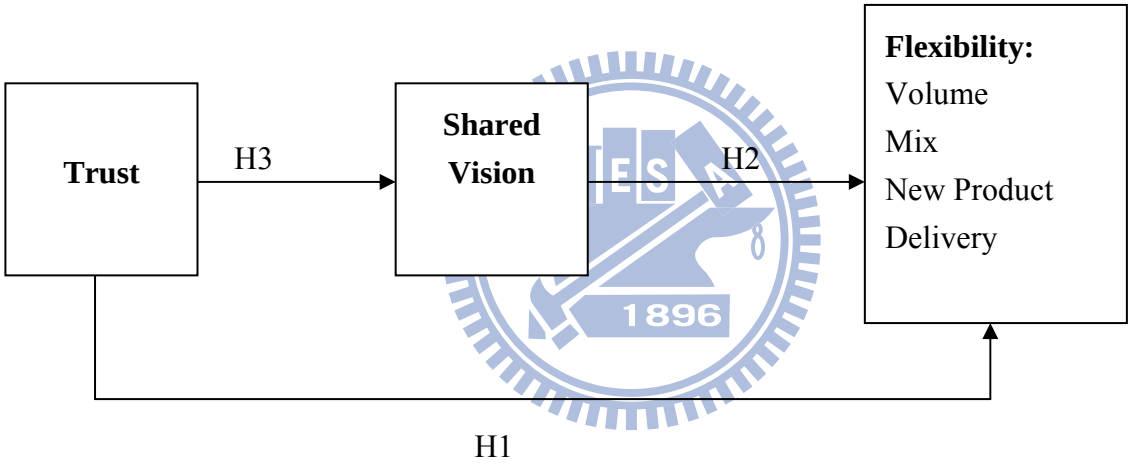
Chapter 2 Literature Review

Environmental turbulence is the main reason for pursuing manufacturing flexibility (Corrêa, 1994). Current market turbulence involving continuous changes in customer preferences or demands (Jaworski and Kohli, 1993) and technological turbulence involving the rate of technological change (Calantone *et al*., 2003) leads a firm to respond quickly in striving for future business opportunities. In an increasingly dynamic environment, a buyer's ability to successfully manage its relationships with suppliers is emerging as a key competence and source of sustainable competitive advantage.

Researchers have conceptualized social capital as embedded resources within cooperative relationships (Burt, 1992; Nahapiet and Ghoshal, 1998). Nahapiet and Ghoshal (1998) distinguished social capital as structural, relational, and cognitive dimensions. According to Nahapiet and Ghoshal (1998) and Tsai and Ghoshal (1998), the structural dimension includes social interaction, the relational dimension includes trust and trustworthiness, and the cognitive dimension includes shared vision. From the social exchange theory, partners involved in repeated exchange might begin to trust each other. Previous studies have suggested that trust emerges from social interactions (Gulati, 1995; Lewicki *et al*., 1998). Once trust is built, both partners are more likely to coordinate their efforts because each party does not act only for its own interests (Anderson and Narus, 1990; Mohr and Spekman, 1994; Morgan and Hunt, 1994). This study examines the effects

of the relational and cognitive dimension on supplier flexibility. Figure 1 depicts the conceptual model that summarizes the research interests and objectives of this study. Based on the literature reviews, this work generates three hypotheses associated with the model. These hypotheses focus on the interrelationships among trust, shared vision and respective flexibility of the supplier.

Figure 1 Conceptual Model



2.1 Flexibility

Flexibility becomes a critical order-winning criterion since a firm with flexibility gains competitive advantage by rapid response to customer's volatile demand. Gupta and Goyal (1989, p.120) defined flexibility as "the ability of a manufacturing system to cope with changing circumstances or instability caused by the environment". Zhang *et al*. (2003, p. 178) regarded manufacturing flexibility as "the ability of the organization to manage

production resource and uncertainty to meet various customer requests". In addition, Upton (1994) described internal flexibility as what the firm can do and external flexibility as what the customer sees. Examples of internal flexibility include machine, material handling, and routing flexibility. External flexibility directly affects a firm's competitiveness; by contrast, internal flexibility relates to a firm's operational efficiency (Chang *et al*., 2003). Examples of external flexibility are volume, mix, new product, and delivery flexibility (Chang *et al*., 2003). In contrast, internal flexibility relates to operational efficiency instead of market demand (Chang *et al*., 2003). To achieve customer value (i.e. delivery on time, high quality, and low-cost), firms must look beyond their internal flexibility (Lummus *et al*. 2003; Zhang *et al*. 2002). From the perspective of buyers, the following external flexibilities significantly relate to supplier response to environmental turbulence.

1. Volume flexibility: the ability to change the level of aggregated output.
2. Mix flexibility: the ability to change the range of products made within a given time period.
3. Product flexibility: the ability to introduce novel products, or to modify existing ones.
4. Delivery flexibility: the ability to change planned or assumed delivery dates.

2.1.1 Volume flexibility

Volume flexibility is the ability to effectively adjust aggregate production in response to customer demand (Hayes and Wheelwright 1984). Volume flexibility permits the firm to adjust production upwards and downwards within wide limits (Khouja, 1998). Vickery *et al*. (1999) related volume flexibility to high market share and financial performance, especially in highly cyclical markets. Firms rely on their external supplies as long-term sources of volume flexibility (Jack and Raturi, 2002). With changing customer demand, the buyer not only adjusts its own capacity, but also needs its suppliers to meet customer demand quantities. With regard to supplier volume flexibility, the buyer is concerned with quantity, cost, time, and quality (Beamon, 1999; D'Souza and Williams, 2000; Suarez *et al*., 1996) associated with volume change. The strategies for increasing volume flexibility include building slack resources, building inventory buffers, and training cross-functional workers. Research suggested that suppliers reach the volume flexibility requirement through production efficiency (e.g. just-in-time delivery) and resource utilization (e.g. overtime). In addition, reserve capacity and changeover time affect volume flexibility (Yang *et al*., 2007). In other words, suppliers with the ability to alter equipment operating rate and the speed and knowledge of base workers have an internal capacity focus. Tan *et al*. (2002) also suggested that quality, quick response, and volume flexibility are critical criteria in evaluating supplier performance. Buyers will regard suppliers that cannot

respond to demand fluctuations and manage effectively to achieve buyer's requirements, as unqualified. Volume flexibility is an important primary flexibility of the manufacturing system. The buyer is concerned with the supplier's capacity for volume requirement.

2.1.2 Mix Flexibility

Mix flexibility refers to the ability to change various products produced within a given period of time economically and effectively without incurring major set-up costs (Das, 2001; Slack, 2005). Mix flexibility implies the capability of a firm to respond quickly and economically to different product mix changes in the market (Karuppan and Ganster, 2004) to enhance customer satisfaction (Gerwin, 2005). A firm with mix flexibility efficiently uses resources and responds to market change (Gerwin, 1993). From a buyer's perspective, a buyer will require its suppliers to produce differentiated products in a certain capacity and change over quickly from one product to another to respond to a variety of customer preferences without incurring a major cost penalty (e.g. changeover cost). Hutchison and Das (2007) listed capabilities to achieve mix flexibility: manufacturing processes that produce a wide range of products, workforce flexibility, and quick changeover times. Gerwin (2005) also indicated that flexible manufacturing competencies include machines, labor, material handling, and routing flexibilities.

