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Buyer and Supplier Collaboration Strategy for Development and Production in the Korean Auto Industry

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Abstract

Purpose – This paper aims to articulate determinants of inter-organizational cooperation based on to the extent to which inter-organizational tasks are related to product development and production processes.

Design/Methodology - This research conducted OLS regression analysis based on the data acquired from questionnaire survey in Korean auto industry.

Findings - Our analysis has verified that complementary and compatible resources, as well as physical and human asset specificities, positively affect inter-organizational product development cooperation. Conversely, in the production process, only complementary resources positively affect inter-organizational cooperation, whereas compatible resources and physical asset specificity have a negative influence. The changing characteristics of compatible resources (with IT innovations and AI), and physical asset specificity (influenced by a rising need to reduce production costs), cause inter-organizational cooperation in production to decrease.

Originality/value - This research attempts to expound upon these determining factors of inter-organizational cooperation by considering both complementary-compatible resources and asset specificity in product development and production simultaneously. The reason why the impact of complementary-compatible resources and asset specificity on inter-organizational cooperation is critical in understanding the determinants of inter-organizational cooperation is that the attributes of complementary-compatible resources and asset specificity in production have changed drastically due to the continuing diffusion of IT innovations and AI (Artificial Intelligence).

Keywords: Asset Specificity, Complementary-Compatible Resources, Inter-Organizational Cooperation, Korean Auto Industry, Product Development, Production
JEL Classifications: F23, L23, L62

1. Introduction

Transaction Cost Economics (TCE) has been widely recognized as the leading academic research model for identifying factors that influence inter-organizational cooperation. Additionally, TCE has noted that inter-organizational cooperation can be viewed as a hybrid organization which serves to curtail a transaction partner's opportunistic behaviors, and thus economize transaction costs (Ménard, 2004; Williamson, 1991). According to TCE, if a long-term transaction relationship is established as a safeguard against a transaction partner's opportunistic behaviors, then a medium level of asset specificity in inter-organizational cooperation can reduce transaction costs (Williamson, 1991). On the other hand, the Resource Based View (RBV) posits that since the purpose of a firm is to improve value for customers by acquiring resources, a firm will benefit from cooperating with other organizations to obtain

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those resources (Blomqvist et al., 2004; Das and Teng, 1998; Parkhe, 1991).

However, despite previous studies' contributions toward identifying determinants of inter-organizational cooperation, there has been no systematic attempt to expound upon these determining factors by considering both complementary-compatible resources and asset specificity in product development and production simultaneously. Generally, a firm aims to obtain complementary-compatible resources which cannot be acquired within their organizations, while pursuing the economization of transaction costs by adjusting their operations according to the degree of asset specificity; yet under the previous research inter-organizational cooperation has been understood through the separate use of complementary-compatible resources or asset specificity (Combs and Ketchen, 1999). The reason why the impact of complementary-compatible resources and asset specificity on inter-organizational cooperation is critical in understanding the determinants of inter-organizational cooperation is that the attributes of complementary-compatible resources and asset specificity in production have changed drastically due to the continuing diffusion of IT innovations and AI (Artificial Intelligence). These changes will be elucidated in the hypothesis section.

The purpose of this paper is to demonstrate whether compatible resources are related to product development or production can significantly alter the impact on inter-organizational cooperation. As a framework for our analysis, we will note the differences in complementary-compatible resources and asset specificity in both the product development and production processes. This paper focuses on the automotive industry as the target of research. Since an automobile is composed of more than 20,000 components, most of which require close inter-organizational cooperation to develop and produce, the auto industry is an appropriate representation for examining determinants of inter-organizational cooperation (Dyer, 1996; Sako, 1996).

2. Literature Review

Since one inter-organizational cooperation goals is to acquire reciprocally dependent resources, many studies note the importance of characteristics of the specific resources which are obtained through inter-organizational cooperation. Much of the early RBV research focused on intra-organizational resources as providing new strategic capabilities (Barney, 1991; Rumelt, 1984). In RBV, there have been various arguments pertaining to the classification of resources. According to Barney (1991), resources can be divided into physical resources, human resources, and capital resources. Hofer and Schendel (1978) classified resources into financial, physical, organizational, and technological. Miller and Shamsie (1996) differentiated between assetbased resources and knowledgebased resources, and clarified that knowledgebased resources are composed of know-how, which can be difficult to emulate. Das and Teng (1998) classified resources into complementary and compatible resources. They suggested that complementary resources can be regarded as those resources whose characteristics are idiosyncratic, possess enough rarity to result in synergy effects, and thus create new values to alliance partner whereas compatible resources are defined as those resources that can be easily replaced by knowledge without deteriorating performance due to the similarity.

