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科技不確定性與機會主義：關係管理對
產業採購行為的影響
Technology Uncertainty and Opportunism:
The effects of Relationship Governance on
Industrial Procurement

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中文摘要

　　「採購」乃製造業於生產製造過程中所必經的程序之一，有鑑於中國的低勞動成本及政府的開放政策，帶動中國科技產業的蓬勃發展，在採購決策過程中，製造商與其供應商的關係，亦是許多學者所關心的議題。然而，針對中國高科技產業之採購行為的相關研究卻鮮少被提及。本研究欲探討中國科技業廠商之採購行為與供應商機會主義的關係，以期能找出降低供應商機會主義行為的管理機制。

　　本研究以供應商機會主義為依變項，並以科技不確定性為採購環境作為自變項，帶入中國組織特性、關係及特定資產投資為中介變項，欲探討中介的影響效果。本研究以大中華地區連接器廠商為研究對象，計有效樣本為 95 份，並以 SAS 統計軟體進行分析。經由因素分析及複迴歸分析後，實證調查結果獲致如下重要發現：(1) 科技不確定性越高，供應商機會主義的表現越低；(2)在科技不確定性高的情況下，組織內集權式關係管理相較於專屬資產投資較能有效控制供應商的機會主義。

關鍵字：科技不確定性、機會主義、採購行為

Technology Uncertainty and Opportunism: The effects of Relationship
Governance on Industrial Procurement

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ABSTRACT

In high-technology markets, technology uncertainty and supplier opportunism are two unique problems for organizational buyers in making procurement decision process. The purpose of this article is to explore (1) how the technology uncertainty influences supplier opportunism and (2) how *guaxin* influence procurement and opportunism in China high-technology market. Using survey data from organizational buyers' purchase of connector manufactures in greater China, there were a total of 95 samples from 47 different firms. Combined with high-technology market and China culture, there are two unique factors which are *centralization of relationship governance* and *specific asset investment*. Based on multiple equation models, they show that (1) centralization of relationship governance is more efficiency in managing opportunism when the procurement situation is in highly technology uncertainty and (2) technology uncertainty has a negative influence on supplier opportunism. The managerial implications are discussed.

Key Words: Technology uncertainty, Opportunism, Purchasing behavior.

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黃孟婷 謹誌

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Introduction

1.1　　　Research Motivation

In high-technology markets, technology uncertainty is one of the major problems which have been discussed for decades. In Heide and Weiss's (1995) article, they claim that technology uncertainty and switching cost are the two problems which exist in high-technology market. However, in the decision-making process, not only technology uncertainty but also supplier opportunism is an important factor which could influence the transaction cost in the purchasing behavior.

Although there is increasingly research in procurement and opportunism among member firms, little attention has been given to connect the relationship between procurement and opportunism. In the research of Heide and Weiss (1995), they argue that certain aspects of a firm's purchasing situation may influence the purchasing decision. They examine how the characteristics of high-technology markets have different effects in the two stages of buys' decision process, the consideration stage and switch stage. The idea of consideration or switching is a kind of opportunistic behavior. The reason is the switching behavior which is performed by one party would erode the other party and increase the transaction cost. In the relationship of marketing channels, this kind of behavior would evoke opportunism.

In the high-technology industry, China already became a major growing market where every country wants to go in. Due to the emergence in consumer electronics, such as cell-phones, laptops, MP3, video games, and digital cameras, the growing demands derives the performance of connector markets. In 2001, the major application of connectors is in personal computers; but, nowadays many connector manufacturers also strive for orders from consumer electronics and internet

communication. In the report of connector industry forecast (2007), the author mentions that world connector sales will achieve a 6.6 percent increases in 2007 based on strong economies in China and Asia and forecasts that sales will make five consecutive years of growth. The growth rate in China is the highest compared with North America, Europe, Japan, and Asia-Pacific. The percent change is 15.0 percent from US 6,010.7 dollars in 2006 to US 6,912.4 dollars in 2007. Therefore, according to the statistic report, it's not surprised that China would be a prospective country in the future.

Since 1978 Deng Xiaoping opened China to market competition, China already became a domestic exporter in the world. To attract foreign investors, China government provided preferential treatment to foreign investors, such as tax holidays, reduced tax rates, and duty-free import of machinery and equipment. In the twentieth century, China is the largest emerging economy in the world and is characterized by very rapid change. Due to China's huge market potential, relative low cost of productive resources such as land, labor, and improving business environment, more and more high-technology companies are moving to China (Zhao, Flynn, & Roth, 2006). After China became a member of the WTO in December 2001, China not only took a large step forward toward increased economic exchange with international trading partners but also became the largest exporter in the world of many industrialized markets. In Yeung, Cheng, and Lai's article (2005), they forecast China would be the largest producer of semiconductors in the world by 2010 and the vast technology would transfer in electronics industry emerging as the most prominent and rapidly developing industries.

However, because of the cultural difference and the lack of lawful controls and transparency in procurement procedures, organizations in China are faced with confusing and inconsistent bureaucracy. Therefore, many researchers (Zhao, Flynn, &

Roth, 2006) claim the notion of *guanxi*(relationship) is a critical research issue in doing business in China. *Guanxi* is the granting of preferential treatment to business partners in exchange for favor and obligations (Lee, Pae, & Wong, 2001). In academic field, there are several theoretical bases used in studies of *guanxi*, including relational exchange theory, transaction cost economics theory, and resource dependence theory (Zhao, Flynn, & Roth, 2006). In the connector manufacture industry, buyers often have existing suppliers who can provide the product, as a result of previous equipment purchases. Therefore switching behavior would have more impact in the relationship and increase the transaction cost. According to transaction cost economics theory, the purpose of the article is to find out how *guanxi* influence procurement behavior and opportunism in business-to-business relationships.

In the relationship among member firms, opportunism between member firms is a popular topic because a firm which behaves opportunistically could increase its short-term, unilateral gains but could erode the other party in the long-term. Brown, Dev & Lee (2000) claim opportunism by one party can erode the long-term gains potentially accruing to both parties in a dyadic channel relationship. But the opportunistic behavior is hard to monitor. As a result, a lot of researchers examine how to mitigate opportunism in marketing channels (Heide & John, 1992).

On the other way, a key to success in business-to-business markets is to understanding client purchasing behavior (Bunn, 1993). However Bunn (1993) argues that such understanding is difficult to achieve, because the organizational procurement process is often dynamic and complicated. In Chang and Ding's research (1995), they also have recognized that Industrial purchasing is a complex decision-making process, and the purchasing behavior has been influenced by a variety of interpersonal, organizational, and environmental factors. Therefore, research scholars and marketing managers agree that organizational buyers use alternative decision processes for

different situations (Bunn, 1993). Bunn (1993) reports the development of a classification scheme of purchasing patterns and situations. The development provides a tool by which sales representatives can develop adaptive selling approaches based on a small set purchasing situations and corresponding purchasing decision approaches.

According to the open-door policy and the growing portion of marketing activity in high-technology, China already became an important market in the world. But the empirical evidence about purchasing behavior and opportunism in China is still scare. In particular, very little conceptual and empirical research has been directed toward examining how to mitigate opportunism in purchasing process in China high-technology market. Therefore, the article focuses on two specific questions faced by purchase managers in China: (1) how the technology uncertainty influences supplier opportunism in China high-technology market, and (2) what role *guanxi* takes in purchasing behavior and supplier opportunism.

1.2 Research Objective

According to research motivation, the article focuses on the relationship between organizational purchasing behavior and opportunism in China high-technology market. Because trying to answer the two specific questions, I investigate the mediate effect of governance mechanisms in managing opportunism and purchasing situational factors and the efficacy of governance mechanisms, including relational governance and specific asset investment.

My main premise is that the organizational buyers in China high-technology market could use alternative governance mechanisms to mitigate opportunism in the characteristics of different situations. Such knowledge will help us provide managers

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with a better understanding of which governance mechanisms to use in different characteristics of situations and how to limit opportunism more effectively. With this understanding, managers can more effectively and efficiently manage opportunism in their channels and thereby reduce the transaction cost.