2.1.3 New Product Flexibility

Koste and Malhotra (1999) proposed addressing product flexibility by two different dimensions: modification flexibility and new product flexibility. Modification flexibility refers to the ability to make minor design changes into a specific product (D'Souza and Williams, 2000; Gerwin, 1993). As products have a short life cycle, a buyer needs to shorten the lead-time of new product development. Sethi and Sethi (1990) discussed product flexibility measurements as either the time or cost required for introducing new products to existing operations. Studies have shown that the early stage of product development involving determining the specifications and designs of a product to be critical to new product success (Cooper, 1990; Bacon *et al*. 1994). Chang *et al*. (2005) presented that manufacturing involvement, multi-skilled workforce developments, and manufacturing/design integration have significant positive effects on new product flexibility. Kara and Kaysi (2004, p.471) described, "Multi-skilled workers and continuous learning are some of the factors enhancing product/new product/modification flexibility". The new product pre-launch stage includes concept generation, preliminary technical assessment, testing and marketing plan. All supply chain partners jointly share the responsibility for achieving new product flexibility (Kumar *et al*., 2006). Suppliers that work closely with the buyer to provide technical or design support during the new product pre-launch stage and the engineering change on existing products, could save the buyer

time or cost during product development.

2.1.4 Delivery Flexibility

With regard to supplier's delivery performance, on-time delivery, lead-time, and reliability are primary metrics (Shin *et al*., 2000). Delivery reliability refers to the ability to deliver on or before the promised scheduled due date (Handfield *et al*., 1992) and delivery dependability refers to the ability to deliver on time with accurate quantities and kinds of products needed (White, 1996). Delivery flexibility is "the ability to accommodate last-minute changes to order quantities, small-batch deliveries, fast deliveries, and higher on-time delivery rates" Ketokivi (2006, p. 220). Sa´nchez and Pe´rez (2005) argued that delivery flexibility is the firm's capability to adapt lead-time to meet changing customer requirements. Gupta and Goyal (1989, p.120) define flexibility as "the ability of a manufacturing system to cope with changing circumstances or instability caused by the environment". From the literature, delivery flexibility not only encompasses delivery reliability and delivery dependability, but the ability to cater to changing orders in a very short time (Sawhney, 2006). Market demand has previously been more stable and product life cycle longer. Now, customer preferences and demand are difficult to forecast. A firm should be able to change planned delivery dates in meeting customers' requirements. A buyer's collaboration practices with suppliers enable it and its partners to act together to improve delivery performance. The supplier that lacks the ability to accommodate rush

orders and deliver on promised due dates (Chan, 2003), will result in additional cost to the buyer (e.g. line down cost) and negative customer value. Suppliers' delivery flexibility is the ability to change the product mix and reallocate capacity to accommodate buyers' rush or special orders. In other words, suppliers that operate at different output levels and quickly and easily change production quantities, and quickly change to a different product mix or to producing various products without a major changeover, are more responsive to buyers' demands and deliver on the promised due date. In summary, suppliers with mix and volume flexibilities achieve delivery reliability and dependability and accommodate buyer's rush orders.

2.2 Trust

Researchers have defined trust as the belief that a partner's word or promise is reliable to fulfill its obligations in the relationship (Schurr and Ozanne, 1985) and as a willingness to rely on an exchange partner in whom one has confidence (Moorman *et al*., 1992). Trust also refers to one party that believes others to be benevolent and honest (Larzalere and Huston, 1980). Trust is the most important variable in relational exchange by social exchange theorists (e.g., Blau 1964; Homans 1958). The social exchange theory assumes that parties maintain a relationship to gain a valued outcome. Lambe *et al*. (2001) suggested that trust building between two parties might start with relatively minor transactions, and increase as the number or size of interactions increases. If a party receives

increased benefit from the other, it will reciprocate as the benefit increases (Homans ,1958). Young-Ybarra and Wiersema (1999) characterized trust based on three components--dependability, predictability, and faith. Dependability refers to expectations that the partner will act in the other's best interest. Predictability is the consistency of the partner's actions. Faith refers to no opportunistic action of the partner. Regarding to the controversies of the conceptualizations of trust in the literature, McEvily *et al*. (2003 p.101) indicated that 'the field would be better served by researchers acknowledging that trust is a multifaceted concept, clearly identifying which definition is most relevant for their particular research question, and applying that definition consistently". This paper employs trust as a construct based on goodwill or benevolence. It has frequently been referred to as goodwill trust (Dyer and Chu, 2003; Ring and Van de Ven, 1994). Under this definition, confidence in another partner's integrity (Morgan and Hunt 1994), and belief in the reliability of another's promises (Schurr and Osanne, 1985) are usual.

The issue of trust in buyer-supplier relationships is significantly important, since the dyadic relationship often involves a high degree of interdependence. According to transaction cost economics (TCE), trust is viewed as a substitute for costly control and coordination mechanisms (Bromiley and Cummings, 1995). TCE also suggest that building trust through economic controls (i.e. hostages, specific assets) is the means to minimize potential opportunistic behavior (Ybarra and Turk, 2009). Gulati (1995, p.93) argued that

"trust counteracts fear of opportunistic behavior and as a result, is likely to limit the transaction costs associated with an exchange". Gao *et al*. (2005, p.398) argued that, "Based on the principle of reciprocity in exchange theory (Blau, 1964), mutual trusting behaviors and bilateral perceptions of trustworthiness must exist for a relationship to become stable and long lasting (Anderson and Weitz, 1992; Smith and Barclay, 1997)". According to the principle of reciprocity in exchange theory (Blau, 1964), ''trust entails trust'' (cf. McDonald, 1981). In the context of buyer-supplier relationships, the supplier's perceived trust in the buyer as dependable and benevolent will contribute to joint responsibility, shared planning, and a flexible arrangement (Johnston *et al*., 2004). This work specifically measures the trust of the buyer in the supplier. According to Doney and Cannon (1997), buyers select reliable suppliers who demonstrate behaviors that consider buyer's interest to reduce their perceived risk. Morgan and Hunt (1994, p. 23) defined commitment as "an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it; that is, the committed party believes the relationship endures indefinitely". In other words, the causal relationship between trust and commitment results from the principle of generalized reciprocity.

To achieve the flexibility required in the supply chain where there are unforeseen circumstances, buyers and suppliers need to devote high levels of cooperation and joint planning. Commitment refers to the motivation to stay with a supplier (Geyskens and

Steenkamp, 1995). Research has found that trust significantly and positively relates to commitment (Geyskens *et al*., 1999; Morgan and Hunt 1994) and cooperation (Anderson and Narus 1990; Morgan and Hunt 1994). Ganesan (1997) indicated that trust can enhance commitment to a relationship by reducing the risk of a partner's opportunistic behaviors and the transaction cost in an exchange relationship. Trust also facilitates inter-organizational communication and information sharing to improve responsiveness (Handfield and Bechtel, 2002). According to the social exchange theory, trust is created with reciprocally mutual beneficial actions through manifold interactions over time (Blau 1964; Homans 1959). If previous exchanges have been positive, supply chain partners may anticipate that further exchange will bring positive outcome. Positive outcome over time increase partners' trust of each other and commitment to maintaining the exchange relationship (Lambe *et al*., 2001). Bauer *et al*. (2002) argued that trust is developed through past experience and its effects are adverted in the future. In other words, trust emphasizes that short-term inequities will be compensated in the long run. Therefore, trust increases the probability of maintaining valuable buyer-supplier relationships. The supplier will be motivated to increase the value delivered to the buyer by adapting its own products, processes, and procedures to the buyer's specific needs. This enables suppliers' willingness to make an effort to generate desired outcomes. Hence, it is expected that a buyer's trust in its supplier positively influences supplier flexibility. Hence, we propose the following

hypothesis:

H1: A buyer's trust in its suppliers has a positive impact on supplier (a) volume flexibility, (b) mix flexibility, (c) new product flexibility, and (d) delivery flexibility.