A firm generally tends to acquire complementary and compatible resources which have different attributes from those possessed by a transaction partner to obtain competitive advantages. Since complementary resources stem from a variety of different resources, they may cause a firm to become dependent on a transaction partner, thus strengthening long-term inter-organizational cooperation (Bleeke and Ernst, 1991; Harrigan, 1985; Sivadas and Dwyer, 2000). Harrison et al. (1991) argued that complementary resources are more effective at improving the performance of merged firms than compatible resources. Acquisition of complementary resources can be realized through inter-organizational cooperation, which will provide a firm with opportunities to gain new abilities (Kogut and Zander, 1992). In contrast, compatible resources can be defined as those which may easily be replaced by a transaction partner's resources due to similarity between resource attributes, and can be exchanged with a minimum of difficulty (Doz, 1998; Dyer and Singh, 1998; Kale, Singh and Perlmutter, 2000). The level of needs for a firm to acquire compatible resources is one determinant of inter-organizational cooperation (Parkhe, 1991). Since compatible resources have a high level of similarity, they can be easily redeployed to other organizations and reused when current partners are replaced. The reusable and readily transferable nature of compatible resources will result in cost reduction.

The aforementioned research argues the importance of resources in acquiring competitive advantages, but it does not sufficiently grapple with the question of how complementary and compatible resources can be obtained through inter-organizational cooperation in product development and production. Therefore, this paper aims to articulate how different complementary and compatible resources affect the formation of inter-organizational cooperation in product development and production.

TCE has noted that transaction governance can reduce transaction costs by preventing a transaction partner's opportunistic behaviors (Williamson, 1985). However, since TCE has employed a dichotomous classification (i.e. market vs. hierarchic organization) for its analyses, it has been criticized for overemphasizing both the efficacy of vertical integration and the use of detailed contracts as a defensive method (Poppo and Zenger, 2002). In fact, even in a case of uncertainty and high asset specificity, it is commonly observed in many industries that numerous firms do not vertically integrate transactions, but rather continue to cooperate with transaction partners (Carter and Hodgson, 2006; David and Han, 2004; Woodruff, 2002). When a market fails, relational governance based on inter-organizational cooperation, which has been induced by long-term transactions, has played an important role as a viable alternative to vertical integration (Dyer, 1997).

In this research, we argue that asset specificity and complementary-compatible resources have to some extent, contributed to explaining why inter-organizational cooperation is formed. Despite new values created by the accumulation of complementary-compatible resources through inter-organizational cooperation, if asset specificity caused by inter-organizational cooperation increases to such an extent that a firm is trapped in a completely locked-in situation, inter-organizational cooperation cannot be continued. So far, how resources and asset specificity in product development and production affect the determinants of inter-organizational cooperation has been underexplored. The necessity of effective management of complementary-compatible resources and asset specificity are important determinants of inter-organizational cooperation in product development and production.

Since the purpose of this study is to investigate factors affecting the formation of cooperation between an auto company and its supplier, the range of inter-organizational cooperation that this paper focuses on will accordingly be limited to that which takes place between an automobile manufacturer and its supplier. The term 'inter-organizational cooperation' in this paper is defined as a systematic set of activities by which organizations cooperate to solve various problems through the mutual sharing of information and resources in order to achieve economic goals. In order to adequately explain the determinants of inter-organizational cooperation, we will divide inter-organizational tasks based on whether they relate to product development or production. Theoretical frameworks of this research are as follows.

First, we will advance our argument by classifying resources into complementary and compatible resources, and differentiating between their uses in product development and production processes. In previous research, the acquisition of complementary resources has been established as an important determinant of inter-organizational cooperation (Chung, Singh and Lee, 2000; Gulati, 1995; Stuart, 1998). These studies, however, have not analyzed how complementary resources differ between product development and production. For our research framework, we will separate complementary resources in product development from in production. Likewise, as the framework of this study, we divide compatible resources into those which relate to product development and those which relate to production. Compatible resources in product development are those which are made use of during the product development process. In the same way, compatible resources in production are those which are required to produce products.

Second, this research will classify asset specificity and transactional uncertainty into two types in the product development and production processes. TCE defines asset specificity as the degree of difficulty in redeploying assets to other partners, caused by investing heavily in assets customized to a specific transaction partner's demands. TCE has classified asset specificity into physical asset specificity, site asset specificity, dedicated asset specificity, and human asset specificity (Williamson, 1985; Ybarra and Wiersema, 1999). However, since in most cases functionally important parts suppliers are now located near auto companies in order to realize 'just-in-time delivery', site asset specificity is no longer as critically important in the auto industry as it once was. Instead, physical asset specificity and human asset specificity should be regarded as the two most important types of asset specificity for determining inter-organizational cooperation between an auto company and its suppliers. Physical asset specificity can be defined as the degree of difficulty in redeploying physical assets such as equipment, tooling, and molds, which have been highly customized for one partner, to new partners. Similarly, human asset specificity is the degree of difficulty in retraining engineers and workers to reapply highly customized skills and knowledge to new customers. Since physical asset specificity and human asset specificity affect both product development and production processes, physical asset specificity can be classified into physical product development and production asset specificities. Likewise, human asset specificity may be divided into human product development and human production asset specificities.

However, the aforementioned definition of asset specificity does not accurately reflect IT innovation which has taken place on production lines (Zaheer and Venkatraman, 1994). For instance, even if production equipment is customized for a specific customer, a firm can reuse it at a low cost due to IT innovations. Accordingly, this paper will define asset specificity as the level of difficulty in reutilizing assets to a specific customer due to high customization of assets. As transactional uncertainty may affect product development and production processes, this paper will divide transactional uncertainty into two types: transactional uncertainty in product development and production.