Literature Review

2.1   Technology Uncertainty

In the research of Bunn (1993), he reports a classification scheme of purchasing patterns and situations. Extended the Robinson, Faris, and Wind's (1967) and Webster and Wind's (1972) models, Bunn (1993) includes both internal/organizational and external/environmental determinants to distinguish the characteristics of the situations into four factors which are purchase important, task uncertainty, extensiveness of choice set, and perceived buyer power. Bunn (1993) indicates that uncertainty has already been taken attention greatly by the previous organizational purchasing researchers and becomes a central aspect of purchasing behavior. Task uncertainty is also consistent with the RFW dimension of "newness plus information needs" (Bunn, 1993).

In Heide and Weiss's (1995) research, they point out two specific problems for organizational buyers in high-technology markets. They argue the characteristics of high-technology markets which are uncertainty and switching costs have different effects in a buyer's decision process. Because of high level of technological change and heterogeneity in high-technology markets, general determinant of buyer decision making in high-technology markets is uncertainty. Uncertainty prevails for two reasons in high-technology markets (Heide & Weiss, 1995). First is a lack of relevant experience with the product category; second is specific market condition that imposes demands on a buyers' information processing capacity (Heide & Weiss, 1995). In the connection manufacture industry, due to high level of consumer electronic products change, manufacturers have to make decisions quickly to catch up. And the purchase managers in the industry may often experience uncertainty.

And in the lately research, some scholars also find the switching costs is a main consideration when buyers consider to end a relationship with their vendors. In Demirhan, Jacob, & Raghunathan's (2007) research, they investigate the impact of a decline in the IT cost and the switching cost on IT investment strategies of firms. They find the early entrant may assume an aggressive investment strategy or a defensive investment strategy in response to a decline in the IT cost, depending on whether the switching cost relative to the extent of decline in the IT cost is high or low. When firms control the switching cost, the early entrant increases its investment in quality and switching cost and maintains its quality and its market-share leadership irrespective of the extent of decline in the IT cost (Demirhan, Jacob, & Raghunathan, 2007). On the other hand, in computer software market, the switching cost is also an important antecedent variable in encouraging technology commitment which drives the repeat purchase or usage of a particular technology (Pae & Hyun, 2007).

According to characteristics of connector markets, this article comprises task uncertainty and switching costs factors as two factors of purchasing situation. Because of the characteristics of technology-driven markets, rapidly changing technologies and the absence of relevant information derive a high level of uncertainty; the switching costs drive the intention of the repeat purchase or usage. Because of the wide usage in consumer electronics, such as HVAC security, imaging systems, TV/video, audio systems, video games/toys, consumer automotive, and other segments of the world consumer electronics market, in the connector markets there are a high level of uncertainty which drives from the quick change in consumer products; on the other hand, due to the difference between digital silicon technology with consumer products, the switching costs would be a important concern for connector manufacturers.

2.2　　　Opportunism

Opportunism is "refers to a lack of candor or honesty in transactions, to include self-interest seeking with guile" (Williamson, 1975, p. 9). According to transaction cost analysis (Williamson, 1985), parties may act opportunistically if given the chance which is labeled as opportunism. In practice, it involves two elements: (1) distortion of information, including overt behaviors such as lying, cheating, and stealing, as well as more subtle behaviors such as misrepresenting information by not fully disclosing, (2) reneging on explicit or implicit commitments such as shirking, or failing to fulfill promise and obligations (Jap & Anderson, 2003).

In the classification of opportunism, Williamson (1996) distinguishes opportunism into ex ante opportunism and ex post opportunism. Ex ante opportunism means an exchange engage in opportunism before the firm transact; whereas ex post opportunism means an exchange engage in opportunism after the firm transact. For instance, Williamson (1996) instances the brand name of hotels to distinguish ex ante and ex post opportunism. He mentions that ex ante opportunism is hotels operating under this brand name can engage in opportunism before the actual formation of the relationship; the ex post opportunism is they can behave opportunistically after the relationship has been launched. And both of the opportunism could erode the value of the brand.

Taking a deep look at ex post opportunism, Wathen and Heide (2000) present the explicit role of ex post opportunism in inter-organizational exchange. They outline original and emergent conceptualization of the ex post opportunism construct in inter-organizational relationship, describing as active and passive opportunism, and how active and passive opportunism manifest themselves under existing and new circumstances. Passive opportunism also means "blatant" or "strong form"

opportunism which is manifestations of the so called moral hazard problem, in the sense that one of the parties to the exchange is purposely withholding effort or somehow refraining from performing agreed-on actions; on the other hand, active opportunism refers interfirm relationships are frequently governed by contracts that forbid certain actions, in the sense that expressly forbidden acts are committed (Wathen & Heide, 2000).

This article focuses on the ex post form of opportunism, which is the failure of an exchange partner to perform without guile (Brown, Dev, & Lee, 2000). It includes withholding or distorting information to "mislead, distort, obfuscate, or otherwise confuse" (Williamson, 1985, p. 47), and it also includes shirking, which means "not delivering the promised action and resources, and failing to do this on a fairly systematic and sustained basis" (Hardy & Magrath, 1989, p. 123). In addition, it can also include contracts which forbid certain actions but could hazard the other party (Wathen & Heide, 2000). The emphases on this article are whether suppliers would execute thoroughly or not and whether they shirk or not after or on the traction. In technology-driven markets, each step in the process of producing needs to be precise. If suppliers supply flawed products, buyers might stumble with knotty situations in the process of producing end products. Therefore, in the process of purchasing decision make, the article focuses on ex post opportunism to provide some implications for purchasing managers in the high-technology markets.

2.3   Purchasing Behavior

In order to succeed in business-to-business markets, it's important for selling firms to understand customer firms' purchasing behavior (Johnston & Lewin, 1996). In the past decades, researchers have studied the processes and behaviors used by organizations in their purchasing activities. Selling firms also have encouraged these investigations because these investigations could support marketers to better understand, serve, and retain their organizational customers. Therefore scores of conceptual and empirical articles have investigated the constructs relative to organizational purchasing behavior.

In the late 1960s, numerous scholars interest in studying the organizational purchasing process. In the following six years, there were three major models in this area. First was the model of industrial purchasing behavior which was addressed by Robinson, Fairs, and Wind in 1967. The main contribution of the theory is that it proposes a typology of purchasing situations. The model is a three by three matrix. They suggest taxonomy of three basic categories of purchase situations (new task, modified rebuy, and straight rebuy) with three different purchase situations. Briefly, organizational purchasing behavior is hypothesized to vary according to how much experience the organization has had in previous situations (newness of the problem), how much information is needed to make a decision (information requirement), and the extent to which alternative product offerings were considered (consideration of new alternatives). Due to its simplicity and intuitive appeal, the buygrid model has been a popular framework in empirical studies and has been described as "…one of the most useful analytical tools for both academicians and practitioners interested in organizational purchasing behavior…" in Moriarty's research (Moriarty, 1983, p. 29).

Second, in 1972, Webster and Wind address a model of organizational

purchasing behavior. They argue that organizational purchasing behavior is a process composed of a sequence of phases or stages. Webster & Wind (1972) assert that organizational purchasing behavior is a decision-making process carried out by individuals, in interaction with other people, in the context of a formal organization. The four classes of variables determining organizational purchasing behavior are individual, social, organizational, and environmental. Within each class, there are two categories of variables which are task and nontask classifying the organizational purchasing decisions.

Third, in the next year, Sheth(1973) simplifies the organizational purchasing behavior to four parts which are expectations of individuals involved in the process, industrial purchasing behavior, conflict resolution, and situational factors. There are two different constructs introduced in Sheth's model from Robinson, Faris, and Wind and Webster and Wind's models. The first is informational characteristics or the source and type of information each decision-maker is exposed to; the second is conflict negotiation characteristics (Johnston & Lewin, 1996).

In retrospect the three original models of the organizational purchasing behaviors, Robinson, Faris, and Wind (1967) and Webster and Wind (1972) propose the central models; Sheth conceptualize the process of organizational purchasing behavior. Scores of empirical research appear that these models were correct in proposing environmental, organizational…etc. characteristics as well as the stages in the purchasing process significantly affect organizational purchasing behavior (Johnston & Lewin, 1996). So we could realize that the three models are robust in theory. In 1996, Johnston and Lewin combine the proposition of the original three models and add two other factors, decision rules and role stress. They propose an integrated model of organizational purchasing behavior for future research.