2.3 Shared Vision

Hoe and McShane (2002, p.283) indicated, "A shared vision is a clear, common, specific picture of a truly desired future state". When exchange parties have a shared vision, they have the same perception about how to integrate strategic resources and how to interact with one another. Empirical studies have shown that parties in a supply chain with a shared vision have better performance (e.g., Spekman *et al.*, 1999). By contrast, Boddy *et al*. (2000) found that a lack of shared vision between suppliers and customers causes difficulty in cooperation. Without a shared vision in buyer-supplier relationships, the exchange partners may promote their own interests at the expense of others and further impair cooperative relationships. In other words, a shared vision contributes to relationship continuity. Developing a shared vision between buyers and suppliers helps focus on their strategic goals (Voss, 2005) and aligns them in the same direction. Thus, a shared vision helps to create commonality between buyer-supplier relationships and provides coherence in interactive activities.

Developing a shared vision helps each actor in buyer-supplier relationships see the potential benefit, and understand their expected contribution (Riis, 2009). A shared vision

aligns goals and values resulting from increased communication, information sharing, and understanding between the partners (Young-Ybarra and Wiersma, 1999). Buyers and suppliers with a shared vision have a greater perspective toward long-term orientation (Ganesan, 1994; Lusch and Brown, 1996) which focuses on achieving future goals. Frequent and close interactions allow buyers and suppliers to perceive that they are a team that shares important values and aspirations, in which partners are expected to strengthen cooperative goals. If both buyers and suppliers understand the importance of collaborating and improving the supply chain, they will facilitate cooperative actions (Li, 2005) to meet the manufacturer's flexibility requirements. Hence, we propose the following hypothesis:

H2: Shared vision has a positive impact on supplier (a) volume flexibility, (b) mix flexibility, (c) new product flexibility, and (d) delivery flexibility.

2.4 The Mediating Role of Shared Vision between Trust and Supplier flexibility

Various studies have identified trust as an essential element of a long-term buyer-supplier partnership (e.g. Anderson and Narus, 1990; Rousseau *et al.*, 1998). Prior studies claimed that trust induces joint efforts (Gambetta, 1988) or shared resources (Tsai and Ghoshal, 1998). Trust facilitates inter-organizational communication and commercial or confidential information sharing to improve responsiveness (Handfield and Bechtel, 2002). Based on the social exchange theory, if exchange partners realize the benefits of

previous transactions, the parties may engage in riskier behavior that provides greater benefits to exchange partners while trust increases over time. Growing trust indicates an orientation of parties towards ultimate values rather than immediate rewards (Huston and Burgess, 1979). Thus, a buyer with a high level of trust in its suppliers will (1) communicate sensitive information (2) provide advance information (Kingshott, 2006) about changes to market and customer preference. Ali and Birley (1998) argued that shared vision is the component of ability, in which shared vision is not just a common value, but the ability to achieve a collective goal and align actions accordingly. A shared vision of dyadic relationships likely varies over time in response to opportunities and needs (Lai *et al*., 2009). Buyer-supplier relationships are difficult to sustain because of different visions, which can result in inter-organizational conflicts. As the buyer and supplier frequently interact, both are more likely to perceive each other as trustworthy actors (Gabarro, 1978), to share important information, and to create a common goal. A positive relationship between trust and a shared vision may be expected, because a trusting relationship between a buyer and its suppliers implies that the buyer and suppliers engage in greater information sharing. Hence, a shared vision requires trust as a prerequisite. In other words, trust helps to convey a sense of identity in inter-organizational relationships and may create commitment to collective goals. We hypothesize:

H3 (a): A buyer's trust in its suppliers will help to develop a shared vision.

Trust has positive social benefits that draw parties closer together, embedding them in a social framework that promotes cooperation (Stinchcombe, 1986; Thibaut, 1968), and facilitates a common understanding of aims and objectives (Anderson and Weitz, 1989). As in our prior discussion, trust helps a buyer and its suppliers to develop a shared vision. This study also proposes that a buyer's trust in its supplier will affect supplier flexibility. Additionally, if the supplier has a clear picture of mutual goals in the supply chain, it will have a strong intention to integrate resources and engage in productive behaviors to meet the buyer's flexibility requirements. In linking this evidence for shared vision on supplier flexibility with our proposition of the influence of trust on shared vision, we can expect a shared vision to mediate in the trust-supplier flexibility linkage. The above arguments lead to:

H3(b) : Shared vision mediates the relationship of a buyer's perceived trust and its suppliers' (a) volume flexibility, (b) mix flexibility (c), new product flexibility, and (d) delivery flexibility

2.5 Control Variables

A large-scale buyer may have more resources and power on its suppliers that lead to supplier flexibility. On the supplier enablement front, large buyers with available resources can withdraw their demand or offer more orders to compel suppliers to achieve flexibility requirement. The duration of the collaborative relationship with suppliers may also affect

supplier flexibility. According to the relational contracting theory (RCT), the relationship duration will help to develop trust and a shared vision. Following Heikkilä (2002), relationship duration contributes to information flows and cooperation, further leading to high supply chain efficiency. The level of environmental turbulence (market and technological turbulence) might have different effects on social mechanisms of suppliers' flexibility. The effectiveness of social mechanisms also varies among different industries. In the face of environmental turbulence, buyers in the high-technology industry may prefer inter-organizational trust and shared vision building among their suppliers, to quickly respond to technological turbulence and a dynamic market. Therefore, this study includes the size of the buyer, measured by its total number of employees, duration of relationship, type of industry, market turbulence, and technological turbulence as the control variables. These enable us to identify the nature of the relationship between supplier flexibility and social mechanisms more effectively.

Chapter 3 Methodology

3.1 Sample and Data Collection

This research investigated the relationship between social mechanisms and supplier flexibility in the supply chain. A survey of major Taiwanese firms was conducted. A questionnaire was pre-tested with 25 middle or top managers from different companies not included in the final study. Based on their responses, several questions were eliminated and reworded. We obtained suggestions for adaptations to ensure the clarity and appropriateness of items. We revised and eliminated several redundant and ambiguous items accordingly. The revised survey questionnaires were sent out through e-mail to 1000 members chosen at random from among the 5000 membership of SMIT (Supply Management Institute, Taiwan) which is an institute for purchasing management certification (e.g. Certified Purchasing Professional and Certified Purchasing Manager) training. All the items adapted from English scale were translated into Chinese. Survey questionnaires were sent out through E-mail to the purchasing managers of buyers who are in charge of transactions with suppliers. Purchasing managers were selected as they are often the main point of interaction with their firm's suppliers. Participants were asked to select one important supply relationship and to answer all questions referring to this one supplier. After 2 weeks of initial mailing, we sent the follow-up mail to non-respondents with a copy of questionnaire. As a result, 175 returns were received out of 1000

questionnaires (17.5 percent). After elimination of 13 incomplete questionnaires, the final sample was 162 questionnaires for analysis (16.2 percent). Table 1 presents characteristics of our final samples.