3. Hypothesis

The more strongly a firm attempts to obtain complementary product development resources, the more intimate inter-organizational cooperation will become. Considering that a key attribute of complementary resources is that they cannot be easily replaced by other resources, a firm could scarcely hope obtain a current transaction partner's complementary resources from a new partner (Dyer and Singh, 1998). Since a car is assembled from more than twenty thousand components, the total system of a car is very complex. Since the integrity of such a system can be achieved only by combining heterogeneous technology with 'know-how', an auto company is required to design highly orchestrated car systems by acquiring complementary resources from its supplier. Therefore, the quality of parts drawings designed by a supplier must be verified in order to ensure the stability of the entire system. When acquiring complementary resources such as specific parts technologies from its suppliers, an auto company should cooperate with its suppliers in elevating the whole performance of the automobile as one unified system.

Obtaining complementary resources in production enhances inter-organizational production cooperation. An auto company needs to make its entire assembly line more efficient by accumulating unique resources, such as assembly skills and processing technologies, used in its supplier's production line. A car is composed of numerous components with technology that may be unique to its supplier. For instance, electronic wiring technology is required in the production of electronic components, while machining technology is indispensable in producing stamping components. An auto company cannot realistically cover all kinds of production technologies. An auto company's assembly line can advance smoothly and steadily only through inter-organizational cooperation with suppliers. Therefore, obtaining complementary resources such as components processing technologies and assembly skills from suppliers will improve productivity and reduce production costs.

By understanding the conditions in which parts are used and acquiring know-how and production technologies that an auto company has developed, a supplier can reduce the production costs and ameliorate components quality. In short, while acquiring complementary production resources, an auto company and its supplier should cooperate with each other. Hypotheses 1a and 1b will be derived from the results of the analysis as follows:

> *H1a: The more a firm acquires complementary resources for product development, the more inter-organizational cooperation in product development will be enhanced.*
> *H1b: The more a firm acquires complementary resources for production, the more inter-organizational cooperation in production will be enhanced.*

Since an auto company is required to develop a complex automotive system during product development, unexpected reciprocal interferences amongst components and design errors are frequently found; therefore, product development management skills can themselves be regarded as valuable compatible resources. Therefore, as abrupt design changes often occur during product development, a firm may find it difficult to standardize management and process execution skills even when there is a highly compatible common ground between an auto company and its supplier. When unexpected problems occur, a firm is required to obtain compatible resources which are based on tacit knowledge through face-to-face contacts. When face-to-face conferences become more common, inter-organizational product development cooperation will be improved (Dyer, 1996). The acquisition of compatible resources results in inter-organizational product development cooperation.

Compared with the production process, a product development process requires a supplier to communicate much more frequently with the auto company because development involves many experiments, prototypes, and unexpected interference among components. If resources sought by both an auto company and its supplier are similar, then the auto company and its supplier will more easily obtain them (Das and Teng, 1998). Therefore, the acquisition of compatible product development resources enables a supplier to smoothly communicate with an auto company, and inter-organizational cooperation is consequently enhanced (Bensaou and Venkatraman, 1995).

On the other hand, the acquisition of compatible production resources will hamper inter-organizational cooperation. As the automobile market matures and global diffusion of IT technology accelerates, competition among companies to reduce production costs intensifies. As a result, a firm's ability to reduce production costs is a decisive factor influencing its competitive advantage. Accordingly, an increasing number of firms tend to encapsulate highly compatible resources into modules, outsourced as packages to suppliers, in order to reduce production costs. Production management skills, process execution skills and production technology can all be recognized as compatible production resources for problem solving between an auto company and its suppliers. Unlike compatible product development resources, since compatible production resources can be easily procured from other suppliers, one supplier may be easily replaced with another. Since production management and plan execution skills embedded in module components are highly compatible and can easily be procured from outside, this compatibility hampers inter-organizational production cooperation. Moreover, since highly compatible production resources can now be encapsulated into equipment and modules with the introduction of flexible factory automation and similar IT innovations, production management skills based on AI and modularization are widespread. Consequently, if a firm intends to acquire compatible production resources from a transaction partner, the need for inter-organizational learning through human exchanges will decrease due to the fact that compatible resources tend to be embedded in machines and equipment.

In addition, it is beneficial for a firm to routinize and standardize inter-organizational communication procedures in order to obtain compatible resources. As compatible production resources are easily standardized, a firm can have these incorporated into manuals which would be regarded as explicit knowledge. The acquisition of compatible production resources that increase the standardization of communication procedures may decrease the total amount of communications between firms. Once the number of communications decreases, inter-organizational production cooperation will be hindered. Therefore, acquisition of compatible resources will result in a decrease of inter-organizational production cooperation. Hypotheses 2a and 2b are derived as follows:

H2a: The more a firm tends to acquire compatible resources for product development, the more inter-organizational cooperation in product development will be enhanced.
H2b: The more a firm tends to acquire compatible resources for production, the more inter-organizational cooperation in production will be diminished.

