

科技部補助專題研究計畫成果報告 期末報告

供應商在國際客戶伙伴關係中創新的前項與結果之分析：以台灣與大陸供應商為例(第2年)

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中文關鍵詞：社會資本，創新，全球供應鏈。

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科技部補助專題研究計畫成果報告

(期中進度報告/期末報告)

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供應商在國際客戶伙伴關係中創新的前項與結果之分析：以台灣與大陸供應商為例

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Relationship-Based Innovation: Evidence from the Global Supply Chain

INTRODUCTION

While firms are competing at the global level, garnering leading-edge innovations is quite often feasible at the global level as well through collaborations with supply chain partners from the other part of the world. For instance, the most successful Apple products incorporate multiple innovations of its global supply chain partners including Samsung and LG in South Korea and TPK in China while those partners are gaining market knowledge and innovative ideas from Apple. To meet the global level competition, more firms are relying on the relationships with their global supply chain partners (Doz and Wilson 2012) as strong supply chain relationships possess the social capital necessary for suppliers to deeply engage with customers in order to discover unexpressed customer needs and jointly create the knowledge to develop innovative concepts and solutions (Dedrick, Kraemer, and Linden 2010). Obviously, global supply chains expose suppliers to a diverse customer base and close relationships that may facilitate suppliers' acquisition and creation of knowledge and enhance the discovery and development of innovative product. However, most suppliers are from emerging market like China or Taiwan and lack of knowledge base to combine and create new knowledge sets for radical innovation. In addition, emerging market suppliers are usually in an asymmetry bargaining power position against their international customers (Jean, Sinkovics, and Cavusgil 2010). Those MNE buyers are less

willing to share their core knowledge with suppliers to avoid potential risks of knowledge leakage. Further, geographic and cultural distance make social interaction more difficult in global supply chain relationships than interorganizational relationships in the domestic setting (Blocker et al. 2011). Accordingly, not all suppliers can leverage their social capital and relationships with international customers to develop radical innovation ability.

Extant theories argue that organizations with strong social networks and tight communities bounded by shared norms, trust, and reciprocity are more willing to collaborate and attempt risky ideas, which can enhance innovation (Inkpen and Tsang 2005; Nahapiet and Ghoshal 1998).

However, empirical evidence shows mixed results; some studies find social capital has positive effects on such relationship-based innovation because social capital enhances knowledge sharing and learning in the collaborative relationships (Tsai 2001), others report no or a negative effect, suggesting that strong social capital may stifle innovation because organizations may become complacent and insulated from outside. For example, Fang (2008) shows that sharing information with close customers in an emerging market can lead to undesirable new product outcomes because close ties lead to homogeneous market information. Corine S. Noordhoff et al. (2011) argue that embedded ties may stifle innovation because of opportunism and knowledge redundancy.

Contradictory results suggest the social capital-innovation link is neither simple nor direct. Rather, if novel concepts and breakthrough ideas are to emerge from the supply chain, complex

processes and mechanisms embedded in strong relationships likely come into play. Yet, only limited few studies have examined the processes and pathways through which social capital generates relationship-based innovation in the context of global supply chains. Drawing on the resource-based view (RBV) (Barney 1991) and capabilities building of rent creation literature (Lu et al. 2010; Teece, Pisano, and Shuen 1997), this study extends social capital—innovation research by investigating the mediating roles of proactive customer orientation and joint learning capability as distinctive capabilities that can transform potential benefits of social capital into desirable innovation outcomes within the global supply chain relationship. This study also assesses a possible moderating effect of supplier innovation capability in terms of design responsibility and the degree of supplier dependence. Reflecting the structure of the tie between supply chain partners, supplier design responsibility and dependence are relevant contextual factors that may shape firms' abilities to leverage knowledge and information resources, which may affect innovation-generation processes in International customer–supplier relationships.

While the literature identifies incremental and radical innovations as major types of innovations (Roy and Sivakumar 2010; Roy, Sivakumar, and Wilkinson 2004), this study focuses on relationship-based radical innovation, which refers to the novel or unique technology in a product category emerging out of customer-supplier relationships that provides customers with significant value and drastically alters consumption in the market (Chandy and Tellis 1998). Radical innovation has been considered as source of sustainability and competitive advantage of the firm (Chandy and Tellis 1998). In addition, radical innovation generate more customer value than incremental innovation (Chang et al. 2014). However, extant literature pays less attention to radical innovation than other forms of innovation, particularly in the B2B context (Story et al. 2014). Therefore, radical innovation is the focus of this study.

The context of this study is Taiwanese suppliers and their relationship with global buyers in the electronic industries. Global supply chains present suppliers with unique opportunities and challenges to engage their downstream customers in radical innovation. Although cross-border, customer-supplier relationships possess a rich diversity of resources and skills, suppliers may find it difficult to mobilize social capital and fully exploit the generative capabilities of close, cooperative relationships. Further, many contracting suppliers, especially those from emerging markets, often compete through low-cost, standardized production, and are highly dependent on their international OEM customers due to their limited resources and organizational capabilities (Doz and Wilson 2012). Nevertheless, new product development is a critical task for suppliers and capitalizing on relationships with major international customers offers the potential to innovate, to develop radically new innovations that can broaden their product lines for other

customers, and to enhance their international market competitiveness. For example, Taiwanese suppliers have recently taken on more responsibility for product innovation for their international OEM customers and have transitioned from the role of OEMs to that of original design manufacturers. New product development is a critical and particularly challenging task for these types of firms because they operate with limited resources and organizational capabilities. In addition, technological turbulence in the electronic industry creates opportunities for suppliers to generate innovation. Hence, the empirical context of this study offers an excellent opportunity to examine the issue of innovation generation for suppliers in global supply chain.

This study attempts to make three contributions to international marketing literature on innovation in international buyer-supplier relationships. First, while prior studies focus on the drivers of innovation activities in individual firms, this study investigates the mechanisms of innovation generation in buyer-supplier relationships in global supply chains, which is referred to as relationship-based innovation in this study. Research has remained scant on building an integrated model to coherently investigate the processes which underlie innovation from inter-firm relationships (Griffin et al. 2013). This study addresses the gap in the literature regarding relationship-based innovation focusing on radical innovation in the context of global supply chains (Roy and Sivakumar 2010; Roy, Sivakumar, and Wilkinson 2004). Recent marketing literature calls for more work on understanding the capabilities required to the success of radical innovation in B2B markets (Story et al. 2014). Second, this study empirically examines the processes through which social capital affects radical innovation that emerges from international customer-supplier relationships. Therefore, we advance research on the social capital—innovation link by examining alternative paths and mechanisms. We identify distinctive capabilities including proactive customer orientation and joint learning capability as key enablers which help realize the potential benefits of social capital in the process of radical innovation generation in global supply chain relationships. We offer an alternative explanation for the conflicting and occasionally contradictory empirical evidence regarding the social capital—innovation link. Third, this study explores the contextual moderating effects of supplier design responsibility and supplier dependence on the linkages between social capital and innovation generation in international customer-supplier relationships.

THEORY AND HYPOTHESES

Relationship-based Innovation in Global Supply Chains

In line with Chandy and Tellis (1998), in this study, radical innovation refers to the propensity of a supplier to introduce new products in the marketplace that (a) incorporate substantially different technology from existing products, and (b) that can fulfill customer needs better than

existing products. Relationship-based innovation is defined as generating radical innovations through engagement with a supply chain partner, often an international customer, that enables a supplier to offer new products to other customers, enhancing its overall competitiveness (Roy and Sivakumar 2010; Roy, Sivakumar, and Wilkinson 2004).

