Governing the Uncertainty - Integrating the Transaction Governance Perspective and the Knowledge Governance Perspective

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ABSTRACT

Researchers have not reached a consistent conclusion on the relationship between uncertainty and the level of buyer-supplier integration. Drawing perspectives of transaction governance and knowledge governance, this study discusses (1) how will uncertainty arising from transaction environment, task environment, and innovation and development affect the level of integration between buyers and suppliers and (2) does there exist interactive effects between different types of uncertainty on the level of integration between buyers and suppliers. Data from a field study of 126 converter-supplier relationships in Taiwan textile industry supports the research model. Taking into account the perspectives of transaction governance and knowledge governance simultaneously gives us a more comprehensive picture about how different types of uncertainty affect converters’ choices of the levels of quasi-integration with their suppliers in a different way.

Keywords: Outsourcing, Quasi-integration, Types of uncertainty, Knowledge sharing
Outsourcing is not only a major source of competitive advantage, but also an important part of business strategy (Yang, Wacker and Sheu, 2012). Therefore, the management of outsourcing relationships has been the favorite empirical domain of researchers of organization economics and organization sociology (Wathne and Heide, 2004; Williamson, 2008). In the outsourcing context, manufacturers focus on their own core knowledge and production capability and outsource other activities to their suppliers to form vertical labor division systems. The demands of resource exchange and joint production create the interdependence between organizations. The interdependence between transaction parties results in uncertainty and causes the governance problems of adaptation and coordination (Dekker, 2004).

In vertically outsourcing transactions, manufacturers may choose to maintain an arm-length relationship with their suppliers, or to develop more collaborative relationships, such as, repeated transactions; long-term oriented relationships (Ganesan, 1994); information sharing (Noordewier et al., 1990); quasi-integration (Zaheer and Venkatraman, 1995) to manage the transaction problems. Quasi-integration means that there is a substantial proportion of manufacturer’s business relying on a particular supplier (Blois, 1972). By forming closer relationships with their transaction partners, manufacturers are more capable to respond to the consumers’ demand in the downstream market. In addition, the high degree of quasi-integration also reflects the characteristics of relational governance such as, long-term relationship orientation and reciprocity between the transaction parties (Blome, Schoenherr and Kaesser, 2013). Blois (1980) views such a highly integrated relationship as a type of vertical integration without legal form. Eccles (1981) calls the stable and long-term relationships between manufacturers and their suppliers as quasi-firms. However, the formation of such a collaborative relationship is not costless. Manufacturers need to invest considerable time, resources and flexibility. Therefore, some manufacturers do not choose this
high commitment mode. Instead, they maintain loose coupling relationships with their suppliers to respond to uncertainty in the transactions.

Uncertainty is the major factor which affects firms’ governance decisions. A lot of research examines the influence of uncertainty on decisions about the firm’s boundary. However, their empirical findings are inconclusive. From the relational governance perspective, scholars argue that manufacturers should develop a highly integrated relationship with their suppliers to reduce the adaptation problems resulting from uncertainty in the transactions (Heide and John, 1990; Joshi and Campbell, 2003). On the contrary, drawing on the strategic perspective, researchers argue that in a highly uncertain environment, firms need greater flexibility to respond to the transaction uncertainty. Therefore, firms should not commit too much to a single transaction relationship. Keeping loose-coupling relationships with their suppliers allows firms to change suppliers flexibly (Porter, 1985). The reasons that lead to this inconsistent conclusion may be:

(1) uncertainty is a multi-dimension construct (David and Han, 2004; Rindfleisch and Heide, 1997; Sutcliffe and Zaheer, 1998). Different types of uncertainty affect governance decisions in different ways. Neglecting the multi-dimension characteristics of uncertainty and using unidimension to explore the relationship between uncertainty and governance decision may cause a biased result (Sutcliffe and Zaheer, 1998). Previous empirical research finds that the effect of uncertainty on the degree of quasi-integration is not significant (Subramani and Venkatraman, 2003; Zaheer and Venkatraman, 1995). Gulati, Lawrence, & Puranam (2005) point out that there are two important sources of uncertainty in the vertical business relationships. One arises from the transaction environment and the other comes from the task environment. Through the field study, this research figures out that the major source of uncertainty in transaction environment is market uncertainty and the uncertainty of task environment comes from performance ambiguity and the dependence on the suppliers. How
do these three types of uncertainty affect the level of quasi-integration between transaction parties?

(2) In addition to the uncertainty coming from executing contractual arrangements, Nooteboom (2004) proposes uncertainty may arise from the process of innovation competence development. Manufactures need the complement knowledge and skill owned by their suppliers to decrease their cognitive limitation. However, knowledge sharing between manufacturers and their suppliers may lead manufacturers to face the risk of knowledge spillover which may affect firms’ governance decisions.