Since human asset specificity in product development increases through investment in human skills and training, inter-organizational cooperation will increase (Dyer, 1997; Dyer and Singh, 1998; Saxton, 1997). When a firm needs to develop specifications of components for its transaction partner, it needs to make new drawings customized to the specific user. In addition to the skills and knowledge a firm has already accumulated, producing a customized drawing necessitates new types of skills and knowledge. Making a drawing based on new skills and knowledge urges a firm to invest in human assets by providing design engineers with further training. If a supplier invests substantially in human assets customized to a specific auto company, the degree of human product development asset specificity will grow. A supplier needs to share this knowledge and information with the auto company in order to implement its new human assets. As the sharing of knowledge and information during the product development process grows, inter-organizational cooperation in product development will increase. Therefore, inter-organizational cooperation in product development will emerge alongside increases in human product development asset specificity.

Optimizing a production line for a customer requires inter-organizational cooperation in production. A supplier needs to secure human resources in order to reduce production costs and improve quality for that specific customer. Highly skilled human resources can be secured by training workers and staff. Specialized training pertaining to production management skills aimed at a particular customer will result in an increase of investment in inter-organizational human assets. Production information and 'know-how' will, by necessity, be shared during this process. The increase in the sharing of production information and 'know-how' then results in the formation of inter-organizational cooperation in production. Therefore, hypotheses 3a and 3b are established as follows:

> *H3a: The higher human asset specificity of product development becomes, the more inter-organizational cooperation in product development will be enhanced.*
> *H3b: The higher human asset specificity of production becomes, the more inter-organizational cooperation in production will be enhanced.*

Experimental equipment and machines for prototypes are regarded physical product development assets. Tooling for such devices should be optimized for a particular customer in order to efficiently create and test a prototype. Once all these machines and equipment are customized, it is very difficult to redeploy them for use with another customer. Since the increase of investment in physical product development assets means a growing dependence on a specific transaction partner, this kind of behavior will gain a partner's trust (Ganesan, 1994; Yu et al., 2006). Building trust with a partner by investing in physical product development assets will encourage a firm to invest further (Narayandas and Rangan, 2004). If a supplier replaces its partner in spite of high physical product development asset specificity, the supplier will inevitably incur high transaction costs. In such circumstances, a supplier will endeavor to gratify the auto company's demands in order to sustain the transaction (Ganesan, 1994; Lui et al., 2006). Since a supplier's sincerity in meeting an auto company's requests requires the sharing of responsibility and risk concerning problem solving with an auto company, inter-organizational trust is built. Trust comes into play as a transactional governance to effectively protect physical product development assets. Therefore, increased physical product development promotes inter-organizational cooperation in product development.

As unpredictable technical problems and changes in market demands frequently occur during a product development process, a firm is required to address problems as promptly as possible. It is important for a supplier to disclose and exchange information in the product development process in order to cope with a transaction partner's demands. More frequent exchanges and disclosures of information will enhance inter-organizational cooperation in product development (Sako, 1996; Sako and Helper, 1998). Therefore, growing physical product development asset specificity will bring about the formation of inter-organizational cooperation in product development.

In contrast, the higher physical production asset specificity becomes, the less inter-organizational cooperation in production will be promoted. In states of high physical production asset specificity, a firm attempts to actively reduce production costs in order to recover financial investments in production equipment. Even if physical production asset specificity increases transaction costs, a firm must minimize the total number of its communications in order to reduce its production costs if it is to successfully respond to evolving global competition and maturing markets. One of the most effective ways of reducing communications is modularization and standardization of equipment. Therefore, high physical production asset specificity will hamper inter-organizational cooperation in production.

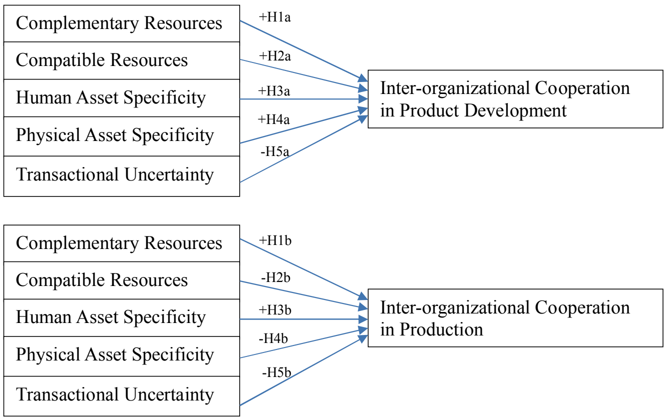
Physical production assets, such as production machines and equipment, can be classified into two types: general-purpose and special-purpose machines. A general-purpose machine has various uses, so it can be easily redeployed to produce for other customers. On the other hand, a special-purpose machine is designed for use with a particular customer. Once a special-purpose machine is implemented in production, the level of physical production asset specificity will grow. Since a special-purpose machine mass-produces a specific item without changing tooling and jigs, the more it is customized for a specific customer, the higher the productivity of the machine. Once the tooling and jigs of special-purpose machines are set up to satisfy a customer's specific needs, a firm has less need to communicate frequently with a customer in order to produce items. Consequently, if the high productivity of machines reduces production costs, the need for a supplier to actively cooperate with its customer will diminish.