To extend research of organizational purchasing behavior, in 1993, Bunn develop

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a classification scheme of purchasing patterns and situations. He identifies and classifies six prototypical purchasing decision approaches among organizational buyers that differ across four underlying purchasing activities. It's the first empirical taxonomy to categorize purchasing situations in the recent research. In the recent years, some researchers in organizational purchasing behavior try to extend the original models and integrate the purchasing behavior. For example, Moon & Tikoo (2002) extend the research on prototypical decision approaches and compare purchasing activities, the accompanying prototypical purchasing decision approaches, and the impact of situational variables by organizational buyers and users. Lewin & Donthu (2005) also conduct a meta-analytical integration of this research stream.

However, take a deep look at purchasing behavior and opportunism, little attention has been given to connect with this two concepts. According to purchasing behavior models, in a decision marking process, purchasing behavior could be influenced by purchasing environment, namely purchasing situation. To fill this gap, this article tries to examine the relationship between the nature of purchasing situation and supplier's opportunism. This article comprises characteristics of China high-technology markets and China culture and desires to provide contribution for future research and implication. Consequently, combined the point of view in opportunism and purchasing situations, the hypothesis is:

H1: The higher technology uncertainty, the lower supplier opportunism.

H2: The higher switching cost, the lower supplier opportunism.

2.4　　　　　Interfirm Relationships

The reason why restrain opportunism is a critical issue is that opportunism could erode the long-term gains potentially accruing to both parties in a dyadic channel relationship. Governance mechanisms are tools that are used to establish and structure exchange relationships (Heide, 1994).

There are already many scholars discuss how to control supplier opportunism in industrial relationship. For instance, Stump and Heide (1996) issue eight factors that could control opportunism; Brown, Dev, and Lee (2000) examine the mechanisms of ownership, transaction-specific assets, and relationships to mitigate opportunism. In lately research on this topic, Heide, Wathne, and Rokkan (2007) add the point of microlevel social contracts as the context in which monitoring takes place and distinguish monitoring as output monitoring and behavior monitoring.

In Chinese business markets, *guanxi* lies at the heart of China's social order and is among the most important, talk about, and studied phenomena in China today (Lee & Dawes, 2005). And in high–technology markets specific asset investment could be a mechanism to guarantee and stabilize the quality of products. On the other way, specific asset investment could be a safeguard mechanism in forbidding opportunism. Therefore, this article comprises the characteristic of Chinese culture and technology-driven markets to investigate the efficacy of governance in managing marketing channel opportunism.

2.4.1　Specific asset investment

Transaction specific assets are those assets that have little or no value outside the focal exchange relationships (Williamson, 1985). According to transaction cost theory, such investment could give rise to transaction costs and combine to create "market failure", in the sense that the market mechanism becomes an inefficient means of

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mediating exchange (Williamson, 1975). The idiosyncratic investments include specific physical assets (e.g., furnishing, storage, promotional material) as well as idiosyncratic intangible assets (e.g., management procedures, specialized training, partner's brand name capital) (Vazquez, Iglesias, & Rodriguez-del-Bosque, 2007).

Suppliers and buyers often consider making specific asset investments in their channel relationships as to enhance the efficiency of their buyer channels (Vazquez, Iglesias, & Rodriguez-del-Bosque, 2007). There are three reasons for organizations to invest in transaction specific assets (Brown, Dev, & Lee, 2000): (1) transaction specific assets are more effective than generalized assets; (2) firms can also serve transaction specific asstes as a signal of honorable intentions with respect to their trading relationship, by investing their own resources to ensure their continued participation in the relationship; (3) transaction specific assets are indications of commitment which can boost confidence and obviate the need for investment to monitor or control the partner, thereby cutting channel costs. However, Williamson (1985) mentions that although such idiosyncratic investments often are deployed deliberately because of their productive nature, their limited value outside a given relationship exposes the investing party to the risk of opportunism. But on the contrary, specific asset investment could be a safeguarding mechanism against opportunism.

The aim of this article is to observer whether specific asset investments made by the partner act as a governance mechanism to eradicate or at least minimize opportunism in China high-technology markets. In technology-driven markets, sometimes suppliers have to invest idiosyncratic investments in order to achieve the specific orders, especially for the different specifications for different products. As a result, specific asset investments have already been an unspoken consensus in the channel relationship. Further, supplier investments also could act as a hostage to

discourage opportunism. Therefore, extend Brown, Dev, and Lee's (2000) research, the risk of forfeiting these idiosyncratic investments could restrain supplier malfeasance, regardless of supplier motives for investing in transaction specific assets (Brown, Dev, & Lee, 2000). In the point of view, the hypothesis is:

H3: The supplier's opportunism which the buyer perceives will be reduced the more the supplier has invested in transaction specific assets of its own.

H4: The transaction specific asset is a mediator between purchasing situation and supplier's opportunism.

2.4.2 Relationship Governance

Building on relational contracting theory (Macneil, 1980), Heide (1994) mentions relational norm is an alternative safeguard to specific asset investment against opportunism. The spirit of relational norm captures from relational exchange which accounts for the historical and social context in which transactions take place and views enforcement of obligations as following from the mutuality of interest that exists between a set of parties (Heide, 1994). Further, the relational norms emphasize the positive motivations that follow from mutually oriented behavior, and the core idea is to create a social environment, which discourage self-interested behavior in favor of mutual interest seeking (Vazquez, Iglesias, & Rodriguez-del-Bosque, 2007).

Within Chinese society, it is organized by concentrical *guanxi* circles, extending from the family to relatives, friends, and so on (Lee & Dawes, 2005). Literally, *gunaxi* is based implicitly on mutual interests and benefits (Yang, 1994) and *gunaxi* is a social connection and a synonym for special favors and obligations to the *guanxi* circle (Lee & Dawes, 2005). In China marketing relationship, *guanxi* is a major influential concept in managing marketing channel. Davies (1995) defined *guanxi* as "the social interactions within the network place and its members in the equivalent of

an infinitely repeated game with a set of people they know." In China, unlike Western, the contracts between inter-organizations are described as "marriage" which means try to match the mutual "interest" domains (Wong & Chan, 1999). Most *guanxi* ties are developed through dining and gift-giving rather than the more formal means of employing lawyers to protect the enforcement of a written contract (Wong & Chan, 1999).

In the lately research, Gao, Sirgy, and Bird (2005) suggest while buyers perceive supplier to be trusting of the buyers and while buyers perceive the supplier to be highly committed to the relationship, it could reduce buyer decision-making in organization purchasing, in other words, reduce the supplier uncertainty could minimize supplier opportunism. Although the characters of these two governance mechanisms are so different, in the real world, transaction specific asset investment and relational exchange could be used simultaneously in take advantage of their different impacts (Brown, Dev, & Lee, 2000). In Brown, Dev, and Lee's (2000) research, they already found the hotel managers should emphasize relational exchange along with ownership and hotel idiosyncratic investment. As a result of the characteristic of China market, based on the heart of China's social phenomena, mutual interests and benefits, relational norms would be more efficient than specific asset investment in minimizing the impact of opportunism. Consequently, the hypothesis is:

H5: The supplier's opportunism which the buyer perceives will be reduced the more the buyer perceives a relational exchange with its supplier.

H6: The efficacy of a relational exchange will be better than transaction specific asset investment in minimizing the supplier's opportunism.

H7: The relational exchange is a mediator between purchasing situation and supplier's opportunism.

2.4.3　Purchasing processes in China

Due to the characteristics of Chinese culture, high power distance is evident in China's pervasive centralized authority and hierarchical structures (Zhou & Chuah, 2002). In business organization, power distance is consistent with the focus on *guanxi* relationships with upper-level authorities, particularly in state-owned enterprises, and the strong hierarchical ordering (Zhao, Flynn, & Roth, 2006).

The environment, including culture and uncertainty, could influence organizational characteristics and further organization behavior (Daft, 2004). Extent to the research of purchasing behavior, Cardozo (1980) suggests that increasing level of uncertainty results in larger purchasing units and greater involvement from higher level personnel. McCabe (1987) also find a positive relationship between the level of uncertainty and centralization of purchasing decision-making and a negative relationship between uncertainty and participation. In practice, McCabe (1987) suggests that high uncertainty may find more individual involved in the same time during the decision process, but that the actual number of people exercising real decision-marking authority decreases, reflecting more hierarchical control. Furthermore, Morris, Hansen, and Pitt (1995) also claim the structure of purchasing center is a mediator between environmental turbulence and decision-making process which means the organization behavior could be influenced by the structure of purchasing center.