Knowledge is an important intangible asset for organizations to sustain permanently. Hayek (1945) argues that the basic economic problem is not how to distribute the existing assets, but rather how to make better use of assets owned by social actors. Although a lot of research proposes that knowledge sharing among firms in the supply chain may improve the performance of individual organizations and the overall supply chain (Myers and Cheung, 2008) and combining the complementary knowledge owned by the individual organizations in the supply chain is one of the sources of firm’s competitive advantages (Dyer and Singh, 1998). Foss (2007) argues that previous research based on the knowledge based view seldom draws on the concern of efficiency. In knowledge governance, firms should concern not only the value creation, but also the cost of knowledge sharing. Foss (2007) proposes that firms should combine governance mechanisms that are best suited for promoting knowledge sharing, integration and creation. Discussing the efficiency of organizational forms in generating knowledge or capability, Nickerson and Zenger (2004) point out that the degree of interaction among knowledge sets in the transactions is the key factor that affects the choices of governance mechanisms. The more complex the transaction is, the higher the degree of interaction of knowledge sets is needed. Then, consensus based hierarchy that emphasizes extensive knowledge sharing and commonly shared search heuristics to guide decision
making will be the most efficient governance mechanism to mitigate knowledge-formation hazards.

Integrating competence perspective and governance perspective, Nooteboom (2004) proposes a conceptual framework to discuss the factors that affect the choices of governance mechanisms. Except for the uncertainty caused by the execution of contracts, Nooteboom (2004) points out uncertainty arising from innovation competence development. He proposes that uncertainty about the contingencies of contact execution and uncertainty for leaning by interacting with others have different implication in the choice of governance mechanisms. According to the transaction cost theory, environmental uncertainty causes the problems of contracting and monitoring. A higher level of environmental uncertainty leads to hierarchical governance to protect against the hazards of opportunism. However, from the competence perspective, the uncertainty of innovation and development arising from the fast change of technology and markets yields the need for outside partners’ complementary knowledge. Therefore, the risk of knowledge spillover increases, which induces the need of knowledge governance and affects the integration between transaction parties. Foss et al. (2010) propose that the relationship between knowledge sharing and the governance mechanisms is an important research issue. Because of the differences of newness and complexities of transaction goods and services, there exist different levels of knowledge sharing between transaction parties. How will the levels of knowledge sharing affect the levels of integrations between transaction parties?

(3) Many scholars indicate that the effects of transaction perspective and competence perspective on the choices of governance mechanisms are in fact so intertwined that treating them as competitive explanations is fundamentally misleading (Argyres and Zenger, 2012; Jacobides and Winter, 2005; Nooteboom, 2004). Firms’ governance decisions are affected by uncertainty type and the interaction between uncertainty type (Santoro and McGill, 2005).
This study explores how will the uncertainty arising from executing contracts and from interactive learning influence the level of quasi-integration? Are there interactive effects between different types of uncertainty on the levels of quasi-integration between buyers and suppliers?

**RESEARCH MODEL AND HYPOTHESES**

Uncertain transaction environment and quasi-integration: Market uncertainty

Market uncertainty means instability of consumers’ preference and expectations or unpredictability of competitors’ activities (Atuahene-Gima and Murray, 2004). Under condition of market uncertainty, manufacturers have to adjust products and services to meet the needs of consumers continuously. Some previous studies about governance of market uncertainty focus on the individual dyadic relationship—how manufacturers manage their relationship with customers to response to the downstream market uncertainty. However, other researchers argue that firms’ ability to response to the downstream customers flexibly under uncertain market conditions depends on the governance mechanisms they employ with their upstream supplier (Heide, 1994; Joshi and Campbell, 2003; Wathne and Heide, 2004). The uncertainty manufacturers facing in the downstream markets may affect the governance of the relationship with their upstream suppliers (Noordewier et al., 1990).

Market uncertainty causes the difficulty in predicting the future contingency and in planning previously (Williamson, 1975). Uncertainty about the future situations may highlight two different types of opportunism: First, passive opportunism—a refusal to adapt to changing circumstances and second, new circumstances can also be exploited actively—a party may use the new circumstances to extract concessions from the other, or to force renegotiation and improve the terms of trade at the partner's expense (Williamson, 1985).

How will the uncertainty of manufacturers’ downstream markets affect the relationship
between manufacturers and their suppliers? So far researchers have not reached a consistent conclusion (Joshi and Campbell, 2003). According to transaction cost theory and resource based view, uncertainty is the most important factor that encourages manufacturers to establish a close relationship with their suppliers. Under the condition of high market uncertainty, by establishing a close connection with the suppliers firms may stabilize the environment (Pfeffer & Salancik 1978), and reduce the impact of market uncertainty (Heide and John, 1990; Podolny, 1994). Besides, researchers of relational governance argue that when the market uncertainty is high, firms incline to conduct an alliance relationship with their supplier. Good experience of cooperation in the past and expectation of cooperation in the future urge the suppliers to respond the manufacturers’ requirement flexibly (Heide and Stump, 1995; Joshi and Campbell, 2003). When the manufacturers are highly integrated with the suppliers- concentrating their orders to a small base of supplier, they make a relationship specific commitment (Subramani and Venkatraman, 2003). This trustworthy behavior to their suppliers is likely to trigger reciprocal commitments by the suppliers (Hallén, Johanson, and Seyed-Mohamed, 1991). The suppliers may be more willing to adapt to the manufacturers’ requirement.