Even a special-purpose machine can be redeployed to various customers as the flexibility of a special-purpose machine drastically increases due to innovations in electronic sensor technology and the development of new information technologies (Brynjolfsson and McAfee, 2011). The number of special-purpose machines regarded as FMS(Flexible Manufacturing System), which are able to flexibly cope with various customers' needs just by changing programs, amending designs, and recombining modules, is increasing significantly. Despite high production asset specificity created by investment in special-purpose machines, these machines can still be redeployed to other customers without causing a firm to incur high costs due to these drastic technological progresses. Once the flexibility of a special-purpose machine grows, even when a transaction partner terminates a contract, transaction costs will not drastically increase. Therefore, high physical production asset specificity can be clearly seen to weaken inter-organizational production cooperation. To reflect this, hypotheses 4a and 4b are as follows:

H4a: The higher physical asset specificity of product development becomes, the more inter-organizational cooperation in product development will be enhanced.
H4b: The higher physical asset specificity of production becomes, the more inter-organizational cooperation in production will be diminished.

A decrease in transactional uncertainty will result in reduced transaction costs, which will then lead to increased inter-organizational product development and production cooperation. The reasoning is as follows: first, if the transaction partners' behavioral uncertainty diminishes, then inter-organizational cooperation in product development will increase. When a transaction partner's behavior is predictable during automobile development, trust will be built. In a trustworthy environment, a supplier can disclose important transactional information about product development to an auto company without fear of being betrayed. If important transactional information is shared, then inter-organizational cooperation in product development will increase (Sako, 1996; Sako and Helper, 1998). Therefore, at a low level of transactional uncertainty, inter-organizational cooperation in product development will be expedited. All hypotheses in our research are shown in Fig. 1.

Fig. 1. Research Hypotheses



H5a: The lower the degree of transactional uncertainty, the more inter-organizational cooperation in product development will be enhanced.
H5b: The lower the degree of transactional uncertainty, the more inter-organizational cooperation in production will be enhanced.

4. Methodology

Detailed panel data on the auto industry is needed in order to test the hypotheses put forward in this research, but it is almost impossible to obtain published data for our analysis. Hence, we have used data obtained from questionnaire surveys as a means of testing our hypotheses. A linear OLS regression model was employed in order to test the hypotheses. The target of our questionnaire survey was Korean parts suppliers in the auto industry. Since the Korean auto industry has been very successful in exporting cars to newly emerging countries as well as to developed countries, it is worthwhile to investigate Korean parts suppliers concerning inter-organizational cooperation.

Prior to the questionnaire survey, we interviewed 35 directors belonging to product development and production departments of major Korean suppliers such as Hyundai Mobis, Sungwoo Hightech, and Mando, producing important functional components and chassis. The questionnaire survey was designed based on the results of our interviews with Korean suppliers. After constructing the questionnaire, we revisited more than 25 companies and asked managers to answer the questionnaires in order to confirm whether the questionnaire items properly reflect the realities faced by suppliers and to ensure that the questionnaire was well-designed. The questionnaire was corrected repeatedly in response to feedback from interviewees in order to raise the response rate. We sent questionnaires to the managers and directors of Hyundai and Kia motors suppliers in October 2011. In order to directly send questionnaires to the relevant directors and managers, we carefully investigated the point of contact for the suppliers' directors and managers. Questionnaires were administered by mail to directors and managers in the product development and production departments of 452 companies that appear in the membership directory of the Korean auto parts association. The response rate for the questionnaires was low at first, so we called and visited suppliers to collect more data. Among the 112 returned questionnaires, we found 102 responses valid for statistical analysis. The questionnaire was composed of items based on a 5-point Likert scale (1 = Not at all, 5= To a very great extent) to measure the respondents' subjective opinions.

4.1. Dependant Variables

Inter-organizational cooperation in product development and production were introduced into our regression models as dependent variables for testing our hypotheses.

4.1.1. Product Development Cooperation

Measurements of inter-organizational cooperation should estimate how closely a firm cooperates with a partner during product development and production processes. The questionnaire's items regarding product development and production processes were created by modifying Bensaou's (1997) measurements in order to estimate the extant level of inter-organizational cooperation. Inter-organizational cooperation in product development and production in the questionnaire were each composed of three respective questions whose scores were summed to form a new variable. All these questions were asked to respondents with use of a 5-point Likert scale. We operationalized the variable for inter-organizational product development cooperation (PDCOOP), as shown in items 1-3 of Table 1.

During the product development process, an auto company and its supplier may face unexpected problems caused by reciprocal interference between its own components and other suppliers' components. An auto company should share component technologies with a supplier in meetings in order to avoid reciprocal interferences. If an auto company frequently provides its supplier with technical support in meetings where inter-organizational face-to-face contacts are conducted, then inter-organizational cooperation will increase.

4.1.2. Production Cooperation

Since inter-organizational cooperation in production differs from that of product development in terms of task content, the reality of inter-organizational cooperation needs to be reflected in an item on the questionnaire measuring cooperation. In operationalizing the variable of inter-organizational production cooperation (PCOOP), we adopt Bensaou's (1997) measurement items, but modified part of them. Inter-organizational production cooperation was measured with three items and we formed a new variable by summing the scores of these items. The questions asked to respondents are found on Table 2 in the "production cooperation" column.