Therefore, referring to the feature of China business markets, the structure of purchasing center should be an influential variable in the research of purchasing behavior. This article includes two concepts of purchasing center structure, centralization and complexity, in observing the relationship between purchasing situation and opportunism. As to complexity, it refers to the degree of differentiation

between groups based on the orientation of members and the nature of tasks performed (Lau, Goh, & Phua, 1999). With regard to centralization, it's the distribution of formal control and power within an organization (Lau, Goh, & Phua, 1999). Consequently, the hypothesis is:

H8: The structure of purchasing center in China is a mediator between purchasing situation and supplier's opportunism.

H9: The higher uncertainty, the more complexity during the decision-making process.

H10: The higher uncertainty, the more centralization during the decision-marking process.
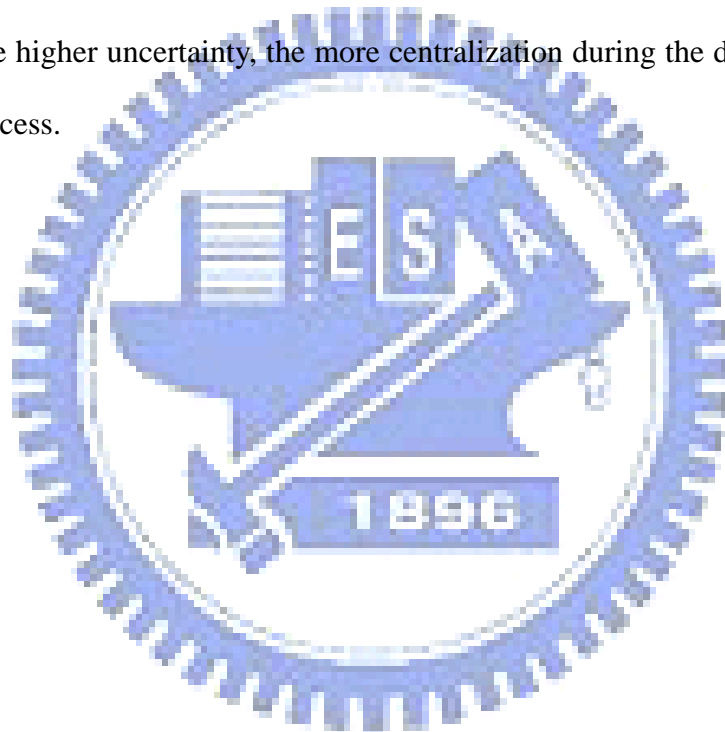
Research Method

3.1 Research Framework

According to the literature review, figure 1 is the research framework. The aim of this article is to investigate the mediate effect of interfirm relationship between managing opportunism and purchasing situational factors. This article comprises governance mechanism and features of decision-making process as the interfirm relationship to observe the efficacy of different governances.
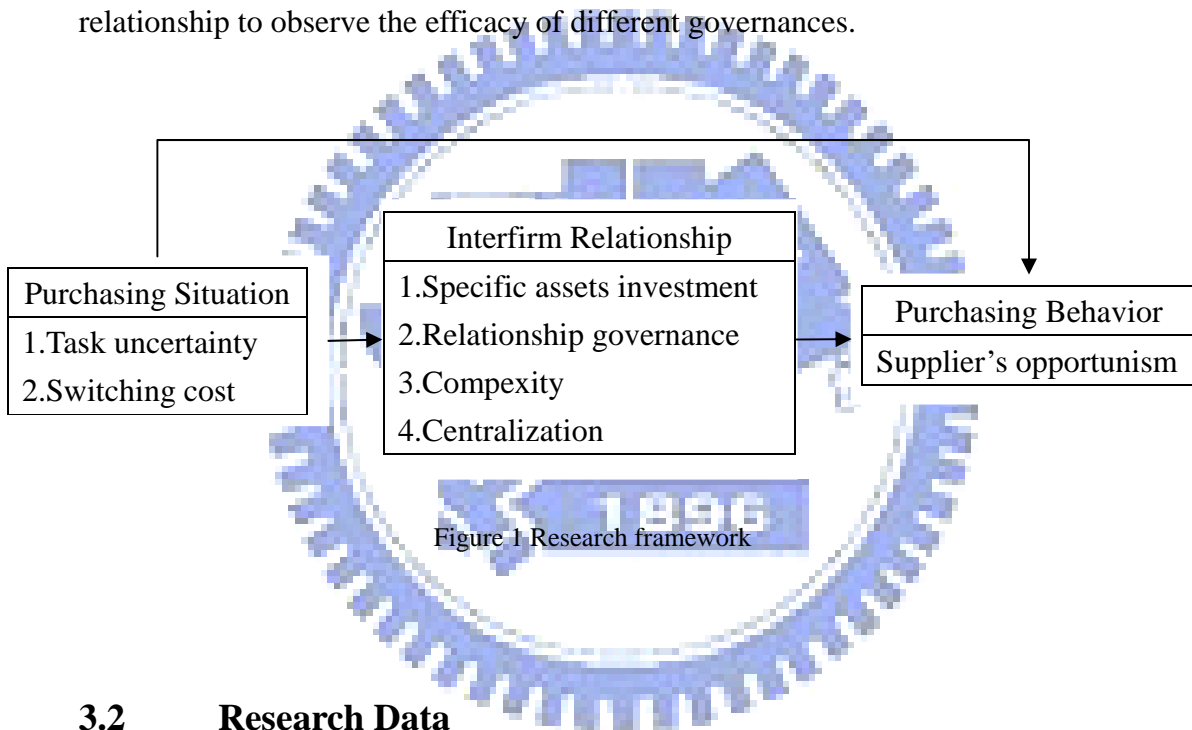
```
┌─────────────────────┐      ┌──────────────────────────┐      ┌──────────────────────┐
│ Purchasing Situation│      │ Interfirm Relationship   │      │ Purchasing Behavior  │
│ 1.Task uncertainty  │ ───> │ 1.Specific assets        │ ───> │ Supplier's opportunism│
│ 2.Switching cost    │      │   investment             │      │                      │
└─────────────────────┘      │ 2.Relationship governance│      └──────────────────────┘
                             │ 3.Compexity              │
                             │ 4.Centralization         │
                             └──────────────────────────┘
```

Figure 1 Research framework

3.2 Research Data

The hypotheses described in literature review need to be tested in a field study of organizational buyer's decision processes in high-technology markets. Because the data about organization purchasing behavior in China connector markets is hard to collect, the date of this article is from Sung (2004) and Su (2004) which they collected in 2004.

The sampling frame of their research was the member directory of Taiwan Electronic Connectors Associations and an industry annual report which was

published by Global Sources in 2004. They combined the two databases and concluded 255 connector manufacturers which are located in Taiwan, China, and Hong Kong. They randomly selected 80 firms and started the survey by mails or e-mails from March, third, 2004 to April, eighth, 2004. They investigated the purchasing representatives and engineers, because both of these positions were involved in the process of material purchase and the users of the purchase products, they had a clear and thorough understanding of the nature of the relationships among their companies and the suppliers. A total of 95 samples from 47 different firms remained in the target sample after questionnaires that included contradictions and errors are eliminated. The response rate was 58% (116/200=0.58).

3.3　　　Questionnaire Development

In the research of Sung (2004) and Su (2004), they measure their constructs using a structured questionnaire. To ensure the scale validity, the scale which they used was from prior research. The scales are certain measures which already used in previous research and were used as benchmarks for the concepts being analyzed in this field. Although the data is the same as Sung's (2004) and Su's (2004), in this article the research construct is different from theirs. Therefore, the scale of this article is described as following.

3.3.1　High-Technology Market Environment

Technology uncertainty. The scale accesses the degree of the buyer's perceived lack of information relevant to a decision situation (Bunn, 1993).

Switching cost. This scale measures the buyer's expected cost incurred in connection with locating new suppliers, as well as with developing new processes for supplier interaction (Heide & Weiss, 1995).

20

3.3.2 Interfirm Relationships

Specific asset investment. The scale describes the extent to which the supplier has made investment that are dedicated to the agreement with the connector manufacturers (Stump & Heide, 1996).