Prior studies use different approaches to identify the drivers of radical innovation. In a recent review, Slater et al. (2014) synthesize different drivers of radical innovation including organizational culture, senior leadership, process, organizational characteristics, and product launch strategy. However, extant studies have not fully examined process of radical innovation generation in international B2B context (Griffin et al. 2013). To address this gap, we focus on social capital as a key driver of radical innovation in the international customer–supplier relationship. Radical innovation involves high risk, uncertainty, and complexity. Social capital, characterized by frequent contacts and a harmonious atmosphere between exchange partners, can enhance the amount and quality of knowledge and information-sharing, and curtail the risks and complexity that can hinder radical innovation in global supply chains.

Social capital and Innovation

Following previous study (Pérez-Luño et al. 2011; Xueming et al. 2004), we focus on external relational dimension of social capital in global supply chain. Social capital in this study refers to suppliers' trustworthy and long lasting relationships with international customers. Social capital theory claims that a network of relationships constitutes a valuable resource (Xueming et al. 2004). The resource based view (RBV) focuses on organizations as unique bundles of accumulated tangible and intangible resource stocks, including specific internal capabilities, processes, and procedures, and routines that are linked to or are controlled by the organization (Barney 1991). The relationship view of social capital theory extends the RBV to the interorganizational context, and highlights relational resources that can also be a source of competitive advantage (Dyer and Singh 1998; Xueming et al. 2004).

While potential benefits of social capital has been articulated in the literature, recent research caution about the potential dark side of embedded relationships and social capital. For example, Villena et al. (2011) argue that social also may become a source of blindness by restricting information flows and increasing the risk of opportunistic exploitation. Corine S. Noordhoff et al. (2011) also argue that embedded relationships may be detrimental to innovation due to knowledge redundancy and potential risks of opportunism.

The relationship between relational dimension of social capital and innovation has been widely examined (e.g. Cuevas-Rodríguez, Cabello-Medina, and Carmona-Lavado 2014; Pérez-Luño et al.

2011). However, most studies focus on a direct link between social capital and innovation (e.g. Pérez-Luño et al. 2011). Few studies examine the mediating and contingent effects of the social capital–innovation link. Furthermore, empirical studies on the social capital–innovation link present equivocal results. Certain empirical studies reveal that strong network ties and embeddedness can enhance innovation (Tsai 2001). However, a contradictory view suggests that strong ties and embeddedness may be detrimental to innovation (Corine S. Noordhoff et al. 2011; Uzzi 1997). Possible explanations for the negative effects of social networks on innovation are as follows: First, strong ties may create over-embeddedness in the exchange relationship, and insulate firms from novel ideas. Second, close relationships may reduce the level of conflict and tension, which may be helpful in the innovation–generation process. In line with these contradictory findings, more research is necessary to understand the organizational mechanisms through which social capital can affect innovation.

Conceptual model

To address this gap, building on the RBV (Barney 1991) and the capability-building perspective of rent generation (Eisenhardt and Martin 2000; Teece, Pisano, and Shuen 1997), we develop a conceptual framework which examines the firm-distinctive capabilities that transform the resource of social capital into relational-based radical innovation in global supply chain relationships. The RBV argues that resources are stocks of tangible and intangible assets which can be sources of competitive advantage (Barney 1991). Extending the RBV, researchers argue that possession of resources does not guarantee the development of sustainable competitive advantages, as those resources can be traded and are transferable across organizational boundaries (Lu et al. 2010). Rather, capabilities can translate resources into competitive advantage because capabilities are embedded in organizational processes which are inimitable and difficult to transfer to other firms (Rai, Patnayakuni, and Seth 2006). According to this perspective, firms must develop capabilities to acquire, integrate, reconfigure, and release resources that are embedded in their social and relationship contexts to stay ahead of competition (Teece, Pisano, and Shuen 1997). Following the resource-capability-performance logic, we argue that potential benefits of social capital resource can only be realized through leveraging distinctive capabilities in the process of innovation generation in global supply chains. Based on the extant literature (Blocker et al. 2011), we focus on proactive customer orientation and joint learning capabilities as two vital organizational capabilities that can mediate the social capital–radical innovation link. Customer proactive orientation and joint learning have been separately identified in previous literature as critical organizational capabilities that are related to innovation (Narver, Slater, and MacLachlan 2004). Proactive customer orientation, is proposed

by Blocker et al. (2011) and defined as the “capability to continuously probe customers’ latent needs and uncover future needs” (p. 217). Proactive customer orientation plays a crucial role in fueling firm innovation because it helps firms gain information regarding future trends, and assists in obtaining a better understanding of customers’ current and future needs (Narver, Slater, and MacLachlan 2004). With this capability, a supplier is able to uncover a customer’s unexpressed needs, exercise strategic foresight, and envision innovative solutions and products. Another potential generative mechanism, we suggest is joint learning capability which Fang and Zou (2010) define as “the ability of the partners to develop relationship specific organizational infrastructure and communication channels to integrate the partners knowledge, (and) create a new knowledge base for relationships” (p. 908). With this capability, supplier and international customer are able to utilize the relationship to generate the new knowledge necessary for innovative solutions and products.

In addition, based on knowledge based view (Grant 1996), Zhou and Li (2012) argue that external knowledge acquisition and knowledge sharing are two knowledge integration mechanisms which affect firms’ knowledge base and foster radical innovation. Proactive customer can be seen as a critical external knowledge acquisition mechanism and joint learning capability is a knowledge sharing mechanism which affect suppliers’ knowledge and enhance relational based radical innovation. Therefore, we propose proactive customer orientation and joint learning are mediators that translate and mobilize the benefits of social capital into concrete relationship-based radical innovation.

In addition, we argue that the effects of proactive customer orientation and joint learning capabilities for relationship-based radical innovation may be contingent on and contextually moderated by the degree of supplier design responsibility and dependence. According to the RBV and capabilities-related research (Fang and Zou 2009), the effective use of firms’ capabilities relies on its organizational characteristics and organizational structures. Reflecting the structure of a supplier’s tie to its customer, our model examines the moderating effects of a firm’s organizational characteristics (supplier design responsibility) and interorganizational structures (supplier dependence) on the relationship among proactive customer orientation, joint learning, and relationship-based radical innovation.

Insert Figure 1 here

Generative Capabilities for Relationship-Based Innovation

Mediating role of proactive customer orientation

Proactive customer orientation refers to the extent to which firms are capable of discovering and addressing their customers' latent and future needs (Blocker et al. 2011). In contrast to responsive customer orientation, which focuses on addressing customers' current and expressed needs, proactive customer orientation is a critical capability that aids suppliers in sensing and uncovering the emerging needs and market trends of customers. We argue that social capital based is a critical resource that can be exploited to develop a firm's proactive customer orientation. Social capital triggers proactive customer orientation through interaction and collective vision with a supply chain partner to gain deep insights.

First, social capital is characterized by trust, manifests itself as a firm's belief in its partner's goodwill, competence, capabilities, benevolence, and openness (Nahapiet and Ghoshal 1998). In the supply chain context, trust is defined as one partner relying on the other to protect his or her business interests without explicitly requesting it (Nahapiet and Ghoshal 1998). Trust creates a platform for a supplier to build its ability to probe latent customer needs and market opportunities by supporting an environment conducive to search and sense activity without worrying about potential risks of information leaking as such information could funnel through chain members. While proactive customer orientation involves certain risks and uncertainties because of the unconstrained nature of exploratory engagement with a customer in exchanging customer related information, trusted and expectation of long lasting relationships permit firms to feel secure in learning and understanding customers, resulting in enhanced relationship management with customers, which is referred to as proactive customer relationship in this study.