Rutner and Gibson (2001) reported an expected response rate of 5.7 percent on the data collection by "e-mail-out-e-mail return" method. In addition, their study on logistics information systems indicated that different survey techniques yield different rate of return ranging from 3.7 percent to 12.6 percent. Namely, our survey return rate was acceptable from E-mail surveys and supply chain targets. To assess non-response bias, we compared early and late respondents (Armstrong and Overton, 1977). The results showed that there were no significant differences in terms of number of employees (t=0.993, p=0.322) and duration of relationship (t=1.2, p=0.231). Since the data of this study were gathered from a single respondent, there is the possibility for the occurrence of common method bias. We used a Harmon's one-factor analysis to check for common method bias (Podsakoff and Organ, 1986). If common method variance is a serious problem in this study, a single factor will emerge from a factor analysis or one general factor accounts for most of the covariance (Podsakoff and Organ, 1986). An exploratory factor analysis found many factors derived and explained 71.15% of the variance, while a single factor explained only 19.32% of the variance. Therefore, common method bias did not pose a potential threat to this study (Podsakoff *et al*., 2003).

Table 1 Characteristics of Informants' firms

Characteristics	Number in Sample	Percentage
Industry		
High-tech Manufac	82	50.62
Traditional Manufa	80	49.38
Number of Employees		
<1000	94	58.02
>1000	68	41.98
Relation Duration with supplier		
< 10 years	83	51.23
>10 years	78	48.15
Not Reported	1	0.62
Relation Type		
Purchasing	98	60.49
Outsourcing	18	11.11
Both	46	28.40

3.2 Measures

We followed the procedures suggested by Churchill (1979). First, we defined the domain of each construct. Second, we searched the literature for appropriate scale. The measurements for each construct in this study are listed in the Appendix. Informants responded to five-point Likert-type scales for all variables from 'strongly disagree' (1) to strongly agree' (5).

Flexibility: In regard to flexibility, the measurements of volume (VOL) and mix (MIX) flexibility were adapted from Zhang *et al*. (2003). There were 5 items for volume flexibility and 6 items for mix flexibility measurement. For delivery flexibility (DLV) and new product (NP) flexibility, scales were adapted from previous researches (c.f. Chan, 2003; Duclos *et al*., 2003; D'Souza and Williams, 2000; Krause *et al*., 2001; Koste and

Malhotrar, 1999; Sawhney, 2006). There were 5 items for delivery flexibility and 4 items for product flexibility measurements.

Trust and Shared Vision: To examine the effect of trust (TST) and shared vision (SHV), we further employed the construct from prior researches. We adapted scales from Kumar *et al.* (1995), Kozak and Cohen (1997), and Spekman *et al*. (1999) to measure trust. For shared vision, scales were adapted from Li and Lin (2006). There were 9 items for trust and 3 items for shared vision.

Control Variables: Size of the buyer was measured by employee headcounts 1- more than 1000 and 0- less than 1000. Duration (DUR) was measured by more than 10 years of cooperative experience with 1 and less than 10 years with 0. In regard to industry type (IND) measurement, 1 represented high-tech firms and 0 represented traditional manufacturing firms. Market turbulence measurement (MTU) items were adopted from Jaworski and Kohli (1993) and technological turbulence (TTU) items were from (Calantone *et al*., 2003).

Chapter 4 Results

4.1 Reliability and Validity

This research conducted confirmatory factor analyses (CFA) using AMOS 7.0 to assess the reliability and convergent and discriminant validity for our measurement models (Bagozzi and Yi, 1988), and to drop some items that possessed low factor loadings. To assess model fit, this paper used the overall model chi-square measure (χ^2), root mean square error of approximation (RMSEA), root mean square residual (RMR), comparative fit index (CFI), normed fit index (NFI) and goodness-of-fit index (GFI). Because the sample sizes were not large, this study estimated two measurement models: the two independent variables: trust and shared vision ($\chi^2(7) = 8.098$; $p > 0.05$; RMSEA = 0.031; RMR= 0.01; CFI=0.99; NFI=0.99; GFI=0.984), and the second for supplier's flexibility ($\chi^2(74) = 90.792$; $p > 0.05$; RMSEA = 0.038; RMR= 0.026; CFI=0.986; NFI=0.929; GFI=0.933). The results of these models are presented in the Table 3-1 and Table 3-2.

The convergent validity of the scales was tested in two ways. First, the results on indicator loadings were significant ($p <$. 001). The composite reliability (CR) and Cronbach's alpha of each factor ranged from 0.7 to 0.9 (Nunnally, 1978). Second, this study checked the average variance extracted (AVE) for each construct to evaluate the discrimant validity of the focal constructs. The results showed that the AVE for each factor is higher than 0.5 and larger than the squared correlation between the factor pair (See Table 2). These results

support the convergent validity of the scale items (Anderson and Gerbing, 1988; Fornell and Larcker, 1981).

To further assess the validity of supplier's flexibilities as a second-order construct, this research further conducted a second-order CFA to examine the underlying unidimensionality of flexibility constructs. The model exhibited an excellent model fit, with a ratio of Chi-square to degree of freedom of 1.221, RMSEA of 0.037, RMR of 0.025, CFI of 0.986 and GFI of 0.931. The result revealed all four first-order factors loaded on the second-order factor strongly (>0.67). The second-order confirmatory factor analysis supported the view of flexibility as a single overall construct composed of four distinct sub-dimensions (See Table 3-3). Finally, the evaluation of discriminant validity was checked by chi-square difference test between each pair of construct (Anderson and Gerbing, 1988). In all cases, combining each of flexibility and social mechanism dimensions with another resulted in a significant increase in the chi-square statistic ($p <$ 0.01). The results of Table 4 support the discriminant validity.

Table 2 Means, standard deviation, and correlation matrix of constructs

	VOL	DLV	MIX	NP	TST	SHV
Volume Flexibility (VOL)	1.00					
Delivery Flexibility (DLV)	0.351**	1.00				
Mix Flexibility (MIX)	0.484**	0.503**	1.00			
New Product Flexibility (NP)	0.397**	0.449**	0.599**	1.00		
Trust (TST)	0.233**	0.328**	0.251**	0.256**	1.00	
Shared Vision (SHV)	0.176*	0.401**	0.321**	0.395**	0.511**	1.00
Means	3.673	3.877	3.601	3.671	3.895	4.008
Standard deviation	0.550	0.521	0.624	0.628	0.484	0.640
Cronbach's α	0.709	0.847	0.866	0.834	0.881	0.932
Composite trait reliability	0.790	0.850	0.848	0.845	0.884	0.905
Average variance extracted (AVE)	0.559	0.588	0.530	0.648	0.718	0.760

**Correlation is significant at the 0.01 level (two-tailed).

* Correlation is significant at the0.05 level (two-tailed).