Relational norms. The scale measures the extent to solidarity, mutuality, flexibility, role integrity, and harmonization of conflict between suppliers and buyers. The scale is developed by Sung (2004) and Su (2004) and the idea of the five comprising elements is from Macneil (1980).

Complexity. The scale measures the extent of complexity of procurement activities which means the degree to which procurement activities are conducted by skilled personnel and the existence of discrete purchasing tasks performed routinely (Lau, Goh & Phua, 1999).

Centralization. The scale describes the distribution of formal control and power within an organization. Most of the items are adapted from the ones used by Lau, Goh & Phua (1999).

3.3.3 Supplier Opportunism

Supplier opportunism. This scale measures the extent to which the supplier engages in "self-interest-seeking behaviors with guile" (Williamson, 1975). The six items are adapted from the ones which already have been used by Rokkan, Heide, & Wathne (2003).

3.4 Scale Reliability

The different multi-item scales were evaluated on the basis of item-to-total correlations and the coefficient alpha. In table 1, I report each item to total correlations in each construct and the coefficient alpha reliability for each construct.

First, as a general rule of thumb, items with item-total correlation should be greater than 0.3, and scales with alpha-reliability should be greater than 0.7 (Cronbach, 1951). Then the items whose item-to-total correlations were low and whose removal increases coefficient alpha were deleted. As a result, I deleted V26 in high-technology market environment and V34 in interfirm relationships. The reliability estimates are 0.88, 0.88, and 0.85 for high-technology market environment, interfirm relationships, and supplier opportunism.

Table 1 Item-to-total correlations

High-Technology Market Environment		Interfirm relationships		Supplier Opportunism	
Coefficient alpha=0.88		Coefficient alpha=0.88		Coefficient alpha=0.85	
	Correlation with total		Correlation with total		Correlation with total
V18	0.5827	V29	0.3961	V35	0.6134
V19	0.4373	V30	0.3739	V36	0.6953
V20	0.5166	V31	0.3664	V37	0.6401
V21	0.7485	V32	0.5838	V38	0.5993
V22	0.6537	V33	0.6056	V39	0.7151
V23	0.6088	V41	0.5879	V40	0.5465
V24	0.6598	V42	0.4787		
V25	0.6543	V43	0.5426		
V27	0.5447	V44	0.5609		
V28	0.6505	V45	0.4602		
		V46	0.4839		
		V47	0.6178		
		V48	0.6344		
		V49	0.7160		
		V50	0.5902		
		V51	0.5771		

Result

4.1 Demographic Description

Table 2 is the detail of the demographic description in this data.

Table 2 Demographic description

Company		Informant	
Company ownership (%)		**Sex (%)**	
China	14	Male	48
Hong Kong	6	Female	51
Taiwan	72	**Age (%)**	
Others	6	20~29	43
Location of Headquarter (%)		30~39	40
China	14	40~49	15
Hong Kong	8	50+	1
Taiwan	70	**Education (%)**	
Others	6	Elementary-	1
Location of Purchase Center (%)		Jr. High	1
China	25	Sr. High	13
Hong Kong	12	Collage	66
Taiwan	59	Grad. School	17
Others	2	**Citizenship (%)**	
Business Model (%)		China	36
Brander	29	Hong Kong	6
OEM	44	Taiwan	55
ODM	19	Others	1
Others	6	**Department (%)**	
Number of Employees (%)		R&D	15
200-	78	Purchasing	52
200~999	4	Designing	10
1000~9999	4	Modeling	4
10000+	1	Manufacturing	6
		Others	10

In the sample of this research, almost the ownership (72%) and the headquarters (70%) of these connector manufacturer companies were from Taiwan, but almost half of the purchase center were located outside of Taiwan (only 59% located in Taiwan). This implies that more and more Taiwan companies are moving to China, due to its relative low cost of productive resources such as land and labor, huge market potential, and improving business environment (Zhao, Flynn, & Roth, 2006). Further, China citizenship in the interviews was 36%. Compared the percentage of interview citizenship and locations of purchase center, the data implies more and more local employees involved in the purchasing decision-making processes.

4.2　　　Factor Analysis

There are two parts in this section. The aim of first part is to identify the factor structure underlying each construct and report the scale reliability, coefficient alpha and composite reliability, for each construct and factors. The second part reports the result of confirmatory factor analysis to test this latent-variable model. The aim of second part is to look for evidence that these indicator variables really are measuring the underlying constructs of interest, and the model demonstrates an acceptable fit to the data.

4.4.1　　Exploratory Factor Analysis

The principal factor method is used to extract the factors, and this is followed by a varimax (orthogonal) rotation, which means the rotation results in uncorrelated components. In principal component analysis, one of the most commonly used criteria for solving the number-of-components problem is the eigenvalue-one criterion (Hatcher, 1994).

Further, the criterion of interpreting the rotated factor pattern is reported by Stevens (1986). This criterion involves identifying the variables that demonstrate high loadings for a given component. In interpreting the rotated factor pattern, an item is said to load on a given factor if the factor loading is 0.4 (Stevens, 1986) or greater for the factor, and less than 0.4 for the other. On the other hand, it's highly desired to have at least three variables loading on each retained component when the principal component analysis is complete (Hatcher, 1994).

I.   High-technology markets environment

Referring to these criterions, in the construct of high-technology markets environment, I extract one meaningful factor, technology uncertainty. Technology uncertainty factor is accounted for approximately 59% of the total variance. Although the cumulative percent of variance is only around 60%, coefficient alpha is higher than 0.80. So this should be acceptable in this scale. Questionnaire items and corresponding factor loadings are presented in Table 3.

In Table 3, seven variables loaded on technology uncertainty. In technology uncertainty, subjects who scored high on this factor feel that in the process of the purchase they could have adequate information about the suppliers, price, and quality of the product. In other words, it means there is low uncertainty in the process of the purchase. Furthermore, people who score high on this factor also feel that a high cost to develop a new relationship with a new supplier and cost a lot of effort to develop a new effectively process. In high-technology markets, high levels of technological change always results in task uncertainty and switching cost. Therefore, the factor is labeled as technology uncertainty.

Table 3 Result of principle component analysis for high-technology markets environment

Dimension	Item/attributes	Factor loading
Technology uncertainty		
V21. Which vendor to select?		0.84
V22. What quality level would be suitable?		0.79
V23. What a fair price would be?		0.79
V24.How much time in advance to schedule the order?		0.83
V25.Is the specification of the products the same as the order?		0.75
V27.Our belief was that developing procedures to deal effectively with a new supplier would take a lot of time and effort.		0.62
V28.We thought that developing working relationships with new suppliers would be a time-consuming process.		0.72
	Eigenvalue	4.109
	Proportion of the variance explained	0.59
	The cumulative variance explained	0.59
	Cronbach's α	0.88

II. Interfirm relationships

In the construct of interfirm relationships, I extract two meaningful factors. After two steps of factor analysis, I deleted V45 and V46 because of the criterion of number of items for per component at the first time, and in the second factor analysis I deleted V30 for the same reason. Questionnaire items and corresponding factor loadings are presented in Table 4.

By the principle component analysis, the factor 1 and 2 are accounted for approximately 42% and 17% of the total variance. The cumulative percent of variance is accounted for 58%. Although the cumulative percent of variance is only around 60%, each of factors is accounted for at least 10% of the total variance and coefficient alpha is higher than 0.80. So this should be acceptable in this scale.