Second, social capital creates a sense of mutual understanding and shared vision among exchange partners, which can reinforce customer-focused organizational culture and capabilities. A relationship characterized by long term vision is more adaptable and focused on future customer trends and preferences (Grinstein 2008) . Therefore, a supplier sharing a long term vision with a customer is more willing to engage in activities related to understanding and addressing future customer needs.

As a consequence, we suggest social capital operates through proactive customer orientation to generate relationship-based radical innovations from the interactions of supplier and customer. Proactive customer orientation is potentially linked to firm innovation according to the market orientation literature (Narver, Slater, and MacLachlan 2004). The market orientation literature views customer and competitor orientation as critical elements of organizational culture and as

strategic orientations supporting firm innovation (e.g. Gatignon and Xuereb 1997; Han, Kim, and Srivastava 1998). A proactive customer-oriented firm that monitors its customers' future needs closely tends to improve its creativity by producing novel and meaningful new products and processes that enhance radical innovation throughout its entire business system. Proactive customer orientation reflects an exploratory behavior involving the search for new and diverse information and knowledge that drives the firm beyond the scope of its experience and experimentation, yielding variations in organizational activities (Atuahene-Gima, Slater, and Olson 2005). Focusing on latent market needs increases a supplier's ability to add new variants of market information in product development, thereby increasing the problem-solving capacity of project teams (Narver, Slater, and MacLachlan 2004). Proactive customer orientation helps also the firm to pay more attention to new market and technological developments that make existing ideas and innovations gradually obsolete, thereby enhancing the possibility of radical innovation (Atuahene-Gima, Slater, and Olson 2005). Hence,

H1: Supplier's proactive customer orientation mediates the impact of social capital on relationship-based radical innovation from global supply chain relationships.

Mediating role of joint learning capability

Joint learning capability (Fang & Zou, 2010) is a relationship-level construct that captures the degree of partner cooperation and involvement in developing a relationship-specific organizational infrastructure (i.e., systems, rules, routines, and processes) and a communication channel aimed at creating, integrating, and institutionalizing knowledge for the exchange relationship. Fang and Zou (2010) differentiate joint learning capability from absorptive learning capability in collaborative relationships. Joint learning capability is a firm's ability to learn collectively with its channel partner in creating value for both parties in a relationship. In contrast, absorptive learning capability refers to a learning competition where only one party attempts to acquire knowledge and benefits in the exchange relationship. The concept of joint learning is similar to that of relationship learning (Selnes and Sallis 2003) and of collective learning in extant literature, and highlights the importance of learning at the alliance and relationship level instead of gaining knowledge from one party.

Radical innovation features breakthrough concepts that require questioning prevailing norms and that determine fundamentally different solutions to existing problems (Chandy and Tellis 1998). Joint learning helps firms access and expose themselves to diverse knowledge domains, and enlightens organizations on novel approaches by which existing problems can be solved through joint deployment of various organizational capital (Subramaniam and Youndt 2005). By integrating knowledge from external partners into existing knowledge base, suppliers may detect

future market trends and implement the breakthrough ideas into commercial technology (Taylor and Greve 2006). Accordingly, joint learning capability is the key capability that can enhance relationship-based radical innovation.

Although joint learning capability potentially enhances innovation, developing it is difficult because of the uncertainty and risks inherent in knowledge-sharing and creation processes (Kale, Singh, and Perlmutter 2000). A partner may attempt to appropriate novel knowledge through the joint learning process, resulting in a loss of intellectual capital. Social capital mitigates opportunism through relational and cognitive means that allay apprehensions, encouraging knowledge sharing and information exchange. In terms of relational safeguards, trust can create a transparent atmosphere that may reduce opportunistic behavior, and facilitate knowledge-sharing. Yli-Renko et al. (2001) suggest that social capital can enhance the amount of new ventures' knowledge acquisition. Likewise, a recent study shows that trust is a relational means to facilitate learning in international joint ventures (Nielsen and Nielsen 2009).

In addition, shared values and understandings between parties in an exchange relationship facilitate meaningful communication that is essential in both the exchange and integration required for knowledge creation. Nahapiet and Ghoshal (1998) state that shared vision raises the level of mutual understanding among organizational members, which acts as a factor influencing both the anticipation of potential value through collaboration and the motive to combine and share knowledge. Yli-Renko et al. (2001) further emphasize that shared vision can enhance relative absorptive capacity in knowledge assimilation process in the exchange dyad and allows firms to engage more into knowledge acquisition and exploitation.

As a consequence, we suggest social capital operates through joint learning to generate relationship-based radical innovations from the interactions of supplier and customer. Joint learning capabilities entail suppliers combining and integrating different knowledge sets provided by their exchange partners and create novel new knowledge sets. Therefore, social capital encourages the joint learning between supply chain partners that can facilitate the generation of breakthrough concepts, leading to relationship-based radical innovation.

H2: Joint learning capability mediates the impact of social capital on relationship-based radical innovation from global supply chain relationships.

Supplier-Based Contingencies for Relationship-based Radical Innovation

Generating relationship-based innovations with one customer and transferring these as radical new products to others is likely constrained by the nature of the originating customer-supplier relationship. Consistent with the social capital literature (Acquaah 2007), the nature and strength of a supplier's tie to a focal customer are important boundary conditions,

potentially affecting the impact of social capital on relationship-based innovation. That is, the innovation generation capability of social capital with one customer to yield relationship-based radical innovations is contingent on the tie-related issues of supplier's design responsibility and dependence on the original customer. These structural or tie-related aspects of the relationship are critical because, as RBV and capabilities building literature suggest, the effective use of a supplier's capabilities is influenced by organizational characteristics and organizational structure (Zheng Zhou, Yim, and Tse 2005). As discussed below, we suggest the impact of proactive customer orientation and joint learning on relationship-based innovation is contextually moderated by the supplier's organizational characteristic (supplier design responsibility) and the structure of the relationship (supplier dependence).

Moderating effects of supplier design responsibility on relationship-based radical innovation

Reflecting the nature of the supplier's organizational characteristics, design responsibility refers to the extent to which a task or a project a supplier has with its customer emphasizes the creation and development of new items (Azadegan and Dooley 2010). A low design responsibility supplier focuses on merely providing materials and delivering components or assembling parts. In contrast, a high design responsibility supplier emphasizes creative tasks, including product design, product development, and strategic and facility planning. Examples of high design responsibility suppliers are those of firms that provide ODM (original design manufacturer) services to their customers. With the trend toward outsourcing design, more contractual manufacturers have shifted from simply delivering components from specifications to ODM, engaging in more design and development responsibility in global supply chains.

Recent studies show that supplier design responsibility may affect capability development, learning, and innovation in inter-organizational relationships (Azadegan and Dooley 2010; Azadegan et al. 2008). As for proactive customer orientation, a supplier with a high design responsibility focuses more on knowledge exploration and developing new knowledge sets. Hence, a high design responsibility supplier may engage more in transforming customer insights and market trends into radical new products. In terms of joint learning, a high design responsibility supplier may be more likely to recognize the new knowledge developed from joint learning, and transform it into novel new products. Thus, we present the following hypothesis:

H3a: The relationship between proactive customer orientation and relationship-based radical innovation is stronger when supplier design responsibility is high.

H3b: The relationship between joint learning capability and relationship-based radical innovation is stronger when supplier design responsibility is high.

Moderating effects of supplier dependence on relationship-based radical innovation

Supplier dependence in this study refers to the extent to which a supplier relies on the focal interantional customer for business success including purchase volume and sales revenue with the customer that are hard to replace (Pfeffer & Salancik, 1978). In the literature, the impact of firm dependence on innovation generation did not receive a great deal of research attention although dependence plays a huge role in the level of control and power of the other party, potentially affecting the effects of customer orientation and joint learning capability on its relationship-based radical innovation (Jean, Kim, and Sinkovics 2012).