Srinicasan and Brush (2006) point out that for suppliers the creditable commitment made by manufacturers is a nonverifiable safeguard, which is the major reason that urges the suppliers to adapt to the manufacturers’ requirement flexibly. Besides, under the uncertain condition, conducting a highly integrated relationship with the suppliers may contribute to their cooperation and coordination (Gulati, et al., 2005), which is one of the sources of firms’ competitive advantages (Dyer and Singh, 1998).

However, relational governance mechanisms require firm to invest a certain amount of cooperation and commitment. Blois (1980) indicates that cooperation and commitment make the relational governance mechanisms less attractive in the uncertain environment. In handling contingencies, firms need ability to overcome the uncertainty. According to the
strategic view, cooperation and commitment make firms lose this capability. The arrangements of cooperation obligate firms to do something. The freedom of firms’ activities decreases. Therefore, according to the real option perspective, when uncertainty is high (uncertainty about the customers’ preference or the activities of competitors), firms need more adaptive capability. They will keep a distance with their supplier, avoid giving any type of commitment and keep the opportunity to switch to new suppliers to respond to the need of changing environment.

The empirical findings about the relationships between uncertainty and relational governance are also mixed.

Positive relationship between market uncertainty and relational governance  Podolny (1994) finds that high market uncertainty incline firms to develop long-term relationships with their suppliers. In the high uncertain market, firms cannot find the best partner easily, which leads to an increased reliance on previous exchange partners. This is what March (1988) mentioned the satisfied solution. The strategy of the satisfied solution makes firms depend on the current partners more and more and develop long lasting relationships. Wathne and Heide (2004) propose that long-term relationships between manufacturers and suppliers lead to dyadic lock-in which may promote the suppliers’ willingness to respond to the manufacturers’ requirements flexibly. Parallel to Wathne and Heide’s finding, Lui and Ngo (2012) argue that long-term orientation is a governance mechanism which decreases the suppliers’ opportunistic behavior. Therefore, when the market uncertainty is high, firms may conduct long-term orientated relationships with their suppliers.

Negative relationship between market uncertainty and relational governance

Joshi and Stump (1999) argue that when the environment is uncertain, buyers will not conduct long-term relationships with their suppliers. In this circumstance long-term
relationships will make the buyers vulnerable. Poppo, Zhou, and Zenger (2008) point out that uncertainty decreases the expectation of continuity. When market uncertainty is high, the probability of relationship continuity decreases, and market coordination is more efficient. Bello, Chelariu and Zhang (2003) explore factors that affect firms’ adoption of relationalism. They find that when the market is more volatile, firms incline not to draw on relationalism. Ryu and Eyuboglu (2007) propose that when the environmental uncertainty is high, firms cannot build relational norms easily. Therefore, manufactures will not adopt relational governance mechanisms to safeguard the suppliers’ opportunisms.

Synthesizing the arguments and empirical findings of transaction cost theory, resource-based view and strategic management, this study established two competing hypotheses about the association between market uncertainty and the degree of quasi-integration.

Hypothesis 1a: Market uncertainty is positively associated with the greater degrees of quasi-integration.

Hypothesis 1b: Market uncertainty is negatively associated with the greater degrees of quasi-integration.

Uncertain task environment and quasi-integration: performance ambiguity and dependence

Performance ambiguity

If the transaction parties cannot evaluate whether the counterparty has met his obligations associated with the contractual arrangement, performance ambiguity exists
Performance ambiguity means that through output control firms cannot assess the suppliers’ performance objectively. In the transaction of unstandardized products, because transaction parties cannot express the quality requirement explicitly, the problems of performance ambiguity become even more seriously. Performance ambiguity causes information asymmetry, which leads to the problems of performance monitoring. The difficulty in performance monitoring may lead the counterparties have chances to take opportunistic behaviors (Wathne and Heide, 2000), expose manufacturers to the risk of moral hazard (Mellewigt and König, 2009), and hamper the cooperation of transaction parties (Casciaro, 2003; Heide and Miner, 1992). The higher the level of interdependence of the production process is, the more difficult of the attribution of the flaw will be (Podolny, 1994). In designing the governance mechanisms, the transaction cost of cognitive conflict and friction is higher than the transaction cost of incentive conflict and opportunism. Therefore, when the performance ambiguity is high and the performance of each processing stage cannot be examined exactly, the challenges of the governance design are how to encourage the suppliers not shirking and how to avoid the conditions of trying to unload responsibilities onto the others.

If the performance cannot be codified clearly, in order to overcome the problems of performance ambiguity, firms have to supplement the output control by the behavior-based coordination (Celly and Frazer, 1996), measuring the suppliers’ performance subjectively (Johnson and Houston 2000). Poppo and Zenger (2002) argue that when the difficulties of output control increase, firms may draft more complex contracts which list the required activities and procedures suppliers should perform, using behavior control to supplement the functions of output control. Kowtha (1997) also indicates that when the performance ambiguity is high and the causality between behavior and performance cannot be clearly identified, firms may choose a more hierarchical control mode, behavior control, to induce
suppliers to perform what they need to do. Besides reducing performance ambiguity, behavior control has other two advantages: (1) correcting the suppliers’ opportunistic behavior or carelessness instantly; (2) having a clear picture about the relevance of suppliers’ opportunistic behavior and their performance.