Table 4 Result of principle component analysis for interfrim relationships

Dimension	Item/attributes	Factor loading	
		Factor 1	Factor 2
Centralization of relational governance			
V32.The approval from someone higher in the organization (including head of a department) is required for decisions related to this purchase.		0.698	0.135
V33.Instructions came from someone higher in the organization (including head of this department) when existing rules and procedures are not adequate to make a decision related to this purchase.		0.756	0.057
V41.This supplier has spent significant resources to ensure the specifications for the item fit well with our firm's productions capabilities.		0.697	0.232
V47.Staying together in the face of adversity/challenges is very important to both firms.		0.858	0.070
V48.Relationship is based on mutual benefit and trust.		0.837	0.057
V49.Relationship is flexible in accommodating one another if special problems/needs arise.		0.720	0.375
V50.Relationship extends across many complex responsibilities and multiple tasks.		0.681	0.179
V51.When disagreement arise in relationship, all facts are reassessed to try to reach a mutually satisfactory compromise.		0.714	0.113
Specific asset investment			
V29.The different procurement activities involved in this purchase are carried out by job specialists rather then generalists.		0.103	0.681
V31.The division of labor in the purchasing process is clear and well-defined.		0.045	0.673
V42.This supplier's production system has been tailored to producing the items being sold to our firm.		0.105	0.797
V43.Gearing up to deal with our firm on this item requires highly specialized tools and equipment on the part of this supplier.		0.157	0.820
V44.The procedures and routines this supplier has developed situation of our firm.		0.291	0.677
	Eigenvalue	5.406	2.161
	Proportion of the variance explained	0.415	0.166
	The cumulative variance explained	0.415	0.582
	Cronbach's α	0.90	0.80

In Table 4, eight variables loaded on centralization of relationship governance; five variables loaded on norms of specific asset investment. In the factor of centralization of relationship governance, subjects who scored high on this factor feel that the relationship with suppliers is based on trust and benefits. But while specific problems or needs arise, the relationship is flexible in accommodating each other. Furthermore, in purchasing decision-marking processes, the approval of purchasing decisions and instructions are always made by someone higher in the organization. Therefore, integrated two dimensions of Chinese culture, *guanxi* and power distance (Zhao, Flynn, & Roth, 2006), the factor is labeled as centralization of relationship governance.

On the other hand, in the factor of norms of specific asset investment, people who scored high on this factor feel that supplier has developed specific assets, such as specific procedures, routines, highly specialized tools, and equipment to gear to our firm. Furthermore, high-score factor also indicates that more specific individual or professionals involve in the purchasing decision-making processes. Due to the high levels demands of technical skills and profession, even the purchase employees also need some engineering knowledge and background in high-technology markets not to mention the specific asset investment. Therefore, because of the feature of purchasing behavior in high-technology markets, the factor is labeled as specific asset investment.

III. Supplier's opportunism

In the construct of opportunism, only one factor was extracted. The factor is accounted for approximately 58% of the total variance and the cumulative percent of variance is accounted for 58%. Questionnaire items and corresponding factor loadings are presented in Table 5.

Table 5 Result of principle component analysis for opportunism

Dimension	Item/attributes	Factor loading
Opportunism		
V35.On occasion, this supplier lies about certain things in order to protect their interests.		0.743
V36.This supplier sometimes promises to do things without actually doing them later		0.806
V37.This supplier does not always act in accordance with our contracts.		0.759
V38.This supplier sometimes tries to breach informal agreements between our companies to maximize their own benefit.		0.728
V39.This supplier will try to take advantage of "holes" in our contract to further their own interests.		0.820
V40.This supplier sometimes uses unexpected events to extract concessions from our firm.		0.680
	Eigenvalue	3.446
	Proportion of the variance explained	0.574
	The cumulative variance explained	0.574
	Cronbach's α	0.85

4.4.2 Reliability of Constructs and Indicators

In this section, I develop an acceptable measure models to look for evidence that the indicator variables really are measuring the underlying constructs of interest which I found in the exploring factor analysis, and also look for the evidence that the measurement model demonstrates an acceptable fit to the data.

The measure model describes the nature of the relationship between (a) a number of latent variables, or factors, and (b) the manifest indicator variables that measure those latent variables (Hatcher, 1994). The measure model investigated in this research consisted of four latent variables: technology uncertainty, centralization of relationship governance, specific asset investment, and supplier opportunism, which are described in Figure 2.
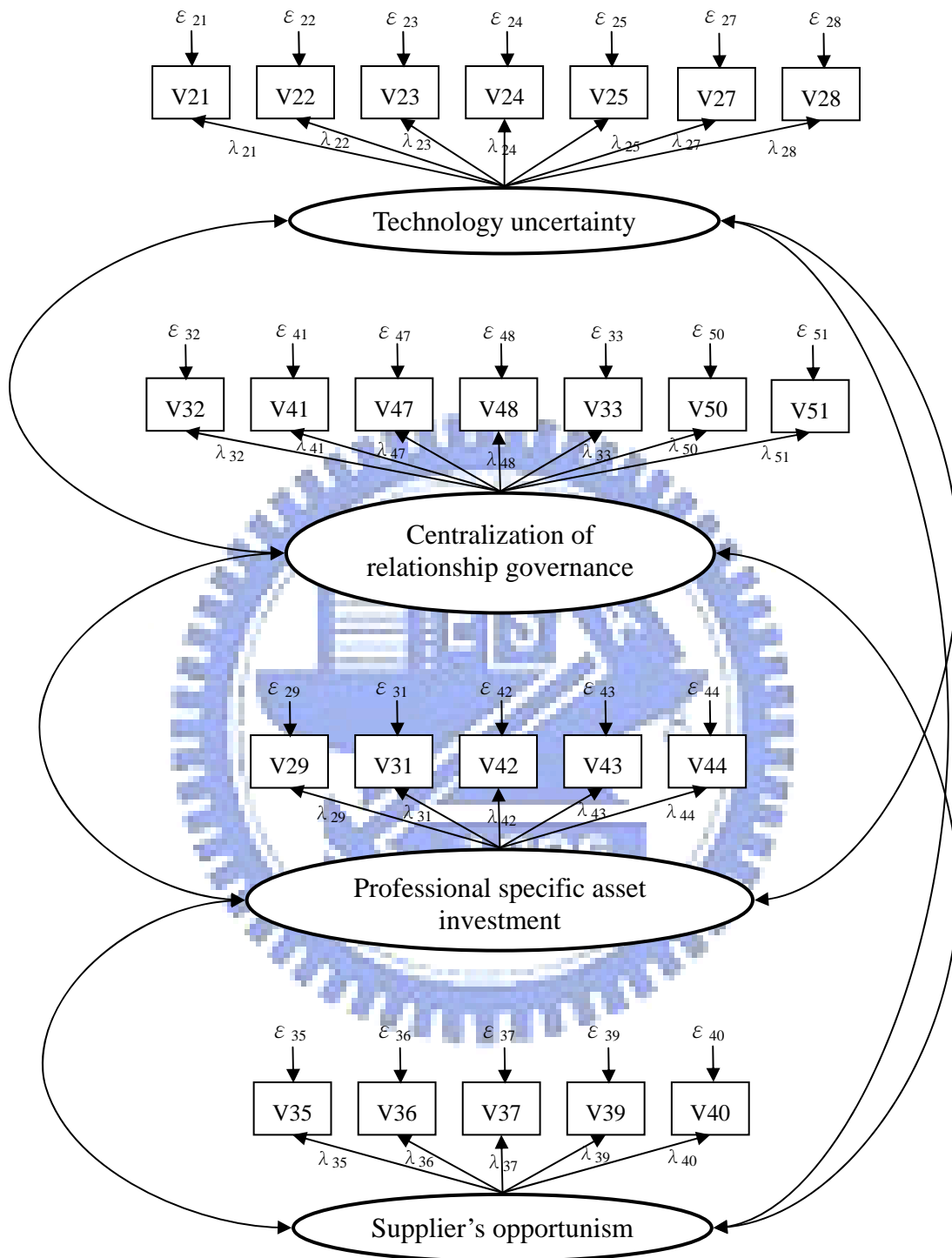
Figure 2 Measure model

The measure model posits no unidirectional paths between latent variables and instead of a covariance which is estimated to connect each latent variable with every other latent variable. In Figure 2, this is indicated by a curved, two-headed arrow

connecting each latent variable to every other latent variable. The maximum likelihood method is used in the model, and the chi-square value for the model was statistically significant, $\chi^2(293, \underline{N}=95) = 540.3338$, p<0.0001, which means the model doesn't fit the data. The chi-square/df ratio is 1.84. Due to the statistic is very sensitive to sample size and departure from multivariate normality (James, Mulaik, & Brett, 1982), the model will very often result in the rejection of a well-fitting model. For this reason, to seek a model with a relatively small chi-square value is the common practice (Hatcher, 1994), rather than necessarily seek a model with a non-significant chi-square.