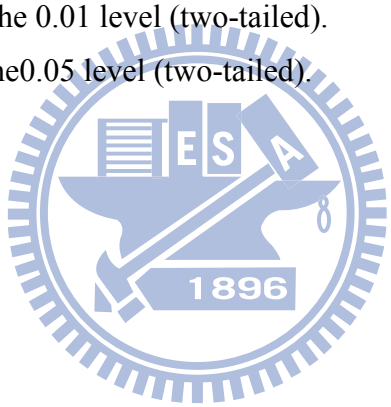


Table 3 Fit statistics — confirmatory factor analysis for constructs

Table 3-1 Result of CFA on Social Mechanisms

Construct	Measurement	Standardized loading
TST	TST4	0.776
	TST5	0.939
	TST6	0.83
SHV	SHV1	0.815
	SHV2	0.956
	SHV3	0.95

$\chi^2(7) = 8.098$

RMSEA = 0.031, CFI=0.99; NFI=0.99, GFI=0.984,RMR= 0.01

Table 3-2 Result of 1st order CFA on Flexibility

Construct	Measurement	Standardized loading
VOL	VF1	0.604
	VF2	0.641
	VF4	0.632
DLV	DLV1	0.689
	DLV2	0.766
	DLV4	0.685
	DLV5	0.834
NP	NP2	0.807
	NP3	0.814
	NP4	0.761
MIX	MIX1	0.611
	MIX2	0.702
	MIX3	0.728
	MIX4	0.875
	MIX5	0.793

$\chi^2(74) = 90.792$

RMSEA = 0.038, CFI=0.986, NFI=0.929, GFI=0.933, RMR= 0.02

Table 3-3 Result of 2nd order CFA on Flexibility

Construct	Standardized loading
VOL	0.684
MIX	0.919
DLV	0.667
NP	0.778

$\chi^2(76) = 92.81$

Table 4 Results of discriminant validity tests

Factors	Constrained model		Unconstrained model		$\Delta \chi^2$
	χ^2	df	χ^2	df	$\Delta \chi^2(1)$
MIX-DLV	230.519	27	93.065	26	137.454
MIX-NP	131.332	20	54.792	19	76.54
MIX-TST	300.032	20	49.578	19	250.454
MIX-SHV	451.683	20	61.314	19	390.369
MIX-VOL	112.003	20	61.642	19	50.361
DLV-VOL	92.983	14	20.778	13	72.205
DLV-NP	164.55	14	38.058	13	126.492
DLV-TST	269.228	14	27.572	13	241.656
DLV-SHV	259.42	14	33.999	13	225.421
VOL-NP	70.526	9	10.011	8	60.515
VOL-TST	96.871	9	10.788	8	86.083
VOL-SHV	95.895	9	5.917	8	89.978
NP-TST	177.077	9	7.203	8	169.874
NP-SHV	167.876	9	18.395	8	149.481
TST-SHV	211.436	9	15.698	8	195.738

Note: All χ^2 values were significant at the $p < 0.01$ level.

4.2 Hypotheses Tests

Hypotheses tests were examined by using structural equation model. Because this study posited that shared vision mediates the effects of trust on four flexibility dimensions (i.e. volume, mix, new product, and delivery), tests were conducted by examining whether mediated models fit significantly better than direct effect model. In direct effect model, trust and shared vision were modeled to have independent effects on four flexibility dimensions. The model fit indices indicate less good fit for direct effect model ($\chi^2(161) = 240.825$, $p < 0.01$; RMSEA = 0.055; RMR= 0.056; CFI=0.96; NFI=0.892;

GFI=0.884). Next, the mediated model was estimated and resulted the good fit of indexes: $\chi^2(160)=192.246$, $p < 0.05$; RMSEA = 0.036; RMR= 0.035; CFI=0.984; NFI=0.913; GFI=0.905. Chi-square difference tests indicate that mediated model is significantly better fit $\Delta\chi^2(1)=12.579$, $p < 0.01$.

According to Baron and Kenny(1986) and Kenny *et al.*(1998), this research conducted four steps to determine whether the shared vision mediates the effect of trust on suppliers' respective flexibility dimensions, four conditions must hold: (1) the predictor variables (TST) must affect the dependent variables in the predicted direction, (2) predictor variables (TST) must affect the mediator (SHV) in the predicted direction, (3) the mediator (SHV) must affect the dependent variables (i.e. VOL, MIX, NP and DLV) in the predicted direction, and (4) the impact of the predictors on the dependent variables must be not significant (full mediation) or reduced (partial mediation) after controlling for the mediator (SHV) (Baron and Kenny, 1986; Holmbeck, 1997). Table 5 contains the analyses necessary to examine the mediated hypothesis. First, the estimates on the direct effect of TST on four flexibility dimensions are all significant at the 0.01 level (Model 1). Second, the direct effect of SHV on VOL is significant at the $p < 0.05$ and other flexibilities are all significant at $p < 0.01$ level (Model 2). Third, in Model 3, the direct effects of TST on VOL, MIX, NP and DLV were added to the original model, including the indirect effects, as mediated by SHV. The results reveal that direct effect of TST on VOL at $p < 0.05$ and

DLV is significant at the 0.1 level, and none effect of TST on MIX and NP. In addition, the effect of SHV on VOL is non-significant, and NP, MIX and DLV are all significant at $p <$ 0.01 level. Further, details of the result also show that the effect of TST on SHV is significantly supported ($\beta = 0.495$, $p < 0.01$).Additionally, we used Sobel's (1982) test to verify the mediated effect of SHV on VOL. The result supports that there is no mediated effect of SHV on VOL (z=0.604, $p < 0.05$). Furthermore, the relation between TST on MIX and NP controlling the mediator (SHV) is zero, suggesting the effects of TST on MIX and NP is fully mediated through SHV. When the mediator was controlled, the effect of TST on DLV was significant ($\beta = 0.193$, $p < 0.05$). The relation between TST on DLV through SHV is ascertained by analyzing β for TST on DLV added SHV ($\beta = 0.155$) to model is significantly smaller than direct effect of TST on DLV in Model 1 ($\beta = 0.308$). The data suggests that SHV is a partial mediator between TST and DLV. Therefore, the effect of trust on mix and new product flexibility is fully mediated, and delivery flexibility is partial mediated by shared vision (Baron and Kenny, 1986; Venkatraman, 1989). The finding showed trust is the main drive of volume flexibility instead of shared vision. Finally, size, duration of relationship and industries, as the control variables, revealed no significant effect on dependent variable. In contrast, market turbulence has negative effect on supplier delivery flexibility ($\beta = -0.18$, $p < 0.05$) and technological turbulence has positive effect on supplier delivery ($\beta = 0.21$, $p < 0.01$). The possible explanation is

customer changing preferences may constrain supplier accommodation to rush orders or adjustment of production planning. Under higher technology change rate, suppliers might promote their delivery flexibility to reduce risk of obsolete inventories. However, our findings reveals shared vision plays a mediator between trust and delivery flexibility while market turbulence and technological turbulence as control variables

Table 5 The Effect of Social Mechanisms on Supplier Flexibility

Model 1

Dependent Variables	VOL	NP	MIX	DLV
	Standardized B (t-Value)			
Control Variables				
Size	-.019 (0.084)	.012 (0.96)	.023 (.095)	.092 (.076)
DUR	.065 (86)	.032 (.429)	-.019 (-.252)	.008 (.113)
IND	-.057 (-.754)	-.007 (-.092)	-.059 (-.778)	-.074 (-1.02)
MTU	-.057 (-.578)	-.064 (-.656)	.034 (.344)	-.165 (-1.75)
TTU	.132 (1.342)	.182* (1.857)	.119 (1.221)	.239** (2.529)
Independent Variables				
TST	.225*** (2.964)	.239*** (3.161)	.236*** (3.129)	.308*** (4.224)