Addressing this gap, this study proposes that the impact of supplier proactive customer orientation and joint learning capability on relationship-based radical innovation is moderated by the degree of supplier dependence. When a supplier is less dependent on the focal customer, low dependence enables the supplier to gain access to additional information and knowledge including new perspectives regarding the market trend from a variety of customers. This can enhance suppliers' breadth of knowledge base and help suppliers overcome potential knowledge redundancy in close relationships (Corine S. Noordhoff et al. 2011). Accordingly, a less dependent supplier's with broad knowledge base is more able to leverage novel information gathered from proactive customer orientation and foster radical innovation (Zhou and Li 2012).

Similarly, a dependence structure characterized by a low degree of supplier dependence is expected to influence the impact of joint learning capability on radical innovation. Low dependence structures help suppliers engage and involve different customers which leads to diverse knowledge sets and low level of knowledge redundancy, and thus, is more likely to facilitate the effectiveness of radical innovation through joint learning capability.

In addition, a less dependent structure in global supply chain can reduce interantional buyers' potential opportunistic behavior in the process of joint learning (Corine S. Noordhoff et al. 2011), which help facilitate the effective of joint learning and foster firms' ability to commercialize ideas into radical innovation.

Accordingly, we predict that the effects of joint learning and customer orientation on innovation generation is stronger with low supplier dependence.

H4a: The relationship between proactive customer orientation and relationship-based radical innovation is stronger when supplier dependence is low.

H4b: The relationship between joint learning capability and relationship-based radical innovation is stronger when supplier dependence is low.

R&D Scale as a Control Variable

This study adopts a supplier's R&D scale, measured by the current number of R&D employees, as a control variable to account for the effect of the scale of its R&D activities in an effort to evaluate the impacts of proactive customer orientation and joint learning on the firm's radical innovation effectively. The variable was log-transformed before specified as control variable to alleviate univariate non-normalities and account for nonlinear effects (Wooldridge 2009)

METHOD

This research examines the specific cross-border relationships between Taiwanese suppliers and their international OEMs in the global supply chain for electronics. This was a deliberate choice because Taiwanese suppliers tend to be smaller than their international OEM customers; thus, their relationships usually demonstrate contextual variety for supplier design responsibility and dependence. Furthermore, the Taiwanese electronics industry offers a valuable empirical context because its industry members have served as pioneers in IT development, have championed cross-border relationships with U.S. and European industry leaders, and are active participants in the global economy (Dedrick et al. 2007). Taiwanese suppliers compete fiercely for contracts and cross-border exchange relationships with leading MNEs, such as IBM, Hewlett Packard, and Dell. Subcontracted activities include product development, manufacturing, and advanced product innovation and design (Pete, Einhorn, and Reinhardt 2005; Quinn 2000). For MNE customers, this move toward outsourcing traditional value-chain activities is significant due to potential performance benefits and advantages over competitors.

Sampling frame and data collection

Data collection in this study was conducted in two stages. First, in-depth interviews were

conducted with 15 senior product and marketing managers or directors of Taiwanese suppliers. This initial qualitative and exploratory approach provided valuable input for the refinement of the questionnaire and the adaptation of key constructs in the industry context. The interviews served as an a priori test of the key constructs regarding their usefulness and appropriateness. Second, the final survey instrument was mailed to Taiwanese electronics companies. The questionnaire was originally prepared in English and translated/back-translated into Chinese by scholars competent in both languages and with substantial research experience in the subject in Taiwan.

To enhance the response quality, we designed the questionnaire to include two parts. Part I contained questions on industry-related variables including demand, R&D, and technological uncertainty. Part II contained questions on relationship variables, including proactive customer orientation, electronic integration, long-term orientation, joint learning, and innovation in the relationship. For each Taiwanese electronic supplier, we invited 2 senior managers to participate. Part I of the questionnaire was completed by the general managers. Part II of the questions was completed by the senior product and account managers in charge of managing relationships with their key customers. Such a design also requires respondents to complete a shorter version of the questionnaire (i.e., only one part of the questionnaire), thus reducing the response burden and improving response accuracy.

The sampling frame consisted of all the electronics companies from the 2010 directory of the *Top 5,000 Largest Firms in Taiwan* published by China Credit Information Service Ltd. (1,020 electronic companies). All of the firms in the database were contacted to assess their eligibility and to locate appropriate informants for the study. Respondents were asked to specify their most important international OEM customers in terms of largest sales volume. This was considered critical to our investigation of the asymmetric nature of cross-border relationships. In

our sample, on average 75% of the suppliers' sales were derived from their single most important foreign OEM customer.

The suggestions by Yu and Cooper (1983) for maximizing response rates were applied, and multiple contact points (Dillman 2000) were established by telephone and personal contact to solicit responses for the study. Questionnaires were also sent by e-mail to accommodate participant preferences for this particular response option. For telephone and e-mail surveys, each informant who agreed to participate in the study was faxed or e-mailed a questionnaire packet.

Survey response and informant evaluation

In total, 204 useable questionnaires were returned, resulting in an effective response rate of 20% (204/1,020). International OEM customers in the data set were from the United States, Japan, Germany, China, and France. Taiwanese electronics suppliers in the sample are engaged in the supply of computer components, semiconductors, communication products, computer peripherals, and optoelectronics. Over 67% of Taiwanese suppliers are small to medium size, with less than 250 employees.

We assessed non-response bias by classifying the responses into the following two groups: early respondents (the first quartile) and late respondents (the last quartile; (Armstrong and Overton 1977)). Independent *t* tests were performed on demographic variables, such as revenue and employee numbers. No significant differences were identified for these descriptive variables between the early and late respondents of our mail survey. In addition, *t*-tests were performed between the two groups on key variables for the proposed conceptual model such as trust, shared vision, proactive customer orientation, joint learning capability, and innovation; these results showed no significant differences.

In addition, we identified a group of randomly selected non-respondents and contacted

them to obtain their explanations for their lack of response to obtain a reliable assessment because non-response bias can only be achieved through feedback from the non-respondents themselves. In all cases, the reasons provided to us for the lack of response were related to a lack of time to complete the questionnaire, the general belief that the questionnaire was too demanding, and that other requests for feedback should be prioritized. These findings imply that non-response bias does not pose a significant threat to this study.

Measurement scales

Multiple-item scales and a 7-point response format were used to operationalize all constructs and variables in the study. The measures were adapted from existing studies and refined based on feedback from experienced researchers and practitioners in the area of inquiry. Social capital was measured using a four-item scale adapted from Pérez-Luño et (2011). The scale assesses the relational dimension of social capital in terms of the extent of supplier perceptions on the long-term, trustworthy relationship with their international customers.

For proactive customer orientation, we measured the extent to which the supplier is able to identify and address the latent needs of their business customers. The scales for proactive customer orientation were adopted from Blocker (2011) and adapted for the current investigation. The joint learning capability scale was measured using items adapted from Fang and Zhou (2010) that measured the extent to which a supplier is capable of developing a relationship-specific organizational structure and communication channels that integrate a partner's knowledge, create new knowledge sets for the relationship, and institutionalize new knowledge for the relationship. We measured the supplier's design responsibility by assessing whether the supplier has an ODM business (= 1) relationship with the key international customer involving creative design and development tasks or as a non-design OEM (= 0) relationship providing materials, components from specification, or assembling parts. We obtained a measure of the supplier's dependence on

the customer by using three items adapted from Ryu and Eyuboglu (2007). The relationship-based radical innovation scale was measured using three items adapted reflecting the context of current study from Atuahene-Gima (2005), which assess the degree of technological advancement and revenue performance from radical innovation associated with the focal international customer relationship.