The study of Bello and Gilliland (1997) finds that the more complicated the transaction product is, the more frequently firms use behavior control mechanisms. Noordewier et al. (1990) argue that manufacturers take monitoring and supervisory actions to make sure that the suppliers will perform well in the high uncertain condition. This monitoring is similar to the hierarchical governance (Stinchcombe, 1985). The behavior control mechanisms firms can use include personal visits to check on the status of goods production and goods shipment, taking action when deliveries are either not on time or inaccurately filled and putting pressure on suppliers in the form of letters, telegrams, phone calls, and even personal visits.

Although transaction cost theory asserts that monitoring is a control mechanism, some scholars argue that behavior monitoring represents an obtrusive form of control which may destroy the transaction atmosphere, offend another party's sense of autonomy and cause reactance (Heide, Wathne and Rokkan, 2007; Joshi, 2009; Noordewier et al., 1990). From the perspectives of risk sharing, agency theory offers a different point of view (Kowtha, 1997). Firms invest in behavior monitoring to obtain the information about the suppliers’ behavior. This information promotes firms’ understandings between suppliers’ behavior and suppliers’ performance. Therefore, the risk which suppliers have to take decreases and the incentives of suppliers’ cooperation increases. In addition, social exchange view emphasizes that transaction parties’ attitudes toward the behavior monitoring will affect the effects of behavior monitoring. Heide et al., (2007) point out that the actual effect of monitoring depends on the context in which monitoring take place. If the transaction parties have informal relationships, in the context of social exchange, behavior monitoring is a permitted control mechanism.
Noordewier et al., (1990) consider the monitoring that buyers place on the suppliers’ production activities as a type of relational governance. Yilmaz and Kabadayi (2006) have similar arguments. They propose that when the manufacturers want to develop long-term relationships with their suppliers, behavior monitoring can be regarded as relationship specific investment. However, if the relationships between manufacturers and suppliers are arm-length relationships, the behavior monitoring that manufacturers place on the suppliers implies they do not trust their suppliers. Behavior monitoring causes the transaction parties have more chance to interact with each other. The supervisors should possess the process knowledge, involve actively and take the risk. All of these behaviors may reduce the cognitive conflicts and frictions (Hernández-Espallardo, Rodríguez-Orejuela, and Sánchez-Pérez, 2010).

The problems of performance measurement cause the firms to face the high governance risk. Both transaction cost theory and resource dependence view regard this moral hazard as the major reason that leads firms to convert the transaction relationships into power relationships (Gulati and Singh, 1998). When the performance ambiguity is high, firms need more adaptation and control mechanisms to promote the suppliers’ contribution and to learn the interfaces of every production stage to decrease the performance ambiguity (Bensaou and Anderson, 1999).

The high level of quasi-integration between manufacturers and their suppliers implies the characteristics of hierarchy and high authority that give the manufacturers the power to monitor and to affect the suppliers’ production processes and performance. Firms outsource the manufacture of products to a small number of suppliers, which means firms want to conduct long-term and stable relationships with their suppliers (Zaheer and Venkatraman, 1995). Such a long-term relationship on the one hand may shape the atmosphere of cooperation and avoid the negative effects of behavior monitoring, on the other hand can be a hostage of transaction parties that safeguard the suppliers’ opportunistic behavior (Heide and
Thus, we expect a positive effect of performance ambiguity on quasi-integration.

**Hypothesis 2:** performance ambiguity is positively associated with the greater degrees of quasi-integration.

**Dependence on the supplier**

Dependence means firms get access to the resources they need through the interactions with their transaction partners (Bello et al., 2003). Dependence arises from (1) the value offered by the transaction partners and (2) the irreplaceability of the trade partners. (Yilmaz and Kabadayi, 2006) Resource based view argues that firm’s dependence on a specific supplier causes the uncertainty of decision making (Heide, 1994) because firms cannot control the key resource they need in their operation.

Astley (1984) argue that cooperation is the natural reaction to the pressure of environmental elimination. Lack of strategic resources induces firms’ cooperation. Ganesan(1994) argues that when a retailer depends on the manufacturer, the retailer will develop a more integrated relationship with the manufacturer. Subramani and Venkatraman(2003) find that dependence on the retailer has a positive effect on the level of quasi-integration. Cai, Yang and Hu (2009) also propose that in the buyer-supplier relationship, dependence on the counterparty is the most important reason that drives buyers to develop a highly integrated relationship with their suppliers. Based on these research findings, we propose that the level of focal firm’s dependence on his supplier has a positive effect on the level of quasi-integration.
Hypothesis 3: High level of dependence on the supplier is positively associated with
greater degrees of quasi-integration.

Uncertainty of innovation and development and quasi-integration: knowledge sharing

This research defines knowledge sharing as the sharing of task information and professional knowledge and solving production problems cooperatively (Wang and Noe, 2010). The needs of knowledge sharing between transaction parties affect the design of governance mechanisms. A well designed governance mechanism may help transaction parties to reach the goals of knowledge sharing (Nickerson and Zenger, 2004).