To seek a model with a relatively small chi-square value, a number of other results indicated that there was in fact a problem with the model's fit. The pattern of large normalized residuals and Lagrange multiplier tests showed that the manifest indicators, V38 and V49, were complex variables. Because both of these variables were multidimensional variables, they were eliminated from the confirmatory factor analysis model in sequence. So the measure model was re-estimated.

For the revised measure model, goodness of fit indices displayed the better values. The chi-square was 480.5962, $\chi^2(269, \underline{N}=95) = 480.5962$, p<0.0001. Although the chi-square value is also significant, the revised model displayed a smaller chi-square/df ratio (1.78) then the original one (1.84). In addition, the revised model displayed a model of chi-square/df ratio was 1.78 which was also less than 2. That means the model is acceptable according to the rule of thumb (Marsh, Balla, & McDonald, 1988).

Therefore, the revised model was tentatively accepted as the research's "final" confirmatory factor analysis model, and a number of tests were conducted to assess its reliability and validity.

The reliabilities of the indicators which are the square of the factor loading,

along with composite reliability for each factor are in Table 6. According to Fornell and Larcker (1981), they suggest that composite reliability is a measure of internal consistency comparable to coefficient alpha. All four factors demonstrated acceptable level of reliability, with coefficients in excess of 0.70 (Hatcher, 1994). The formula for this composite reliability index (adapted from Fornell and Larcker [1981]) is presented here:

$$\text{Composite reliability} = \frac{(\sum L_i)^2}{(\sum L_i)^2 + \sum \text{Var}(E_i)} \qquad [1]$$

[1] where L_i = the standardized factor loading for the factor

$\quad$ Var (E_i) = the error variance associated with the individual indicator variables.

Standardized factor loadings for the indicator variables are presented in Table 6. the t-value obtained for the coefficients in Table 6 rage from 5.81 through 9.65, indicating that all factor loading were significant ($p < 0.001$). This finding provides evidence supporting the convergent validity of the indicators (Anderson & Gerbing, 1988).

The final column of Table 6 reports the variance extracted estimate for each factor which is the amount of variance that is captured by an underlying factor in relation to amount of variance due to measurement error (Fornell & Larcker, 1981). The formula appears here:

$$\text{Variance extracted} = \frac{\sum L_i^2}{\sum L_i^2 + \sum \text{var}(E_i)} \qquad [2]$$

[2] where L_i = the standardized factor loading for the factor

$\quad$ Var (E_i) = the error variance associated with the individual indicator variables.

Note that all indices exceed the 0.50 criteria recommended by Fornell and Larcker (1981), except the norms of specific asset investment factor, for which the variance extracted estimate was 0.46. Take as a group, however, the factors in the

models performed fairly well.

Table 6 Reliability of this research model

Factor	Standardized loading	t-value(a)	Reliability	Variance extracted estimate
Technology uncertainty (F4)			0.88(b)	0.52
V21	0.8322	9.6563	0.69	
V22	0.7487	8.2601	0.56	
V23	0.7285	7.9488	0.53	
V24	0.7905	8.9350	0.62	
V25	0.6874	7.3475	0.47	
V27	0.5733	5.8473	0.33	
V28	0.6745	7.1652	0.45	
Centralization of relationship governance (F2)			0.88	0.52
V32	0.6511	6.8350	0.42	
V33	0.7228	7.8538	0.52	
V41	0.6882	7.3494	0.47	
V47	0.8253	9.5195	0.68	
V48	0.8100	9.2533	0.66	
V50	0.6616	6.9783	0.44	
V51	0.6614	6.9755	0.44	
Specific asset investment (F3)			0.81	0.46
V29	0.6143	6.0813	0.38	
V31	0.5921	5.8135	0.34	
V42	0.7327	7.6207	0.54	
V43	0.7713	8.1634	0.60	
V44	0.6561	6.6042	0.43	
Opportunism (F1)			0.83	0.50
V35	0.7217	7.5760	0.53	
V36	0.7679	8.2452	0.60	
V37	0.6664	6.8208	0.42	
V39	0.7639	8.1847	0.58	
V40	0.6167	6.1833	0.37	

χ^2= 480.5962; d.f.= 269; p< 0.0001; CFI= 0.8314; NNFI= 0.8120

(a) All t tests were significant at p<0.001. (b) Denotes composite reliability.

4.4.3 Validity of Constructs

Discriminant validity is demonstrated when different instruments are measure different constructs, and the correlations between the measures of these different constructs are relatively weak (Hatcher, 1994).

With chi-square difference test, discriminant validity is demonstrated if chi-square is significantly lower for the constrained model, as this suggests that the better was the one in which the two factors were viewed as distinct (but correlated) factors (Anderson & Gerbing, 1988). For example, between F1 and F2, the unidimensional model which fixes the covariance between F1 and F2 displayed a model chi-square of 600.0765 with 270 df; the chi-square for the confirmatory factor analysis factor model was 480.5962 with 269 df. The difference in chi-square between the two models was 119.48 with 1 df. With 1 df, the critical value of chi-square is 10.828 at p=0.001. It was a clearly evidence that the difference between the two models was significant at p<0.001. This test supports the discriminant validity of F1 and F2. The result of discriminant validity for each factor is in Table 7.

In concluded, these findings generally support the reliability and validity of the factors and their indicators. The confirmatory factor analysis model performed fairly well in the analysis.

Table 7 Discriminant validity

Factor	Unconstrained Model	Constrained Model	Δdf	Δchi-square
(F1, F2)	480.5962	600.0765	1	119.4803***
(F1, F3)	480.5962	531.5227	1	50.9265***
(F1, F4)	480.5962	605.1231	1	124.5269***
(F2, F3)	480.5962	580.4987	1	99.9025***
(F2, F4)	480.5962	531.3241	1	50.7279***
(F3, F4)	480.5962	568.4337	1	87.8375***

$\chi^2(0.001, 1)=10.828$, *** p<0.001

4.3 Path Analysis

Path analysis is a well know process which researchers found for multiple equation models. Because SEM procedure needs a large sample size, I use multiple regression analysis for path analysis to make the result more stable.

Path analysis uses simple bivariate correlations to estimate the relationships in a system of structural equations and this process can estimate the strength of each relationship portrayed as a straight or curved arrow in a path diagram (Hair, Black, Babin, Anderson, & Tatham, 2006).

Figure 3 is the path diagram of this research. There are two paths through supplier opportunism. One is by the mediate effect of centralization of relationship governance; the other is specific asset investment. The numbers in the path diagram are the standardized coefficients. This model is specified by the following path equations:

Equation1: Opportunism (F1) = b_{11} Uncertainty (F1) + b_{12} Relationship (F2)

$\qquad\qquad$ + b_{13} Investment (F3) + e_1

Equation2: Relationship (F2) = b_{21} Uncertainty (F4) + e_2

Equation3: Investment (F3) = b_{31} Uncertainty (F4) + e_3

where the b's are the regression coefficients and their subscripts are the equation number and variable number (thus b21 is the coefficient in Equation 2 for the first factor, which is uncertainty).

In figure 3, specific asset investment is the highest influence on supplier opportunism, and technology uncertainty is the highest influence on centralization of relationship governance. The residual coefficients of residual variable path, which reflect unexplained variance of independent variable on dependent variable variance,