Measurement model results

In conducting the model estimation, we followed the two-step approach suggested by Anderson and Gerbing (1988). First, to evaluate the measurement model, we conducted confirmatory factor analysis (CFA) by using IBM SPSS Amos 20.0. The CFA model (M2) includes all provided study constructs. In the measurement purification process, items with an unacceptable loading (i.e., less than 0.5) were eliminated to increase convergent validity (Bagozzi and Yi 1988; Bollen 1989). For discriminant validity, any measure loaded on more than one construct was removed. As shown in table 1, after this process, at least 3 items remained for each construct. The final CFA model shows a good fit of the measurement model with the covariances provided by the data set: $\chi^2 = 154.807$ on 109 d.f., TLI = .977, CFI = .982, and SRMR = .061 (Bentler and Chou 1987; Hu and Bentler 1999).

With the good fit of the measurement model, we evaluated the construct validity of every construct by investigating their unidimensionality, convergent and discriminant validity, and reliability for internal consistency (Fornell and Larcker 1981; Gerbing and Anderson 1988). First, for unidimensionality, standardized residuals should not be greater than 4.0. Our results showed that no residuals are greater than 4.0, indicating no significant threat existed to the unidimensionality of the constructs (Fornell and Larcker 1981). Moreover, all items were significantly loaded on their corresponding factors ($p < .01$), and their loadings were all greater than .5, as shown in Table 1. These loadings indicate an adequate level of convergent validity

(Nunnally and Bernstein 1994). For discriminant validity, average variance extracted (AVE) should be greater than the shared variances of each construct (Fornell and Larcker 1981). As shown in Table 2, the AVEs range from .52 to .90, and the shared variances among the constructs range from .00 to .36, as reported in the upper triangle of Table 2. These indicate a good level of discriminant validity among the constructs in our study (Bagozzi and Yi 1988; Fornell and Larcker 1981). Finally, to assess the internal consistency of our measurements, the composite reliability of each construct is calculated using the formula suggested in the literature (Fornell and Larcker 1981), and the results are presented in Table 1. All composite reliabilities are greater than .80, which is above the often-recognized acceptable level of .7 discussed in the literature (Nunnally and Bernstein 1994).

Insert Tables 1 and 2 About Here

Common method bias assessment

We assessed the level of common method bias present in our study using the marker variable technique suggested in the literature (Lindell and Whitney 2001; Malhotra, Kim, and Patil 2006). As a proxy variable for common method bias, the study used firm size as operationalized by the number of employee in its inception and its correlations with study constructs are reported in Tables 2. Specifically, we estimated the smallest correlation, R_M , in the correlation matrix, a well-accepted technique (Lindell and Whitney 2001; Malhotra, Kim, and Patil 2006). However, to use a more conservative measure, we implemented the second smallest correlation, R_{M2} , instead of the smallest one, R_{M1} , as discussed in the literature (Lindell and Whitney 2001; Malhotra, Kim, and Patil 2006). The second smallest correlation in the correlation matrix, $R_{M2}=.01$, between the marker variable and study constructs/variable was used to adjust the correlations among the study constructs and control variable (Lindell and Whitney,

2001). According to the results, none of the significant correlations among the study constructs/variable became insignificant. Consequently, we concluded that common method bias does not pose a major threat to the study (Lindell and Whitney 2001; Malhotra, Kim, and Patil 2006).

ANALYSIS AND RESULTS

To test our hypotheses, the proposed structural model was estimated (IBM SPSS Amos 20.0) with trust and shared vision specified as the first-order constructs reflecting social capital, which is a second-order construct. As the control variable, R&D scale was included in the analyses.

Mediating Effects of Proactive Customer Orientation and Joint Learning

We tested for the mediating effects of customer orientation and joint learning for social capital and relationship-based radical innovation. Baron and Kenny (1986) stated that several conditions must be met to identify a partial or full mediation. First, the independent variable should affect the mediators significantly. We estimated a model using social capital as the independent variable and proactive customer orientation and joint learning as dependent variables to test this. Shown in Figure 2 (model 1), the results indicate the significant effects of social capital on proactive customer orientation ($b = .47, p < .01$) and joint learning capability ($b = .57, p < .01$). The model fit indices include $\chi^2 = 100.153$ on 41 d.f., TLI = .958, CFI = .957, and SRMR = .078. The second condition required is a significant impact of mediators on the dependent variable. In our results (model 2), both joint learning capability ($b = .42, p < .01$) and proactive customer orientation ($b = .18, p < .05$) significantly influences relationship-based innovation. The model fit indices include $\chi^2 = 22.797$ on 32 d.f., TLI = 1.000, CFI = 1.000, and SRMR = .021, showing an excellent fit. The third condition is a significant direct effect of the independent variable on the dependent variable without specified mediators. In our analysis

(model 3), social capital affects relationship-based innovation significantly ($b = .25, p < .01$), and the model fit indices show an excellent fit with $\chi^2 = 23.283$ on 13 d.f., TLI = .984, CFI = .990, and SRMR = .062. Thus, the third condition is met.

Finally, in testing the mediation hypotheses, the significant impact of the independent variable on the dependent variable should be diminished in a partial mediation or become non-significant in a full mediation when the mediators are added to the third model. According to our results (model 4), the coefficient of the independent variable, social capital, on the dependent variable, relationship-based innovation, decreased from .25 ($p < .01$) to -.10 ($p > .10$) with an excellent model fit, including its fit indices of $\chi^2 = 126.07$ on 84 d.f., TLI = .976, CFI = .981, and SRMR = .065. As summarized in Figure 2, these results support Hypotheses 1 and 2 in the study.

Insert Figure 2 About Here

Moderation Effect of Supplier Design Responsibility and Dependence

For the moderating effects of supplier design responsibility and supplier dependence on the effects of proactive customer orientation and joint learning on relationship-based innovation, we predict that both a supplier's high design responsibility and low dependence on the international customer facilitate contextual settings conducive to creating higher effects of proactive customer orientation and joint learning on relationship-based innovation in Hypotheses 3a, 3b, 4a, and 4b. To test these moderating effects, we performed multi-group analyses according to the participants' design responsibility (i.e., yes vs. no) and by median-splitting the sample according to supplier dependence (Bentler 2005; Bollen 1989; Johnsen and Ford). Two-group analysis was then conducted. However, the literature suggests that measurement

invariance should be assessed when multiple groups are involved in statistical analyses (Steenkamp and Baumgartner 1998). Specifically, the literature requires both configural invariance and partial metric invariance to be supported so that a comparison of standardized path coefficients can be performed across groups, as in our study (Steenkamp and Baumgartner 1998). Therefore, we followed Steenkamp and Baumgartner's (1998) procedure for performing measurement invariance tests.

According to the results of the measurement invariance tests, the configural invariance is supported for both two-group analyses because the combination of significantly loaded items is consistent for both groups, all factor loadings are significantly and substantially different from zero, and the factor correlations are significantly below unity across all groups for both two-group analyses (Steenkamp and Baumgartner 1998). Subsequently, metric invariance was assessed. For both two-group analyses, all of the measurement items were metrically invariant ($p > .05$) among the groups. Because partial metric invariance is a sufficient condition for a two-group comparison of standardized coefficients (Steenkamp and Baumgartner 1998), we proceed with the multiple-group analysis.