The degrees of knowledge sharing in the transactions affect firm’s choices of governance mechanisms (Nickerson and Zenger, 2004). If the production problems that transaction parties face are decomposable, involving limited knowledge interaction, market will be the most efficient governance mode. In markets, prices provide high-powered incentives that motivate actors to search for solutions that both exploit and enhance their specialized knowledge. Markets "dispense with the need of conscious control” (Hayek 1945, p. 527). However, when the products become more and more complicated, which demands the transaction parties share the knowledge they possess to develop common cognitive maps to solve the production problems, market governance is not a good alternative. The tendency of self-interest and opportunism may cause the hazards of knowledge appropriation and impede the knowledge sharing. Market governance cannot manage the hazards of knowledge appropriation effectively. The characteristic of high-power incentive of market governance encourages actors to actively seek knowledge and to hoard knowledge, but not to share knowledge (Nicherson and Zenger, 2004). Quasi-integration is a more efficient mode in this circumstance. The low-power incentive characteristic of quasi-integration encourages knowledge sharing and is essential to consensus (Nicherson and Zenger, 2004). Chang (2011)
argues that when the companies need their partners to share or contribute their knowledge, companies will establish more integrated relationships with their partners.

In conclusion, the levels of knowledge sharing between transaction parities during the process of production or developing new products will have a positive effect on the levels of quasi-integration.

_Hypothesis 4: The level of knowledge sharing between transaction parties is positively associated with the degrees of quasi-integration._

_Moderating effects_

Uncertainty arises from the decision makers do not have enough information (Galbraith, 1973). The ways that firms can use to reduce the uncertainty include (1) the process of trial-error, and (2) searching the information from their partners. Knowledge sharing between transaction parties reduces the impact of market uncertainty (Tywoniak, 2007). Therefore, knowledge sharing weakens the relationships between market uncertainty and quasi-integration.

_Hypothesis 5: Knowledge sharing weakens the relationships between market uncertainty and the degrees of quasi-integration._

Performance ambiguity makes firms conduct more integrated relationships with their suppliers in order to become the important customers of their suppliers and to avoid the suppliers’ opportunistic behaviors. Knowledge sharing helps the transaction parties to form common understanding (Nickerson & Zenger, 2004), to communicate (Mohr and Nevin, 1990), and to solve problems jointly (Uzzi, 1997). Thus, the partners’ behavior will become
more predictable. Firms will become more aware of the partners’ competence and the way they handling transaction problems. Therefore, the effects of performance ambiguity on the level of quasi-integration decrease.

Hypothesis 6: Knowledge sharing weakens the relationships between performance ambiguity and the degrees of quasi-integration.

The more strongly firms depend on their suppliers, the higher the tendency will they have to maintain the transaction relationship. By conducting a highly integrated relationship with their suppliers, firms may decrease the uncertainty arising from their dependence. Knowledge sharing between transaction parties facilitates their communication and increases the predictability of the counterparty’s behaviors. Then firms become more willing to outsource the manufacture to the suppliers.

Hypothesis 7: Knowledge sharing strengthens the relationships between the levels of dependence on the suppliers and the degrees of quasi-integration.

Control variables

We incorporate three variables that are recognized as having an influence on governance choice: size of converter, length of prior association, and holding the supplier’s equity.

Size of converter

Levy (1985) finds that firm’s size is negative related to the level of vertical integration. Because larger firms have abundant resources they will not solely depend on a single supplier. Therefore, the level of integration will be low. Zaheer and Venkatraman(1995) and
Subramani and Venkatraman (2003) find that firm’s size has a negative effect on the level of integration between transaction parties. We include size of converter as a control variable.

**Length of prior association**

Prior research shows that a history of interaction will affect the transaction parties’ cooperation tendency. A history of interaction is a requisite of norm development (Gundlach, 1994) and joint actions (Joshi and Stump, 1999). Subramani and Venkatraman (2003) find that the length of prior association is negatively related to the level of quasi-integration.

**Holding the supplier’s equity**

The sample of this study is the converters of the textile industry in Taiwan. The converters do not have any production equipment. The outsourcing relationships are often based on the friendships or partnerships. In the field study, the respondents tell us that in order to show converters’ goodwill or to solve the suppliers’ financial problem, converters may invest some shares in their suppliers. When converters hold the suppliers’ equity, they may have more power in affecting the suppliers’ decision, which may affect the level of quasi-integration. We include holding the supplier’s equity as independent variable to control the possible effects in our model.

According to the above discussion, we show the theoretical framework in figure 1.
Research setting

The research hypotheses are examined in the context of converter–supplier relationships in the textile industry in Taiwan. The converters fill in the questionnaire. Textile industry is one of Taiwan’s major traditional industries. In the past 40 years, textile industry has earned the largest amount of foreign exchanges for Taiwan. The supply chain of textile industry in Taiwan is composed by a group of small-medium enterprises. Each of them has his own special skill. Fiber manufacturing plants, weaving factories (knitted fabrics and woven fabrics), and dyeing and finishing plants form a vertically non-integrated network.