Table 1. Variables for Product Development and Production

Variable	Question items
Product Development Cooperation	1. Suppliers frequently work face-to-face with auto companies to achieve common goals at the design stage. 2. An auto company frequently supports its supplier by providing training and technical exchanges concerning product development. 3. In an effort towards achieving common goals, an auto company frequently provides product development technology to its supplier in meetings.
Production Cooperation	1. A supplier frequently works face-to-face with an auto company in order to achieve common goals in mass production. 2. An auto company frequently supports its supplier by providing training and technical exchanges concerning the production process. 3. In an effort towards achieving common goals, an auto company frequently provides production technologies to its supplier in meetings.
Complementary Rsources	1. During the product development process, an auto company has complementary skills which are useful for continuing our cooperation. 2. During the product development process, an auto company has abilities different from our own which can contribute to our cooperation. 3. During the product development process we engage in cooperation by contributing resources which have unique characteristics in order to achieve our common goal.
Compatible Resources	1. When development of this product ends, knowledge and technology acquired in the cooperation can be redeployed in cooperation with other customers. 2. Our company's and the transaction partner's product development engineers have similar professional and vocational skills pertaining to product development. 3. Our inter-organizational product development process has at this time many similarities with our transaction partner's product development process
Physical Asset Specificity	1. Assets are committed to physical product development. 2. Special equipment and facilities are needed in order to develop these components. 3. Special tooling and jigs for machine tools are needed in order to develop these components.

Variable	Question items
Human Asset Specificity	1. A lot of time is expended in acquiring knowledge and skills which are needed prior to product development. 2. A customer's needs and specifications have high specialty. 3. A lot of time is expended in order to correctly understand a customer's needs and specifications.
Transactional Uncertainty	1. In your next transaction, how difficult will it be to predict the changing of current product prices by a transaction partner? 2. In your next transaction, how difficult will it be to predict whether or not you can continue your contract with that transaction partner?
Integral Product System	1. To what extent does a supplier's specific component achieve its targeted function through adjustment with other suppliers? 2. To what extent do a supplier's specific components need to interface with other functionally dependent components?
Stock Ownership	Percentage of stocks owned by an auto company
Firm's Size	The number of the supplier's employees

4.2. Independent Variables

4.2.1. Complementary-Compatible Resources

We set resources as independent variables in order to test hypotheses H1a, H1b, H2a, and H2b. Since complementary resources can be divided into complementary product development and production resources, two independent variables for complementary resources to verify our theses were created. Likewise, two independent variables for compatible resources were adopted for testing hypotheses 2a and 2b. Questionnaire items for resources in product development and production processes were basically the same, but some were altered to reflect the differences between the product development and production processes.

We introduced an independent variable 'complementary resources (COMPLE)' by amending Jap and Anderson's (2003) measurement items pertaining to complementary resources. Three questions were asked to respondents in the survey in order to measure the extent to which a supplier acquires complementary resources through cooperation with an auto company, as shown in Table 1.

The measurement items for compatible production resources have basically identical contents however necessary modifications reflecting the reality of a production line were made. The contents of the questionnaire items for compatible production resources are again almost identical, except for the word 'production' being used in place of 'product development'.

In previous research, several variables were operationalized in order to estimate compatible resources. For example, Sarkar et al. (2001) measured a variable of compatible resources by whether or not inter-organizational technical ability had compatibility. Accordingly, we have introduced the compatible resources variable (COMPAT) composed of three items with some modifications both in product development and production processes needed to test our hypotheses.

4.2.2. Asset Specificity

We have also operationalized human asset specificity (HUSPEC) in product development and production processes as needed to test hypotheses H4a and H4b (Bello and Lohtia,1995). Likewise, this research creates a variable for physical asset specificity in the same way. In this paper, measurements concerning asset specificity were employed with slight modifications for use in our analysis. This measurement has many similarities to previous research (David and Han, 2004; Kumar et al., 1995; Poppo and Zenger, 2002). Human asset specificity was respectively operationalized via three items for product development and production processes. Similarly, physical assets can be classified into physical product development and production assets. Physical asset specificity (PHYSPEC) both in product development and production, were operationalized with some modifications to concord with the reality of product development and production processes.

4.2.3. Transactional Uncertainty

Transactional uncertainty is an important determinant affecting a firm's actions to reduce transaction costs (Anderson and Schmittlein, 1984; John and Weitz, 1988; Walker and Weber, 1984). When it is very difficult to predict a transaction partner's behaviors, transactional uncertainty increases. This study operationalized transactional uncertainty (UNCERT) by modifying Zaheer and Venkatraman's (1995) and Poppo et al. (2008)'s measurements.

4.3. Control Variables

4.3.1. Integral Product System

Whether a supplier is required to cooperate with an auto company depends on the design of the component system a supplier aims to develop. If component development needs close functional adjustments between an auto company and its supplier due to a highly integral product system, a supplier is obliged to organize a task team with an auto company in order to elevate the component system's integrity (Ulrich, 1995). In this case, inter-organizational cooperation between an auto company and its supplier will necessarily increase. Conversely, a supplier does not need to closely cooperate with an auto company to develop highly standardized components such as tires or batteries. Two questions were asked to respondents, as shown in Table 1.