Shown in Table 4, we first estimated a two-group model based on the supplier's design responsibility by adding and dropping an equal constraint for each hypothesized path. The chi-square difference tests show that the impact of proactive customer orientation on relationship-based innovation is moderated by supplier design responsibility ($\Delta\chi^2 = 5.03, p < .05$), but not by joint learning on relationship-based innovation ($\Delta\chi^2 = .04, p > .10$). The results support Hypothesis 3a, but not Hypothesis 3b, because supplier design responsibility moderates the impact of proactive customer orientation ($b_{\text{yes}} = .410, p < .01$ and $b_{\text{no}} = .048, p > .05$) on relationship-based innovation, but not the impact of joint learning on relationship-based innovation ($b_{\text{yes}} = .362, p < .01$ and $b_{\text{no}} = .442, p < .01$). With the equality constraint on the

moderated path removed, the model shows a good fit ($\chi^2 = 64.261$ on 82 d.f., TLI = 1.000, CFI = 1.000, and SRMR = .034).

The moderating effects of supplier dependence on the relationship between proactive customer orientation and relationship-based innovation and between joint learning and relationship-based innovation are evaluated by performing another two-group analysis based on the level of supplier dependence, which was determined by adding and dropping an equal constraint on each hypothesized path. The model estimation results show that the effects of proactive customer orientation on relationship-based innovation is moderated by supplier dependence ($\Delta\chi^2 = 2.80, p < .10$), but not by joint learning on relationship-based innovation ($\Delta\chi^2 = .01, p > .10$). Specifically, supplier dependence moderates the impact of proactive customer orientation on relationship-based innovation ($b_{\text{low}} = .281, p < .05$ and $b_{\text{high}} = .031, p > .05$), but not by joint learning on relationship-based innovation ($b_{\text{low}} = .369, p < .01$ and $b_{\text{high}} = .422, p < .01$), supporting Hypothesis 4a but not Hypothesis 4b. With the equality constraint on the moderated path removed, the model estimation results reveal a good model fit ($\chi^2 = 107.404$ on 82 d.f., TLI = .981, CFI = .986, and SRMR = .047). Table 4 presents a summary of our hypothesis-testing results.

Insert Table 3 About Here

The results of multi-group analyses suggest that proactive customer orientation has a fully moderated mediation effect (Muller, Judd, and Yzerbyt 2005) between social capital and relationship-based innovation as it only mediates the impact of social capital on relationship-based innovation when the supplier has either high design responsibility or has low dependence on the international customer. Therefore, our Hypothesis 1 is only supported when the supplier has high design responsibility or low dependence on the international customer. In

contrast, Hypothesis 2 is fully supported since the mediating role of joint learning on innovation is not contingent on the contextual moderators.

DISCUSSION AND IMPLICATIONS

This study investigates whether proactive customer orientation and joint learning capability mediate social capital and relationship-based innovation in international customer–supplier relationships. We intended to offer an alternate explanation for the inconclusive and sometimes conflicting empirical results regarding the relationship between social capital and innovation in the literature. Using a supplier’s perspective and drawing on the RBV and capability building literature, the results provide strong evidence for the essential role of proactive customer orientation and joint learning capability as distinctive capabilities in transforming the potential benefits of social capital into value creation for radical innovation generation in global supply chain relationships. Furthermore, we explore the moderating effects of supplier design responsibility and supplier dependence on the innovation–generation processes. The results show that supplier design responsibility and supplier dependence have a complex moderated mediated effect on the proactive customer orientation–innovation link. This study broadens and deepens our understanding of how and through what mechanisms social capital can lead to relationship-based radical innovation by suppliers in international customer–supplier relationships. We discuss the implications of the results of this study as follows.

Role of proactive customer orientation and joint learning capability

This study shows that both proactive customer orientation and joint learning capability mediate the relationship between social capital and radical innovations. Furthermore, proactive customer orientation significantly intervenes the social capital–innovation link only under the

conditions of low supplier dependence or high supplier design responsibility. The results indicate that proactive customer orientation is a context-specific capability, which may be shaped by a different organizational characteristics and organizational structure. The results are noteworthy, and provide new evidence of alternative paths to the way social capital can contribute to innovation. This is consistent with the recent findings on the contingent effect of proactive customer orientation on innovation (Atuahene-Gima, Slater, and Olson 2005).

In contrast, the findings also demonstrate that joint learning capability can fully mediate the effect of social capital on relationship-based radical innovation in customer–supplier relationships. We provide empirical evidence of the link between social capital, joint learning and innovation, a vital but underexplored issue in the literature (Easterby-Smith, Lyles, and Tsang 2008). Joint learning has been associated with different performance outcomes, such as market performance and relationship value in the literature (Cheung, Myers, and Mentzer 2010; Jean, Sinkovics, and Kim 2010). However, this study extends our understanding of these links by drawing joint relationship learning into the social capital–innovation link. Furthermore, this result demonstrates that supplier design responsibility and supplier dependence do not moderate the mediating effect of joint learning in the social capital–innovation link. The results suggest that joint learning capability is a critical organizational capability that has the same effect on leveraging the potential of social capital on relationship-based radical innovation generation, regardless of the nature and strength of the suppliers tie to the customer. Joint learning mediates the social capital-innovation link, regardless of supplier dependence structures and supplier strategic orientations for design responsibility. Therefore, joint learning capability is shown to be a fundamental process underlying relationship-based innovation, unaffected by key contextual aspects of tie strength in the global supply chain.

Overall, the findings on the mediating effects of different organizational capabilities on

the link between social capital and innovation lend support to the RBV (Barney 1991) and capabilities building perspective of rent generation literature (Lu et al. 2010; Teece, Pisano, and Shuen 1997), which suggests that firm distinctive capabilities including proactive customer orientation and joint learning capability can act as a translator to transform the potential of social capital into radical innovation in global supply chains.

Role of supplier dependence and supplier design responsibility

Our findings reveal complexity in the social capital-innovation link that may help address the equivocal nature of the extant empirical literature on this topic. As noted, various conflicting studies have found that social capital is positively, negatively, and not related to innovative new products (Tsai 2001; Yli-Renko, Autio, and Sapienza 2001; Zheng 2010). Our research accommodates such mixed findings by recognizing a key mediating capability, a supplier's proactive customer orientation, functions in the context of certain supply chain conditions, specifically when a supplier has design responsibility or is less dependent on the key customer. In these contexts, a supplier has the creative capability and diversity of knowledge to exploit the discovery of latent needs associated with a proactive customer orientation, facilitating the development of relationship-based innovations in global supply chains. When the nature and strength of a supplier's tie to its key customer are different, the unsupportive supply chain context weakens the capacity to innovate from discovered needs, breaking the social capital innovation-link and potentially accounting for equivocal empirical findings.

Dependence structure has an important role in managing supply chain relationships, and can shape firms' control of the strategic resources necessary to generate innovative activities. Despite the presumed impact of dependence on innovation generation and performance in the customer–supplier relationship (Tangpong, Michalisin, and Melcher 2008), the literature does not closely examine these links. Our results demonstrate the moderating role of supplier dependence

on the innovation generation process in supply chain relationships. We find that a less dependent supplier may leverage more information and knowledge resources that are generated from a proactive customer's proactive orientation, which can create relationship-based radical innovation. Less dependent suppliers are more autonomous from a key customer, with a broader pool of customers and exposed to a wider and deeper stock of knowledge, facilitating the creative development of insights gained from latent needs. In contrast, a highly dependent supplier is tied to its dominant customer, focusing on a narrower and less diverse knowledge stock and less able to creatively develop and extend novel insights. These findings extend those of Tsai (2009) on the role of a network position within an intra-firm network to the interorganizational context.