Model 2

Dependent Variables	VOL	NP	MIX	DLV
	Standardized B (t-Value)			
Control Variables				
Size	-.015 (-.199)	-.004 (-.05)	.014 (.187)	.081 (1.15)
DUR	.052 (.681)	.001 (.012)	-.044 (-.598)	-.023 (-.333)
IND	-.059 (-.763)	-.028 (-.386)	-.073 (-.985)	-.092 (-.1297)
MTU	-.068 (-0.677)	-.084 (-.885)	.017 (.177)	-.186** (-2.037
TTU	.136 (1.366)	.153 (1.643)	.102 (1.066)	.218** (2.386)
Independent Variables				
SHV	.164** (2.126)	.384*** (5.325)	.31*** (4.178)	.389*** (5.518)

Model 3

Dependent Variable	SHV	VOL	NP	MIX	DLV
		Standardized B (t-Value)			
Control Variables					
Size	.054 (.805)	-.023 (-.302)	-.006 (-.087)	.009 (.127)	.075 (1.075)
DUR	.083 (1.243)	.06 (.79)	.004 (.049)	-.04 (-.542)	-.018 (-.251)
IND	.063 (.939)	-.061 (-.81)	-.029 (-.4)	-.075 (-1.012)	-.094 (-1.342)
MTU	.047 (.547)	-.06 (-.611)	-.081 (-.866)	.022 (.228)	-.18** (-1.987)
TTU	.092 (1.063)	.126 (1.283)	.15 (1.608)	.096 (1.01)	.21*** (2.323)
Independent Variables					
TST	.495*** (7.376)	.193** (2.185)	.067 (.805)	.113 (1.313)	.155* (1.908)
SHV		.066 (.454)	.35*** (4.179)	.253*** (2.946)	.311*** (3.831)

Notes: *p<.1, **p<.05, ***p<.01

Chapter 5 Conclusion and Implication

How the B2B buyer promotes supplier flexibility through its relationships is critically important and has been unexplored. The buyer teams up with its suppliers to establish long-term collaborative relationships for a sustainable and competitive supply chain. Long-term supply chain success requires trust to develop a shared vision of the future. A customer-oriented buyer should be able to adjust suppliers' capacity to match dynamic customer demand. Findings from this study provide important insights into how social mechanisms lead to supplier flexibility for responsiveness. We suggest that the buyer leverage supplier flexibility to meet customer requirements through social mechanisms. Exchange partners with trust will also ensure their shared vision development. Partners with a shared vision will view their goal as cooperative instead of competitive. A shared vision helps facilitate group actions that benefit the whole supply chain. Concerning the effect of social mechanisms on flexibility, although trust induces supplier flexibility, this study finds shared vision as the mediator between trust among mix, new product, and delivery flexibility. On the other hand, trust has direct impact on volume flexibility without a mediator.

5.1 Trust and supplier flexibility

Flexibility is the willingness to alter conditions to meet an unanticipated situation (Johnston *et al.*, 2004). Buyer-supplier collaboration strengthens the buyer's

responsiveness (Squire *et al*., 2009). Suppliers need to reallocate their capacity and change over to meet volume flexibility requirements from buyers. Achieving mix flexibility and new product flexibility need more investments (e.g. human resources or R&D expenditures). Slack (2005, p. 1193) claimed, ". . . volume and delivery flexibility seemed to be interchangeable to some extent". A buyer not only delivers to customers on time, but also has the ability to change the planned delivery date (Sawhney, 2006). According to Johnston *et al*. (2004), higher levels of buyers' perceived trust of suppliers lead suppliers to involve and facilitate performance. From the social exchange theory, trust building is a gradual process through increased exchange and positive outcomes. Joshi and Stump (1999) suggested that trust strengthens the effect of supplier asset specificity on their joint action relationships. While a supplier tries to meet a buyer's requirements (i.e. quickly change quantities, produce various product combinations, minimize the time to implement new product development and accommodate special orders), the supplier needs to change over its capacity and production plans, and devote efforts in R&D and human resources. If a supplier benefits from cooperating with the buyer, it will be willing to maintain the relationship and commit to the buyer with the expectation for future benefit. Hence, trust positively relates to supplier flexibility for responsiveness to a buyer's needs.

5.2 Shared vision as the mediating role on supplier flexibility

Shared vision is regarded as a necessary condition (Li, 2005) and a bonding mechanism (Tsai and Ghoshal, 1998) for exchange partners to combine or integrate resources. Shared vision means that the buyer and supplier have similar objectives and a shared understanding of the importance of collaboration. Ratnasingham and Kumar (2000) characterized trust by an increased level of open communication and information sharing. A buyer with high-perceived trust will have more confidence that the suppliers will act honestly. Under this circumstance, the buyer is willing to share more strategic and sensitive information with its suppliers, thus the buyer-supplier relationships possess common goals and perceive the dyadic relationship as a whole team. This research found that trust facilitates buyer-supplier shared vision.

Volume flexibility enables a firm to meet customer satisfaction by quickly providing volume in response to unanticipated demand and quickly reducing volume to eliminate excess and obsolete inventories. Additionally, Ndubisi *et al*., (2005) showed no significant relationship between cost, technology consideration, and volume flexibility. They concluded that the level of supplier involvement is not as high as other flexibility dimensions. A buyer that highly trusts the supplier to keep its commitment and perform internal capacity adjustment for meeting volume change enhances supplier volume flexibility. Suppliers gain mix flexibility through both direct labor and indirect labor to

design and implement the expanded product mix. Suarez *et al*. (1996) described that skilled workers or sophisticated equipment to achieve mix flexibility increases additional cost. Suppliers' involvement in new product development promotes new product flexibility (Narasimhan and Das, 1999). Sa´nchez and Pe´rez (2003) argued that supplier development significantly contributes to new product time and cost minimization. Suppliers' involvement, including research and development (R&D), marketing, and manufacturing, is essential to new product development. The new product introduction process also involves more people in the decision-making process and greater uncertainty. With regard to mix and new product flexibility, suppliers need greater involvement and more investments to achieve the buyer's requirement. Investment risks include additional cost and holdup between buyer-supplier transactions. Thus, a buyer should develop tighter relationships with suppliers to drive them to make risky investments. Findings from this study suggest that shared vision mediates the relationship between trust and mix/new product flexibility. In other words, a buyer with a high level of trust in its suppliers builds a shared vision to promote its suppliers' mix/new product flexibility. Oke (2005) indicated that delivery flexibility is the consequence of volume and mix flexibility. Kandemir *et al*. (2006) presented the concept of "alliance coordination" and Miller *et al*. (2007) further claimed that shared vision generates alliance coordination. From this perspective, closely coordinating with the buyer facilitates suppliers' delivery flexibility, involving suppliers'

operation decision. Hence, shared vision influences suppliers' delivery flexibility so that suppliers act responsively.

5.3 Managerial Implications and Theoretical Implications

Suppliers can display flexibility toward buyer-requested adjustments (Noordewier *et al.*, 1990). With respect to flexibility, buyers who quickly respond to customers' product requirement or change technical specifications cultivate a closer connection to customers (Homburg, 1998). While organization and marketing studies have already discussed trust and shared vision, this study focuses on the effects of these two social mechanisms on supplier flexibility. The developed conceptual model gives business managers insightful assessment of inter-organization relationships and management practices in supply chains. The key contributions of this study include a profound understanding of the buyer's roles for suppliers' responsiveness, and identifying how the social mechanisms of trust and shared vision influence their expectation of suppliers' compliance to respective flexibility. This research demonstrates two specific managerial and theoretical implications and gives a few ideas for future research.