Figure 1. Theoretical framework

METHODS
Converters play important roles in the textile supply chain in Taiwan. They do not have any production facilities. After converters receive orders from their customers, they outsource spinning, weaving, dying manufacture to their suppliers and supervise the quality of each production stage. The interactions between converters and their suppliers are shown in figure 2.

![Diagram showing interactions between converters and their suppliers]

**Figure 2. The interactions between converters and their suppliers**

Sample and Data Collection

The sample frame includes 450 converters who are members of Taiwan weaving industry association or Taiwan silk and filament weaving industry association or Taiwan knitting industry association.

A two-phase data collection was conducted:

1. In the first phase, we conducted hour-long semi-structured interviews with 8 converters to get a more comprehensive understanding about the characteristics of the textile industry
and the sources of uncertainty in this industry. To further ensure content and face validity of
the measure, we made personal trips to conduct three in-depth interviews with senior export
managers of the converters. On the basis of their responses to the relevance and completeness
of the measures, we revised a few questionnaire items to enhance the clarity.

(2) We built an online survey and asked Taiwan Textile Federation to send an e-mail to invite
the managers of the 450 converters to fill in the questionnaires. A total of 106 valid
questionnaires were obtained.

Measures

Quasi-integration

The level of quasi-integration is measured by a single item: How many percent of the
manufacture did your company outsource to the focal supplier last year? This measure is

Market uncertainty

We use three items to measure market uncertainty: the unpredictability of customers’
demand and competitors’ activities and the instability of the customers’ need in the textile
industry (Atuahene-Gima and Murray, 2004; Joshi and Campbell, 2003). The Cronbach α
measure of reliability for this construct is 0.74.

Performance ambiguity

Performance ambiguity is measure with three items: In case of qualitative or quantitative
failures, it is difficult to establish responsibilities; It would be easy for the provider of this
activity to conceal the quality of the completed service; Using the price to evaluate the
performance of the supplier is not suitable and At the time of contracting for this activity, only
a few core aspects of the product or service were defined but not in any detail all specifications of the service. The Cronbach $\alpha$ measure of reliability for this construct is marginal but acceptable, at 0.61.

**Dependence on the supplier**

The dependence on the supplier is measured by a single item: We could easily find other supplier who would offer as much assistance as this supplier (Reverse coding).

**Knowledge sharing**

Consistent with Ryu and Eyuboglu (2007) and Hernández-Espallardo, et al. (2010), we operationalize knowledge sharing using five indicators: You and your suppliers invest time, resources and energy in sharing knowledge to improve the quality and productivity; to solve the production problem; in sharing relevant market information; in exchanging of product information and in connection with each other when something happens to the company. The Cronbach $\alpha$ of this construct is 0.9.

**Control variable**

We use number of employee to operationalize the size of converter. The logarithm of the number of years a converter had been outsourcing the manufacture to a supplier is used to measure the length of relationship (Heide and Miner, 1992). The dummy variable E is used to signify that whether a converter has the equity of his supplier. $E=0$ means the converter hold the equities of his supplier. $E=1$ means the converter does not have the equity of his supplier.

The measurement items of market uncertainty, performance ambiguity, knowledge sharing and dependence on the supplier are five-point scales from strongly disagree to strongly agree. Measures for the theoretical and control variables in current are reported in Table1.
<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>Cronbach’s α</th>
<th>Reference</th>
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</table>
| Quasi-integration         | How many percent of the manufacture did your company outsource to the focal supplier last year? (QI)  
                          | Ln(QI/(100-QI))                                                        |              | Zaheer and Venkatraman, (1995); Subramani and Venkatraman (2003)        |
| Market uncertainty        | 1. It is difficult to predict the customers’ demand in the textile industry.  
                          | 2. It is difficult to predict the competitors’ activities.  
                          | 3. The customers’ need is unstable in the textile industry             | 0.74         | Noordewier et al. (1990); Atuahene-Gima and Murray (2004); Zho (2008) |
| Performance ambiguity     | 1. In case of qualitative or quantitative failures, it is difficult to establish responsibilities.  
                          | 2. It would be easy for the provider of this activity to conceal the quality of the completed service.  
                          | 3. Using the price to evaluate the performance of the supplier is not suitable.  
                          | 4. At the time of contracting for this activity, only a few core aspects of the product or service were defined but not in any detail all specifications of the service. | 0.61         | Heide and John (1990); Heide and Miner (1992); Stump and Heide (1996); Ebers and Oerlemans (2013) |
| Dependence on the supplier | We could easily find other supplier who would offer as much assistance as this supplier (reverse coding). |              | Noordewier, John, & Nevin (1990); Subramani and Venkatraman (2003); Bello (2003) |
| Knowledge sharing         | You and your suppliers invest time, resources and energy in sharing knowledge  
                          | 1. to improve the quality and productivity;  
                          | 2. to solve the production problem;  
                          | 3. in sharing relevant market information; 4. in exchanging of product information  
                          | 5. in connection with each other when something happens to the company. | 0.9          | Hernández-Espallardo, Rodríguez- Orejuela, and Sánchez-Pérez, (2010); Ryu and Eyuboglu (2007) |
| Firm size                 | How many employees does your company have? |              | Kotabe, Martin and Domoto (2003)                                         |
| Length of association     | How many years does your company have business with the key supplier?    |              | Heide and Miner (1992)                                                   |
| Holding the supplier’s equity | Does your company invest in the share of your key supplier?            |              |                                                                           |
Semantic equivalence. The questionnaire was designed in Chinese. We translate the questionnaire into English and then back translated into Chinese to make sure of its understandability and accuracy.