The results also show that supplier strategic orientation regarding supplier design responsibility may moderate the effect of proactive customer orientation on relationship-based innovation. This finding is consistent with recent arguments that supplier task responsibility may shape interorganizational learning and innovation generation (Azadegan and Dooley 2010). A supplier with a high design responsibility may effectively engage in more explorative tasks and be more likely to leverage information related to both addressed and unexpressed customer needs. In this way, design responsibility provides the creative capability to suppliers to translate the discovery of latent needs with one customer into innovations that can be marketed to other customers. In contrast, suppliers, lacking design responsibility, and merely providing basic materials and components, are unable to utilize information about hidden needs and to apply insights for marketable innovations.

Managerial implications

This research offers further insights for practitioners. Specifically, the results of this study show that suppliers can employ social capital to generate innovation in the international

customer–supplier relationship. A supplier can develop a trustworthy, long-term, and goal-congruent relationship with international customer, enabling the supplier to leverage social capital to discover hidden needs and create the knowledge necessary to develop radical innovative new products, enhancing their competitive advantage in the global market.

That is, managers should be aware of the important roles of developing specific organizational capabilities to further leverage the potential of social capital in innovation generation processes. Specifically, suppliers should develop proactive customer orientation and joint learning capability to better transform and mobilize social capital to generate relationship-based innovations.

Furthermore, managers must realize that dependence can shape innovation generation processes. High dependence on its key customer can create relationship stress and dependence, balancing, which can potentially impede a supplier's flow of innovative ideas (Henke and Zhang 2010). A supplier with more autonomy and less dependence can access more diverse information and knowledge from its customers, which facilitates innovation generation. Our results may also have implications for managers of dominant customer firms, who should consider creating a collaborative environment to manage the vulnerabilities experienced by a highly dependent supplier, and create a trusting relationship that enables innovative activities to thrive within a supply chain relationship characterized by social capital. Furthermore, our results also provide evidence to managers regarding supplier design responsibility in innovation generation. Our results support that firms moving to an ODM business model can better leverage relationship-based innovation benefits from their social capital in customer–supplier relationships.

On the other hand, the joint learning capability - relationship-based radical innovation link is not moderated by either ODM status or dependence level. This suggests that joint learning

capability is consistently affecting relationship-based radical innovation under different relational conditions. Managers are advised to take advantage of the benefits joint learning capability offers in inducing relationship-based innovation by cultivating inter-organizational environments that are conducive to organizational learning collectively with partners as a whole.

LIMITATIONS AND FURTHER RESEARCH

Several inherent limitations should be considered regarding the results of this study. First, supplier innovation was measured using subjective measurements, and focused only on radical innovation. Future studies should also include objective measures of supplier innovation, such as patents or number of new products development. In addition, previous studies have shown that different conceptualizations may have various antecedents and outcomes. Hence, future research could examine other innovation types, such as incremental versus radical innovation or technological versus administrative innovation, and identify their antecedents and performance outcomes in the supply chain. For example, Jansen et al. (2006) developed and tested a model of antecedents, moderators, and performance outcomes of exploratory and exploitative innovation in the intra-organizational context.

In addition, this study tested only the moderating effects of dependence and supplier design responsibility on the drivers and outcomes of innovation. Future research should explore other moderators, such as the cultural differences among international exchange partners engaged in supply chain relationships (Rosenbusch, Brinckmann, and Bausch 2011).

For methodology, this study relies on data collected from Taiwanese OEM suppliers. Because of the limited scope of this sample, generalizing our findings to other international customer–supplier relationships is difficult, especially in other industrial contexts. Future research should consider obtaining data from other industries from both the customers and their suppliers to cross-check the validity of our proposed model. This may prove challenging because

the identity of customers is sensitive in these types of international relationships. Overcoming these obstacles would contribute to the thorough understanding of innovation generation in global supply chains. Another limitation of this study is its cross-sectional design. Although the results of this study reveal the drivers and performance outcomes of supplier innovation generation, their causality can only be implied. Future studies could overcome this limitation by using experiments or longitudinal data collection, although such studies might only be possible for relatively short periods.

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Table 1: Measures and Composite Reliabilities

Construct (Composite Reliability: CR_{η})

Item (Loading)

Social Capital ($CR_{\eta} = .81$) (1 = strongly disagree; 7 = strongly agree)

We expect the relationship with our major international customer to continue a long time. (.81)

Our key customer is trustworthy. (.60)

The goals and objectives of both parties in the relationship with our international customers are compatible. (.74)

Our relationship with our major international customer is a long-term alliance. (.85)

Proactive Customer Orientation ($CR_{\eta} = .89$) (1 = strongly disagree; 7 = strongly agree)

We excel at anticipating changes in what our key international customer needs before they even ask. (.78)

We are able to successfully anticipate changes in our international customers' needs. (.80)

We are able to present new solutions to our international customer that they actually need but did not think to ask about. (.92)

We are always looking for clues that might reveal changes in what our international customers value beyond what they currently ask of us. (.76)

Joint Learning Capability ($CR_{\eta} = .92$)

Our relationship with key international customer has established strong capacity and organizational procedures to develop new knowledge sets. (.84)

Our relationship with key international customer is very good at developing rules, directives, formulas, and expert systems to create new knowledge base for our relationship. (.92)

Our relationship with key international customer has developed superior capability to make appropriate changes of organizational structure to incorporate and distribute the developed knowledge and skills. (.89)

Relationship-based Radical Innovation ($CR_{\eta} = .96$) (1 = strongly disagree; 7 = strongly agree)

Our relationship with this international customer has helped increase sales from radical new products introduced by our firm in the last three years. (.92)

Our relationship with this international customer has helped our company frequently introduce radical new products into new markets in the last three years. (.96)

Compared with our major competitors, our relationship with this international customer has helped introduce more radical new products in the last three years. (.96)

Supplier Dependence ($CR_{\eta} = .88$) (1 = strongly disagree; 7 = strongly agree)

Our company is strongly dependent on this key international customer. (.79)

It would be very difficult for our company to replace sales and profits realized from this international customer. (.92)

Our international customer would be costly to replace. (.80)

Fit Indexes:

Chi-Square = 154.807 on 109 d.f.

TLI = .977

CFI = .982

SRMR = .061

Table 2: Intercorrelations, Shared Variances, and Average Variances Extracted

	F1	F2	F3	F4	F5	F6	F7
Social Capital (F1)	.52	.21	.34	.07	.22	.00	.00
Customer Orientation (F2)	.46	.67	.36	.18	.10	.00	.00
Joint Learning (F3)	.58	.60	.80	.25	.10	.00	.00
Rel.-based Innovation (F4)	.27	.42	.50	.90	.07	.02	.01
Supplier Dependence (F5)	.47	.31	.31	.27	.70	.00	.00
R&D Scale (F6)	.06	.05	.03	.15	-.03	--	.00
Initial Firm Size* (F7)	-.03	-.01	-.06	-.08	.05	.00	--

Note: Correlations are included in the lower triangle of the matrix and shared variances are included in the upper triangle of the matrix. Average variance extracted for each construct is reported in the diagonal.