4.3.2. Stock Ownership

If an auto company owns some of its supplier's stocks and forms a financial alliance, then inter-organizational cooperation will increase. Once an auto company possesses a supplier's stock, it tends to continue a contract with that supplier. Therefore, it is highly likely that trust will be built in a long-term transaction. Trust will then further enhance inter-organizational cooperation. If a supplier whose stocks are owned by an auto company faces technical problems or financial difficulties, an auto company will be inclined to preferentially provide it with technical or financial support. In addition, stock owned by an auto company may make a supplier a financial hostage to an auto company. Possessing certain amounts of a supplier's stock gives an auto company the power to influence its supplier's decision-making process, and can then prevent it from engaging in opportunistic behaviors. Therefore, we have introduced 'stock ownership' (STOCK) into our models as a control variable. As a way of measuring STOCK, we have used the percentage of supplier's stock which an auto company possesses.

4.3.3. Firm Size

In attempting to initiate a transaction with an auto company, a supplier needs to possess human resources and technology. Generally, compared with small and medium size companies, a large company tends to have more human resources and technologies available in inter-organizational cooperation. Therefore, a firm's scale is an important control variable which may affect inter-organizational cooperation. There are several ways of measuring a firm's size, but we have adopted the number of employees as our method of estimation. If the number of a supplier's employees is great, then the number of engineers and workers involved in inter-organizational cooperation will also naturally be higher. When many employees are involved in product development and production processes, inter-organizational cooperation will increase.

4.4. Interaction between Asset Specificity and Uncertainty

Williamson (1991) insists that under a safeguard such as a long-term transaction and a medium level of asset specificity, inter-organizational cooperation should be enhanced. When transactional uncertainty is lowered through a long-term transaction, a firm will cooperate with its transaction partner counting on the safety of the transaction even when asset specificity grows to some extent. This implies that transactional uncertainty and asset specificity might have some interactions if these two variables are put into a regression model. Therefore, we created two variables measuring interactions between human asset specificity and transactional uncertainty (HUSPEC*UNCERT), and between physical asset specificity and transactional uncertainty (PHYSPEC*UNCERT), in order to determine whether there is a strong interaction between asset specificity and transactional uncertainty. According to our research framework, human asset specificity and physical asset specificity may differ between the product development and production processes. Therefore, these four interaction variables were considered in the regression analyses.

5. Analysis

The regression models for testing the hypotheses of this research were classified into product development and production models as follow:

1. $PDCOOP = a + b_1COMPLE + b_2COMPAT + b_3HUMSPEC + b_4PHYSPEC + b_5UNCERT + b_6HUMSPEC*UNCERT + b_7PHYSPEC*UNCERT + b_8STOCK + b_9INTEG + b_{10}SIZE$
2. $PCOOP = c + d_1COMPLE + d_2COMPAT + d_3HUMSPEC + d_4PHYSPEC + d_5 UNCERT + d_6HUMSPEC*UNCERT + d_7PHYSPEC*UNCERT + d_8STOCK + d_9 INTEG + d_{10} SIZE$

Tables 2 and 3 present descriptive statistics and correlation matrixes for the study variables. We were concerned that there might be multicollinearity problems among the independent variables, but VIF scores indicating multicollinearity were almost certainly low enough to be dismissed. All correlations between the independent variables are less than 0.37, with only two correlations being greater than 0.30 (COMPAT and INTEG in Table 3, PHYSPEC and UNCERT in Table 4).

To address the issue of inflated magnitude of interaction effects, we entered mean-centered independent variables before creating the interaction terms. All independent variables were put into regression models. A linear regression model was used for analysis because there was no reason to assume a non-linear relationship among the variables. The use of a linear model was later justified by an examination of the residual distribution, which indicated no problems with serial correlation. The results show that our models were reasonably effective at predicting a supplier's cooperation as demonstrated by adjusted R square scores which were significant at the p <0.01 level.

Table 2. Correlation Matrix for Inter-Organizational Cooperation in Product Development

	Mean	S.D	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) PDCOOP	8.61	3.34	1								
(2) COMPLE	9.76	2.72	.51***	1							
(3) COMPAT	10.56	3.52	.31***	.18*	1						
(4) HUSPEC	10.32	2.97	.43***	.18*	-.01	1					
(5) PHYSPEC	8.54	4.40	.30***	.00	-.03	.06	1				
(6) UNCERT	8.40	1.35	-.23**	-.21**	.06	-.27***	-.10	1			
(7) INTEG	5.64	2.35	.25**	.12	.33***	.19*	.03	-.10	1		
(8) STOCK	.49	2.86	.06	.03	-.18*	-.10	-.06	.02	-.06	1	
(9) SIZE	747.75	715.5	.02	.06	.19*	-.02	-.17*	.07	.12	-.03	1

Note: * Significant at $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3. Correlation Matrix for Inter-Organizational Cooperation in Production

	Mean	S.D	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) PCOOP	8.50	3.14	1								
(2) COMPLE	3.72	1.18	.27***	1							
(3) COMPAT	8.01	2.40	-.50***	-.11	1						
(4) HUSPEC	6.37	2.39	.01	.04	.04	1					
(5) PHYSPEC	6.13	3.92	-.51***	-.02	.26***	.10	1				
(6) UNCERT	3.45	1.78	-.23**	-.04	.11	.01	.36***	1			
(7) INTEG	5.64	2.35	.29***	-.03	-.24**	-.11	-.23**	-.24**	1		
(8) STOCK	.49	2.86	.23**	.10	-.12	.04	-.11	.11	-.06	1	
(9) SIZE	747.75	715.46	.01	-.05	-.05	.09	.10	.04	.14	-.08	1