5.3.1 Managerial Implications

First, the results highlight that shared vision is the critical determinant on suppliers' mix, new product, and delivery flexibility. From the RBV (Resources-Based View), managers of buyer firms need to build new capabilities, transform their resource base, and

reconfigure processes to leverage new valuable resource combinations to sustain competitive advantage in changing environments. Powell (1990) argued that firms engaging in fast-moving industries with short product cycles are likely to engage in network partnerships to reposition products rapidly and respond quickly to changing market conditions. In today's turbulent business environment, firms are teaming up with each other due to technological complexity and diverse customer needs. In the new business model, competitors would rather be individual firms than an entire supply chain. Inter-firm relationships with a shared vision have collective goals and aspirations, and strategically align with mutual interests. Specifically, this value centers on the belief that collaboration leads to better mutual benefit. To achieve buyers' flexibility requirement, suppliers should commit and be willing to allocate their resources. We suggest that managers involve in shared vision development between inter-firms rather than a buying-selling approach.

Second, research has regarded trust as a catalyst in the buyer-supplier relationship, since it provides an expected successful exchange. Das and Teng (2001) argued that trust is a state of mind that reduces perceived relation risk. When trust exists between exchange parties, they are more willing to increase information sharing. In addition, when buyers trust in suppliers, they are inclined to provide critical or confidential information to suppliers. Although our findings suggest that trust alone advances supplier volume

flexibility, trust is still the important element of buyer-supplier relationships. To advance supplier flexibility requirements, managers should frequently interact with suppliers to involve in mutual trust as an integral part of relationships and then develop a shared vision through communication and information sharing.

5.3.2 Theoretical Implications

Trust is the crucial element in the industrial marketing relationship. For instance, Johnston *et al*. (2004) empirically showed that supplier perceived trust has significant impact on joint responsibility and flexibility arrangement. Handfiel and Bechtel (2002) also found out that higher levels of buyer trust relate to higher levels of supplier responsiveness. Trust significantly influences the relationship commitment in which partners maximize their efforts to maintain relationships (Morgan and Hunt, 1994). The social exchange theory suggests that causal relationship between trust and commitment result from the principle of generalized reciprocity (McDonald, 1981). Suppliers that are willing to make specific asset commitments, develop higher level of trust (Handfiel and Bechtel, 2002). Trust attracts and secures partner commitments (Kingshott, 2006). Our finding is consistent with the previous studies that trust significantly impacts supplier flexibility.

Our framework provides helpful guidance for identifying and examining relationships between buyers and suppliers. Despite the strong linkage between trust and supplier

flexibility, our model suggests that shared vision plays a crucial role among trust, mix, new product, and delivery flexibility. As prior discussions in our study, suppliers require high levels of involvement and idiosyncratic asset investments to achieve mix, new product, and delivery flexibility. The risk of those prerequisites is higher than volume flexibility achievement. Although trust provides a motivation for trustee commitment, whether that commitment manifests in actions depends on the risk of involvement and investments. However, trust leads to a high level of sensitive information (Handfiel and Bechtel, 2002) and critical and proprietary information (Lambe *et al*., 2009) sharing. Shared vision develops through communication and information sharing. While a buyer perceives its suppliers as trustworthy, increased strategic or critical information-sharing facilitates the same team identification and whole goal understanding. Thus, suppliers are more willing to make adaptations for buyer needs. In contrast to most previous studies, which suggest that trust always leads to desirable outcomes (Dirks and Ferrin, 2001), we demonstrate that shared vision building effectively extends trust and the commitment theory.

5.4 Limitations and Further Research

Future research can address several limitations of this study. First, because our samples only consist of buyers, the results of a single investigation may have limited generalizability. However, this limitation should be somewhat tempered because every respondent was from a different firm. Second, this study empirically demonstrates social

mechanisms: (1) Trust has significant effect on supplier flexibility (2) Trust helps buyers and suppliers to evolve a shared vision. (3) Shared vision is the mediating role on supplier flexibility (i.e. mix, new product, and delivery flexibility). However, we do not measure the risk to suppliers of providing respective flexibility in detail. Future studies might examine perceived risk on respective flexibility from the supplier's side. Third, based on transaction cost economics, the exchange parties would need to develop the complex repertoire of behaviors (Denison *et al.*, 1995; Hoojiberg, 1996) to foster the exchange relationships and reduce the risk of opportunism. Within transaction cost economics, trust is viewed as a substitute for costly control and coordination mechanisms (Bromiley and Cummings, 1995). According to Lado *et al.* (2008), a high level of trust might maintain value-enhancing relationships when the risk of opportunism is high. We would recommend future researchers aim at the paradoxical effect of trust and opportunism on suppliers flexibility. Finally, this study focused on the effect of trust, which refers to the firm's intention to make things work rather than the ability to perform (Das and Teng, 2001; Nooteboom, 1996). Following Singh and Sirdeshmukh (2000), goodwill trust and competence trust may provide more insight into exchange relationships. How does a buyer's perceived competence trust in suppliers affect suppliers' actions in terms of flexibility? Theoretically intriguing and practically important questions such as this, deserve further study.

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Appendix A: Measurement items

Market Turbulence (Based on Jaworski and Kohli, 1993)

MTU1: In our kind of business, customers' product preferences change quite a bit over time.

MTU2: Our customers tend to look for new product all the time

Technological Turbulence (Based on Calantone et al., 2003)

TTU1: The technology in our industry is changing rapidly.

TTU2: In our principal industry, the modes of production and service change often.

TTU3: In our principal industry, the modes of production and service change in major ways as opposed to slowly evolving.

Flexibility

Volume flexibility (Based on Zhang et al., 2003)

VF1 The supplier can operate efficiently at different levels of output

VF2 The supplier can operate profitably at different production volumes

VF3 The supplier can economically run various batch sizes

VF4 The supplier can quickly change the quantities for our products produced

VF5 The supplier can vary aggregate output from one period to the next

VF6The supplier can easily change the production volume of a manufacturing process

Mix flexibility (Based on Zhang et al., 2003).

MX1 The supplier can produce a wide variety of products in their plants

MX2 The supplier can produce different product types without major changeover

MX3 The supplier can build different products in the same plants at the same time

MX4 The supplier can produce, simultaneously or periodically, multiple products in a steady-state operating mode

MX5 The supplier can vary product combinations from one period to the next

MX6 The supplier can changeover quickly from one product to another

Delivery flexibility

(Based on Chan, 2003; Duclos et al., 2003; Krause et al., 2001; Sawhney, 2006)

DLV1 The supplier is able to make dependable delivery promises

DLV2 The supplier can deliver its products on promised due dates

DLV3 The supplier can deliver in smaller lots and ship more frequently to replenish our stock levels

DLV4 The supplier can move planned delivery dates forward to accommodate rush orders or special orders

DLV5 The supplier can meet the accuracy of delivery quantities

New product flexibility

(Based on Chan, 2003; D'Souza and Williams, 2000; Koste and Malhotrar, 1999)

NP1 The supplier can reduce the time to modify existing products

NP2 The supplier can reduce the time to implement engineering change order

NP3 The supplier is able to minimize the time or cost of new products introduced into production

NP4 The supplier can provide the design support in new products pre-launch

Trust

(Based on Kozak, and Cohen, 1997; Kumar et al., 1995; Spekman et al., 1999)

TST1 The supplier has been open and honest in dealing with us.

TST2 The supplier respects the confidentiality of the information they receive from us.