* = Marker Variable

Figure 1: Conceptual Framework

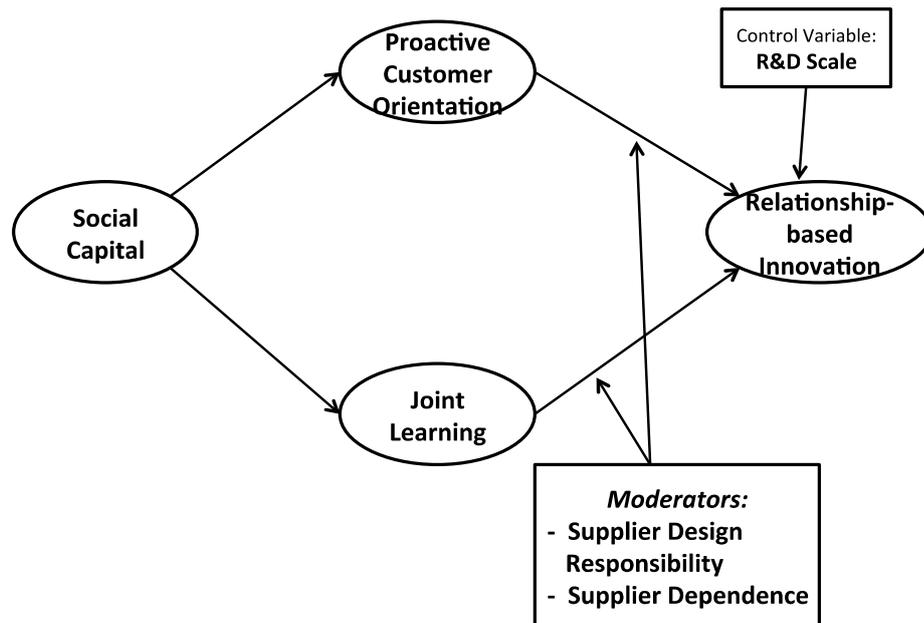
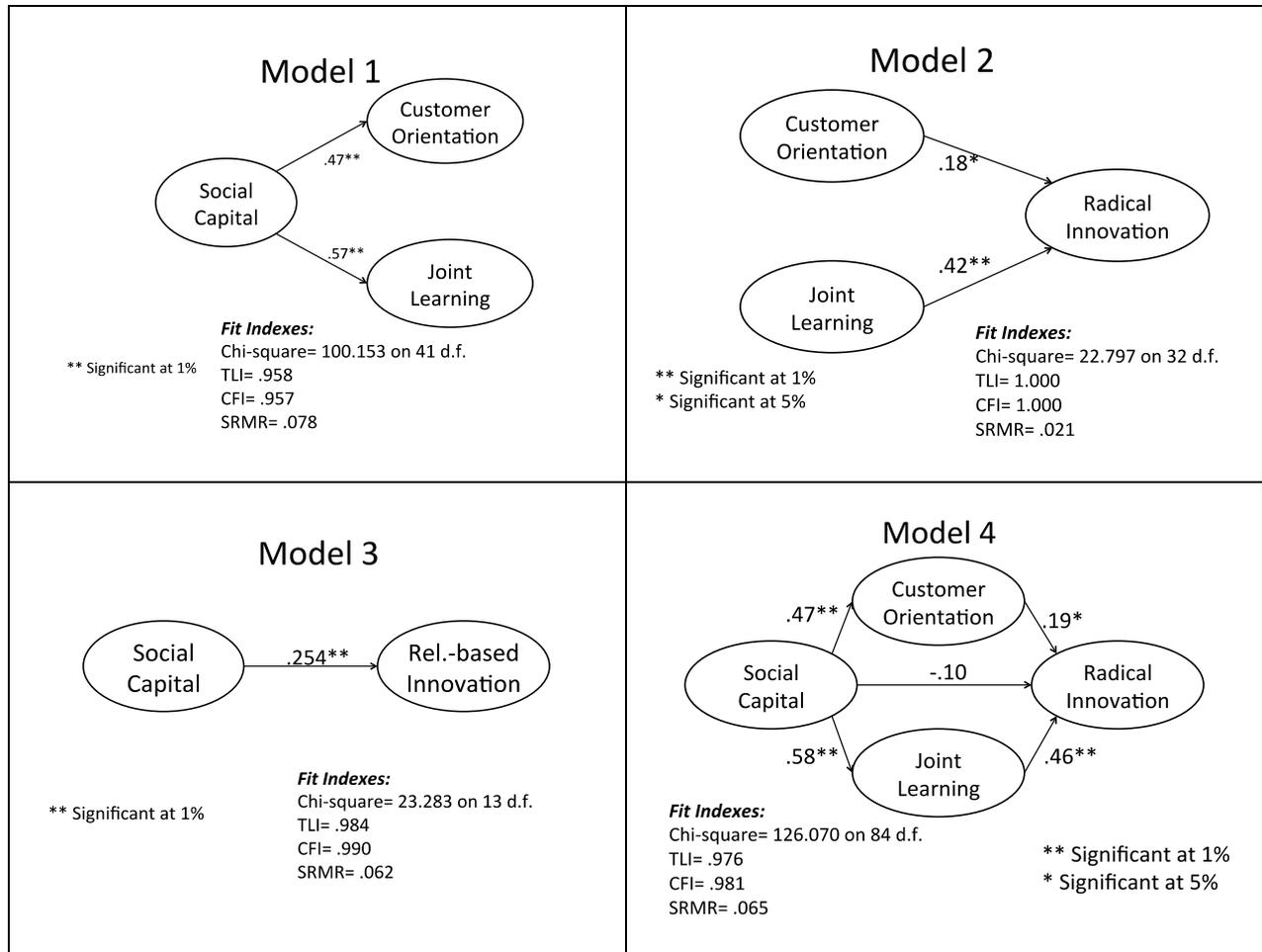


Figure 2: Results of Mediation Tests



* $p < .05$

** $p < .01$

Note: Control variable not depicted

Table 3: Results of Multi-group Analyses

	Relationship-based Innovation	
	ODM-Yes	ODM-No
Proactive Customer Orientation	.410** ($\Delta\chi^2 = 5.03, p < .05$)	.048
Joint Learning	.362** ($\Delta\chi^2 = .04, p > .05$)	.442**
Model Fit	$\chi^2 = 64.261 / 82df$ TLI=1.000 CFI=1.000 SRMR=.034	
	Low Sup. Dep.	High Sup. Dep.
Proactive Customer Orientation	.281** ($\Delta\chi^2 = 2.80, p < .10$)	.031
Joint Learning	.369** ($\Delta\chi^2 = .01, p > .10$)	.422**
Model Fit	$\chi^2 = 107.404 / 82df$ TLI=.981 CFI=.986 SRMR=.047	

科技部補助計畫衍生研發成果推廣資料表

日期:2016/02/16

科技部補助計畫	計畫名稱: 供應商在國際客戶伙伴關係中創新的前項與結果之分析: 以台灣與大陸供應商為例
	計畫主持人: 簡睿哲
	計畫編號: 102-2410-H-004-156-MY2 學門領域: 國際企業
無研發成果推廣資料	

102年度專題研究計畫研究成果彙整表

計畫主持人：簡睿哲		計畫編號：102-2410-H-004-156-MY2					
計畫名稱：供應商在國際客戶伙伴關係中創新的前項與結果之分析：以台灣與大陸供應商為例							
成果項目		量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）	
		實際已達成數（被接受或已發表）	預期總達成數（含實際已達成數）	本計畫實際貢獻百分比			
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	2	2	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
其他成果 （無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。）		該研究計畫目前有一篇期刊論文在國際期刊：Management International Review (SSCI) 中進行第三輪的審查。					

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與(閱聽)人數	0	

科技部補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以100字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文： 已發表 未發表之文稿 撰寫中 無

專利： 已獲得 申請中 無

技轉： 已技轉 洽談中 無

其他：（以100字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以500字為限）

該研究主要是探討供應商創新的研究。主要是以台灣與大陸的資料分析。該研究試圖探討影響供應鏈創新的因素。該研究對於科技創新與國際企業研究做出顯著貢獻。