are 0.84 for specific asset investment, 0.47 for centralization of relationship governance, and 0.66 for supplier opportunism.
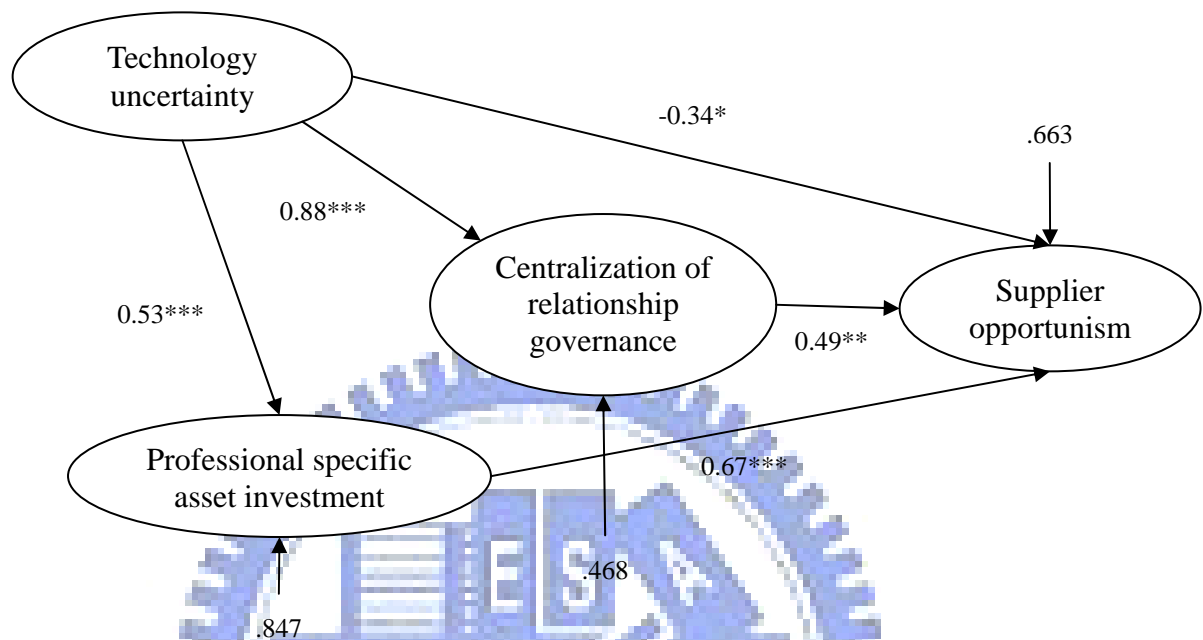

Figure 3 Research path diagram

Furthermore, technology uncertainty has a negative influence on supplier opportunism. That means in the environment of high technology uncertainty supplier opportunism which buyers perceived would be lower than in the technology certainty environment. Because of the technology heterogeneity, in the high-technology industry buyers and suppliers usually already made a long relationship. In the high level of technology uncertainty and high switching cost, companies won't want to take a risk to break the purchasing relationship. That's the reason why technology uncertainty has a negative influence on supplier opportunism.

In addition, in terms of the mediate effect of centralization relationship governance, the indirect effect of centralization relationship governance is higher than specific asset investment. Considering "supplier opportunism" as the dependent in this research model, and considering "technology uncertainty" as the independent, the

indirect effects are calculated by multiplying the path coefficients for each path from technology uncertainty to supplier opportunism:

Total effect = direct effect of uncertainty on opportunism + indirect effect of uncertainty on relationship + indirect effect of uncertainty on investment

$$0.4516^{***}=(-0.3401)^*+(0.4922)^{**}(0.8836)^{***}+(0.6720)^{***}(0.5308)^{***}$$

$$=-0.3401+0.4350+0.3567$$

Therefore, according to the research result, after adding the mediate effect, I found technology uncertainty has positive effect on both mediate variables and the total effect on supplier opportunism became positive. That means centralization of relationship governance and specific asset investment could control supplier opportunism in the high technology uncertainty environment. And centralization of relationship governance is more importance than specific asset investment.

Table 8 Path analysis

Dependent variable Standard β Independent variable	Supplier opportunism (Model 1)	Supplier opportunism (Model 2)	Centralization of relationship governance (Model 3)	Specific asset investment (Model 4)
Technology uncertainty	0.4516*** (<.0001)	-0.3401* (0.03)	0.8836*** (<.0001)	0.5308*** (<.0001)
Centralization of relationship governance		0.4922** (0.001)		
Specific asset investment		0.6720*** (<.0001)		
F-value	23.82***	38.50***	331.27***	36.47***
P-value	<.0001	<.0001	<.0001	<.0001
R-square	0.2039	0.5593	0.7808	0.2817
Adj-R	0.1953	0.5448	0.7784	0.2740

*p<0.05, **p<0.01, ***p<0.001

Conclusion

5.1　　Summary

The understanding of how to mitigate supplier opportunism is a critical issue for managers, since it may have a direct impact on the business performance of firms. The conclusions of result are following.

First, in China high-technology market, technology uncertainty has a negative influence on supplier opportunism. That means in the purchasing process if buyers have less information about the suppliers, price, and quality of the product, buyer would perceive more supplier opportunism. In addition, if it costs less to develop a new relationship with a new supplier and a new effectively process, buyer would also perceive more opportunistic behavior from their suppliers. So in this research, technology uncertainty means high level of technology uncertainty, less information that companies could control, and higher switching cost to develop a new relationship. In high technology industry, companies usually want to make a good relationship with their loyal clients especially with the bigger one. For this reason, even in the high uncertainty environment, the companies won't take a risk to break the good relationship. If they break the relationship, they need to afford the higher transaction cost, including switching cost, especially in the high uncertainty environment.

Second, this article proposed two relationship governance mechanisms, "centralization of relationship governance" and "specific asset investment". Both of these important interfirm relationship variables were combined with the characteristics of high-technology market and China culture. And they have a contextual effect on supplier opportunism and technology uncertainty.

Third, *guaxin* takes an important role in purchasing behavior and supplier

opportunism. The indirect effect of opportunism on relationship (0.4350) is higher than investment (0.3567). That means in the relationship between technology uncertainty and supplier opportunism, centralization of relationship governance has more effect on supplier opportunism.

Finally, centralization of relationship governance would be a governance mechanism to minimize supplier opportunism. In the multiple regression analysis, I found the standardized coefficient on centralization of relationship governance (0.49) is less then specific asset investment (0.67). That means centralization of relationship governance is more efficiency in managing opportunism when the purchasing situation is in highly technology uncertainty.

In conclusion, after adding the mediate effect, I found the total effect of technology uncertainty on supplier opportunism is from negative to positive. That means both governance mechanisms have important effect on supplier opportunism and they could control supplier opportunism in the high technology uncertainty environment. Among the two governance mechanisms, centralization of relationship governance is more important than specific asset investment which is the same as what China companies emphasize on, *guaxin*.

5.2 Theoretical and Managerial Implications

The findings of this article offer supplements to transaction cost theory, relational contracting theory, and the characteristics of China culture in explaining buyer-seller relationships in China high-technology market. Due to the characteristics of China culture, this article added the notion of organization and used confirmatory factor analysis to examine the factors. Therefore, this article extracted two new factors, centralization of relationship governance and specific asset investment.

The result showed centralization of relationship governance is more efficient in managing supplier opportunism. Based on relational contracting theory, Macneil (1980) claims that relational governance is shown to be the most efficient in managing interorganizational relationships. On the other hand, adding the characteristics of China culture, power distance and *guanxi,* the factor of centralization of relationship governance is consistent with the focus on *guanxi* relationships with upper-level authorities (Zhao, Flynn, & Roth, 2006).

The result has shown the technology uncertainty has more positive effect on centralization of relationships governance. Furthermore, the result is supported by McCabe (1987) which he also found a positive relationship on high level of uncertainty with centralization of purchasing decision-making.

In addition, specific asset investment has shown the higher positive effect on supplier opportunism. The result is the same as Brown, Dev, & Lee (2000) which shows that the managers should focus their efforts on building effective relational exchange with their channel partners.

With regard to managerial implications, connector manufacturers in China should emphasize relational exchange more than specific asset investment. Consist with China culture, in the process of purchasing decision-making, *guanxi* is a necessary procedure that people must go through for strangers to establish intention to conduct business with one another (Lee & Dawes, 2005) and *guanxi* has less positive effect on supplier opportunism which means *guanxi* could build up trust between buyers and sellers. Lee & Dawes (2005) claims trust and *guanxi* could maintain a long-term orientation relationship in business market to improve the transaction.

In terms of the purchasing center structure, the structure of organization should be centralized with upper-level authorities to minimize supplier opportunism while in the highly technology uncertainty environment such as when existing rules and

procedures are not adequate to make a decision related to the purchase, some higher manager should give the instructions to approach the decision-making.

5.3   Limitation and Future Studies

The article has some limitations. Due to difficulty in collecting the questionnaires, the sample size of this study is only 95 samples which not exceed five times the number of items on the questionnaires. Future studies could add more samples to improve the reliability of the results.

Second, due to all the items are taken by single source, which is from buyers, there should be common method variance in this research. Therefore, the future study should add the second source to reduce the bias in research.

Finally, because of the characteristics of China culture, the business environment in China is very different from Western, but there is still rare research taking a deep look in China. As a result, the future study should add more situation factors or characteristics to complete this field of research.

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