TST3 Our transactions with the supplier do not have to be closely supervised

TST4 We believe that the supplier is trustworthy

TST5 The supplier usually keeps the promises that it makes to our firm

TST6 We have complete confidence in the supplier' motives

TST7 Maintaining this relationship is vital

TST8 We share with the supplier a similar sense of fair play

TST9 Rewards are shared equitably between us and the supplier

Shared Vision (Based on Li and Lin, 2006)

SHV1 We and the supplier have a similar understanding about the aims and objectives of the supply chain.

SHV2 We and the supplier have a similar understanding about the importance of collaboration across the supply chain.

SHV3 We and the supplier have a similar understanding about the importance of improvements that benefit the supply chain as a whole.

Appendix B: Questionnaires

敬啟者　您好：

這是一份調查問卷，目的在探討「**貴公司與主要供應商間之關係**」。問卷所得資料僅供學術研究分析之用，對於您的填答資料我們絕對保密，請您放心填答。您寶貴的意見對本研究有相當大的幫助，衷心期盼您的協助。最後誠摯地感謝您在百忙之中能撥冗協助填答本問卷！

敬祝

萬事如意

國立交通大學 管理科學系
教　　授: 朱 博 湧
研究生:　黃 旭 鋒

【第一部份：對環境變動性的看法】

下列問題是請您評估 貴公司產業所處環境變動性的看法，請依據實際的狀況，在適當的方格內打勾。

題號		非常不同意	不同意	普通	同意	非常同意
1	在我們這個行業，客戶對產品的偏好變化非常快。	☐	☐	☐	☐	☐
2	客戶隨時隨地都在尋找新的產品。	☐	☐	☐	☐	☐
3	在我們這個產業，技術變化相當快速。	☐	☐	☐	☐	☐
4	在我們這個產業裡，生產及服務模式一直在改變。	☐	☐	☐	☐	☐
5	在我們這個產業裡，生產和服務模式是快速改變，並非漸漸演變。	☐	☐	☐	☐	☐

第二到第三部份填寫說明:

1. 若貴公司接到客戶(A 公司)訂單後，向外**採購零組件之供應商**分別為 S1,S2, S3,…; 其中 S1 公司佔貴公司與所有供應商業務比重最高，則 S1 公司即為貴公司主要供應商。

2. 填寫時請以**主要供應商 S1 公司**，為主要參考依據。

【第二部份：主要供應商彈性的問卷項目】

下列問題是請您評估 **主要供應商配合貴公司**的看法， 請依據實際的狀況，在適當的方格內打勾。。

題號		非常不同意	不同意	普通	同意	非常同意
1	供應商能配合我們，有效率地生產不同等級(水準)的產品。	□	□	□	□	□
2	供應商在不同的生產數量仍可以獲利	□	□	□	□	□
3	供應商能配合我們，避免不必要的浪費來進行各種批量的生產。	□	□	□	□	□
4	供應商能配合我們，快速調整生產我們所需的產量。	□	□	□	□	□
5	供應商能配合我們，將全部所需生產數量移轉到下一期來生產。	□	□	□	□	□
6	供應商能配合我們，可以容易地改變正在生產中產品的生產數量	□	□	□	□	□
7	供應商能配合我們，在他們的工廠生產多樣的產品。	□	□	□	□	□
8	供應商能配合我們，不需作重大的改變即能生產各種不同的產品。	□	□	□	□	□
9	供應商能配合我們，在同樣的工廠裡能同時生產不同的產品。	□	□	□	□	□
10	供應商能配合我們，在即有的營運模式能同時或定期生產大量不同的產品。	□	□	□	□	□
11	供應商能配合我們，在不同的交貨期間能改變不同的產品組合。	□	□	□	□	□
12	供應商能配合我們，快速地調整所要生產的產品。	□	□	□	□	□
13	供應商能配合我們，縮短修改既有產品的時間。	□	□	□	□	□
14	供應商能配合我們，縮短產品設計變更的時間。	□	□	□	□	□
15	供應商能配合我們，有能力減少新產品導入量產的時間或成本。	□	□	□	□	□
16	供應商能配合我們，在產品先期導入時提供產品設計的支援。	□	□	□	□	□
17	供應商能配合我們，對交貨作出可靠的承諾。	□	□	□	□	□
18	供應商能配合我們，承諾準時交貨。	□	□	□	□	□
19	供應商能配合我們，以小批量、且多次運送方式以補足我們的庫存	□	□	□	□	□
20	針對急單或特殊訂單，供應商能配合我們準時交貨。	□	□	□	□	□
21	供應商能配合我們，運交正確的交貨量。	□	□	□	□	□

【第三部份：與主要供應商間的互動關係的問卷項目】

下列問題是請您評估 貴公司**與主要供應商間的互動關係**，請依據實際的狀況，在適當的方格內打勾。。

題號		非常不同意	不同意	普通	同意	非常同意
1	我們的供應商以公開和誠實的態度與我們往來	□	□	□	□	□
2	我們的供應商會以保密的方式處理我們所提供的資訊	□	□	□	□	□
3	我們和我們的供應商間的交易不需要嚴密的監管	□	□	□	□	□
4	我相信我們的供應商是值得信賴的	□	□	□	□	□
5	我相信我們的供應商給我們的承諾	□	□	□	□	□
6	我們對我們的供應商有信心	□	□	□	□	□
7	維持與供應商間的關係相當重要	□	□	□	□	□
8	我們會與供應商分享公平競爭的理念	□	□	□	□	□
9	我們和供應商會公平分享利潤	□	□	□	□	□
10	我們和供應商對供應鏈的目標及目的有相同了解	□	□	□	□	□
11	我們和供應商皆了解到跨組織供應鏈合作的重要性	□	□	□	□	□
12	我們和供應商皆了解改善供應鏈的重要性	□	□	□	□	□

【第四部份：公司基本資料】

請填寫 貴公司下列各項基本資料。本問卷的所有資料僅供整體統計分析之用，個別內容絕對保密，請您放心據實填答。

題號	
1	所屬產業：□高科技製造業 □傳統製造業 □其他_____(請註明)
2	成立時間：□5 年(含)以下 □6-10(含)年 □11-20(含)年 □20 年以上
3	員工人數：□200 人(含)以下 □201-500(含)人 □501-1000(含)人 □1000 人以上
4	與主要供應商合作之經驗：□3 年以下 □3-5 年 □5-10 年 □10 年以上
5	與主要供應商合作關係 □採購 □外包生產□其他_____(請註明)

【第五部份：基本資料】

請填寫下列各項基本資料。本問卷的所有資料僅供整體統計分析之用，個別內容絕對保密，請您放心據實填答。

題號	
1	性別：□男 □女
2	年齡：□30 歲以下 □31-40 歲 □41-50 歲 □51 歲以上
3	婚姻狀況：□未婚 □已婚 □其它_____
4	教育程度：□高中（職）以下 □專科 □大學 □研究所以上
5	服務年資：□不到1年 □1年以上，不到2年 □2年以上，不到3年 □3年以上，不到4年 □4年以上，不到5年 □5年以上
6	職位：□高階主管(CEO, 董事長，總經理，副總經理) □中階主管(直接向高階主管報告) □基層主管(直接向中階主管報告)□其他 _____(請說明)

【問卷到此全部結束，麻煩您重新檢查是否有遺漏未答的問題。再次謝謝您的協助。】

個人簡歷

學歷

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在學期間著作

期刊論文

Chu, Po-Young, Kuo-Hsiung Chang, and ***Hsu-Feng Huang***, 2010, "The Role of Social Mechanisms in Promoting Supplier Flexibility", Journal of Business to Business Marketing. (***SSCI***) (Accepted).

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