RESULTS

Table 2 reports the mean, standard deviation, coefficient alpha, and correlation matrix for measures.

Table 2 Descriptive statistics and Pearson correlations among constructs

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>s.d.</th>
<th>QI</th>
<th>U</th>
<th>PA</th>
<th>D</th>
<th>KS</th>
<th>S</th>
<th>LR</th>
<th>E</th>
<th>T</th>
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<tbody>
<tr>
<td>QI Quasi-integration</td>
<td>-0.086</td>
<td>1.318</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>U Market uncertainty</td>
<td>3.053</td>
<td>.764</td>
<td>-0.193*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PA Performance ambiguity</td>
<td>3.380</td>
<td>.637</td>
<td>.116</td>
<td>.349**</td>
<td>1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>D Dependence</td>
<td>3.12</td>
<td>.989</td>
<td>.387**</td>
<td>-0.175</td>
<td>-0.122</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS Knowledge sharing</td>
<td>3.974</td>
<td>.671</td>
<td>.287**</td>
<td>.073</td>
<td>.144</td>
<td>.034</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S Firm size</td>
<td>66.46</td>
<td>127.4</td>
<td>-0.266**</td>
<td>-0.172</td>
<td>-0.078</td>
<td>-0.048</td>
<td>-0.150</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR Length of association</td>
<td>12.98</td>
<td>7.855</td>
<td>.042</td>
<td>-0.099</td>
<td>-0.021</td>
<td>-0.053</td>
<td>0.024</td>
<td>0.126</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E Holding the supplier's equity</td>
<td>.94</td>
<td>.246</td>
<td>-0.178*</td>
<td>.120</td>
<td>.031</td>
<td>-0.167</td>
<td>-0.089</td>
<td>0.093</td>
<td>-0.118</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at p<0.05;  ** Significant at p<0.01

Hierarchical regression analysis was used to test the hypotheses of this investigation (See Table 3). Model 1 is demonstrated to be statistically significant \( (F=3.729, \ p<0.001) \), indicating that control variables can explain a certain degree of the variance that is observed in the level of quasi-integration. The effect of firm size on quasi-integration is negative and significant \( (\beta=-.197, \ p<0.05) \), implicating that the larger the converter size is, the lower the level of quasi-integration between the converter and his key supplier will be. This result is consistent with the finding of Subramani and Venkatraman (2003).
Table 3 Results of hierarchical regression on quasi-integration

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>-.197*</td>
<td>-.213*</td>
<td>-.207*</td>
<td>-.227**</td>
</tr>
<tr>
<td>Length of association</td>
<td>.076</td>
<td>.080</td>
<td>.067</td>
<td>.048</td>
</tr>
<tr>
<td>Holding the supplier’s equity</td>
<td>-.15</td>
<td>-.069</td>
<td>-.053</td>
<td>-.038</td>
</tr>
<tr>
<td>Independent variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market uncertainty(MU)</td>
<td></td>
<td>-.254**</td>
<td>-.255**</td>
<td>-.249**</td>
</tr>
<tr>
<td>Performance ambiguity(PA)</td>
<td></td>
<td>.225*</td>
<td>.205*</td>
<td>.209**</td>
</tr>
<tr>
<td>Dependence(D)</td>
<td></td>
<td>.353***</td>
<td>.335***</td>
<td>.347***</td>
</tr>
<tr>
<td>Knowledge sharing(KS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KS*MU</td>
<td></td>
<td></td>
<td></td>
<td>.037</td>
</tr>
<tr>
<td>KS*PA</td>
<td></td>
<td></td>
<td></td>
<td>.046</td>
</tr>
<tr>
<td>KS*D</td>
<td></td>
<td></td>
<td></td>
<td>.662**</td>
</tr>
<tr>
<td>R²</td>
<td>.111</td>
<td>.317</td>
<td>.356</td>
<td>.393</td>
</tr>
<tr>
<td>Adj.R²</td>
<td>.081</td>
<td>.276</td>
<td>.311</td>
<td>.334</td>
</tr>
<tr>
<td>F Ratio</td>
<td>3.729***</td>
<td>7.741***</td>
<td>7.999***</td>
<td>6.645***</td>
</tr>
<tr>
<td>ΔR²</td>
<td>.111</td>
<td>.206***</td>
<td>.039**</td>
<td>.037†</td>
</tr>
</tbody>
</table>

n=125  †p <0.1, *p <0.05, **p < 0.01, ***p < 0.001

Model 2 accounts for the direct effects of uncertainty about transaction environment and task environment on the level of quasi-integration. The fitness of the model is good (F=7.741, p<0.001). Market uncertainty has a negative and significant effect on quasi-integration (β =-.254, p<0.01). Accordingly, H1b is supported. That is to say, when the market uncertainty is high, instead of conducting a highly integrated relationship with their partners, converters incline to maintain their flexibility to change the suppliers. The coefficient of performance ambiguity is positive and significant (β =.225, p<0.05). H2 is supported. Hypothesis 3 relates dependence on the supplier to quasi-integration. Dependence on the supplier has a positive effect on the quasi-integration. H3 is supported.

In Model 3, we aid knowledge sharing as the moderator. The fitness of the model
becomes better significantly ($\Delta R^2=.039$, $p<0.05$). The coefficient of knowledge sharing is positive ($\beta=0.205$, $p<0.01$). That means the higher the level of knowledge sharing between transaction parties, the higher the level of quasi-integration. H4 is supported.

Interactive terms were incorporated into Model 4 after a centering procedure to avoid potential multicollinearity problems. The moderating effects of knowledge sharing on the relationship between market uncertainty and quasi integration and the relationship between performance ambiguity and quasi integration are not significant. H5 and H6 are not supported. The moderating effect of knowledge sharing on the relationship between dependence on the supplier and quasi-integration is significant ($\beta=.662$, $p<0.01$). Knowledge sharing strengthens the positive relationship between dependence on the supplier and quasi-integration. The result confirms H7.

**DISCUSSION**

When converters govern their outsourcing transactions, uncertainty plays an important but uncertain role. Except for the uncertainty arising from transaction environment and task environment, uncertainty in the procedure of innovation and development also affects the effectiveness of governance mechanisms and firms’ choices of governance mechanisms (Nooteboom, 2004). This study embraces transaction governance perspective and knowledge governance perspective to explore how uncertainty of transaction environment, task environment and innovation and development will affect the level of quasi-integration between focal firms and their suppliers in the outsourcing relationships.

The empirical results show that when the converters perceive the downstream markets are highly uncertain, they prefer to maintain the flexibility to change suppliers and they may not develop highly integrated relationships with the current suppliers.

When the converters perceive the problems of performance ambiguity are serious, they
will conduct more integrative relationships with their suppliers. The production of textile has at least three stages of process, spinning, weaving and finishing. Each of the stage happens in a sequential way. The output of the prior stage is the input of the following stage. The tasks are sequentially interdependent (Thompson, 1967). Task interdependence derives the problems of performance ambiguity. Prior studies propose that in order to solve the problems arising from task interdependence, firms should build a more hierarchical governance structure (Dekker, 2004). Casciaro (2003) and Santoro and McGill (2005) point out that when the interdependence is high, firms tend to develop equity-based cooperation relationships. Through formal control mechanisms monitor the transaction parties’ behaviors. However, in our research context, most of the converters do not invest in the shares of their suppliers. Instead, they outsource a large percentage of manufacture to a small number of suppliers to show their commitment in their relationship (Blois, 1972). High integration between the transaction parties also switches the transaction relationships to the partnerships which may allow the converters to influence the suppliers’ behavior and promote the suppliers’ performance without bearing the risk of equity investments.

The more strongly the converters depend on their suppliers, the higher percent of the manufacture will be outsourced to the suppliers. When firms’ key resources are controlled by their suppliers, firms depend on their suppliers. The dependence causes uncertainty (Heide, 1994). Firms may use contracts to manage their dependence or conduct a more integrated relationship with their suppliers to reduce the uncertainty arising from the dependence (Cai, Yang and Hu, 2009). However, in a high uncertain condition, firms’ ability to draft complete contracts is limited and the cost of execution contracts is increased. Our research finds that the interdependence between transaction parties drives firms to conduct a quasi-integration structure in a high uncertain environment. This result is consistent with Cai and his colleagues’ finding.
When converters and their suppliers conduct a high level of knowledge sharing, they will establish a highly integrated relationship. The design of this knowledge governance mechanism has its efficiency implication. Nickerson and Zenger (2004) argue that low-power incentive mechanism is good for knowledge sharing, but high-power incentive mechanism encourages firms to hoard knowledge.

High degree of quasi-integration between converters and their suppliers implies the non-price characteristic in the relationship. That is a low-power incentive mechanism which promotes the transaction parties to share their knowledge.

Knowledge sharing moderates the positive relationship between dependence and the degree of quasi-integration. Two other moderating effects are not significant.

In an outsourcing relationship, the outsourcing company may maintain a loose-coupling or highly integrated relationship with their supplier. Previous empirical studies do not support the hypothesis that uncertainty has positive/negative effects on the levels of quasi-integration (Zaheer and Venkatraman, 1995; Subramani and Venkatraman, 2003). In this study we follow the argument of Sutcliffe and Zaheer (1998), uncertainty is a multi-dimension construct. We find that uncertainty in transaction environment and in task environment has different effects on the levels of quasi-integration. Besides, we argue that concerning transaction governance (Williamson, 1991) and knowledge governance (Foss, 2007; Grandori, 2001; Nooteboom, 2004) simultaneously may get a better understanding about the firms’ choices of the levels of quasi-integration in the outsourcing relationships.
REFERENCES


Integration in International Markets. *Journal of Marketing Research (JMR)*, 27(2).