Note: * Significant at $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Hierarchical Regression Analysis for Determinants of Inter-Organizational Cooperation in Product Development

Inter-Organizational Cooperation in Product Development (Dependent variable)	Model 1	Model 2	Model 3
INTEG	.25**	.06	.09
STOCK	.05	.11	.11
SIZE	.01	.01	.02
COMPLE		.39***	.36***
COMPAT		.22***	.21***
HUSPEC		.34***	.33***
PHYSPEC		.29***	.27***
UNCERT		-.03	-.11
HUSPEC*UNCERT			.13
PHYSPEC*UNCERT			-.09
R square	.07	.52	.54
Adjusted R square	.04	.48	.49
F value	2.30*	12.67***	10.70***

Note: * Significant at $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Hierarchical Regression Analysis for Determinants of Inter-Organizational Cooperation in Production

Inter-Organizational Cooperation in Production (Dependent variable)	Model 4	Model 5	Model 6
INTEG		.12	.12
STOCK		.07	.07
SIZE		-.01	-.01
COMPLE	.29***	.23***	.21***
COMPAT	.15	-.34***	-.34***
HUSPEC	-.03	.06	.07
PHYSPEC		-.38***	-.36***
UNCERT		-.03	-.03
HUSPEC*UNCERT			-.04
PHYSPEC*UNCERT			-.03
R square	.11	.48	.48
Adjusted R square	.08	.44	.43
F value	3.98***	10.75***	8.49***

Note: * Significant at $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6. Hierarchical Regression Analysis based on Pooled Data for Determinants of Inter-Organizational Cooperation

Inter-Organizational Cooperation (Dependent variable)	Model 4	Model 5	Model 6
INTEG		.19**	.19**
STOCK		.13	.10
SIZE		-.05	-.05
COMPLE	.31***	.37***	.33***
COMPAT	.12	.16*	.16*
HUSPEC	-.02	.27***	.29***
PHYSPEC		-.03	-.05
UNCERT		-.16*	-.16*
HUSPEC*UNCERT			-.10
PHYSPEC*UNCERT			-.16*
R square	.11	.43	.46
Adjusted R square	.08	.38	.40
F value	3.94**	8.70***	7.64***

Note: * Significant at $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

We separated the results of statistical analyses into Tables 4 and 5 because the dependent variable of Table 4 was inter-organizational cooperation in product development, and that of Table 5 was inter-organizational cooperation in production. In order to confirm whether independent variables were fit to be included in our regression analyses, we conducted hierarchical regression analyses. Compared to Models 1 and 4, in which only control variables were introduced into regressions, Model 2 in 5, in which independent variables were included with control variables, have significantly improved adjusted R squares, as shown in Tables 4 and 5. This demonstrated that the fitness of models improved significantly by including independent variables into the regression models. Hence, independent variables are proper variables to be introduced into the regression analyses. Models 3 and 6 were established to show whether independent variables concerning inter-organizational cooperation in product development and production have a significant effect, even after interaction terms are put into an equation.

Table 4 demonstrates the results of the regression analyses in the product development process. Looking into the results of the analysis, we find that independent variables in the product development process have significant effects ($p< 0.01$ level) on dependent variables. The result was identical to what we hypothesized. As previously mentioned, according to TCE, there might be some interaction effects between asset specificity and transactional uncertainty.

The evidence of our analyses clearly shows that hypotheses H1a and H1b are statistically supported ($p<0 .01$ level). Therefore, it is evident that the more a firm intends to obtain complementary resources in product development and production, the more inter-organizational cooperation in product development and production will increase. Furthermore, data analyses prove that hypotheses H2a and H2b pertaining to compatible resources in product development and production are statistically significant. This demonstrates that compatible resources in product development are a determinant of increasing inter-organizational cooperation, whereas compatible resources in production negatively affect inter-organizational cooperation.

Concerning human asset specificity, hypothesis H3a is statistically accepted, while H3b is not. This result demonstrates that human asset specificity has a significant effect on inter-organizational cooperation in product development rather than in production. Due to unpredictable technical problems a supplier may encounter during the product development process, inter-organizational learning through human exchanges and contact are extremely important in solving problems in the product development process, whereas it is not so critical in production due to the significant progresses of IT technologies and AI.

In relation to physical asset specificity, hypotheses H4a and H4b are also statistically supported. As our hypotheses proposed, physical product development asset specificity expedites inter-organizational product development cooperation, while physical production asset specificity hampers inter-organizational production cooperation.

Contrary to our expectations, hypotheses H5a and H5b, which dealt with transactional uncertainty were statistically insignificant. Consequently, we found that transactional uncertainty was not a decisive factor influencing inter-organizational cooperation, even if independent variables demonstrated positive signs as we theorized. Also, none of the interaction terms introduced into the regression models were found to be statistically significant. This indicates that the interaction between asset specificity and transactional uncertainty is, in fact, negligible.

Finally, we created regression models based on pooled data by the summation of inter-organizational cooperation data in product development and production as shown in Table 6. In the pooled models, the sign of complementary resources is positive and statistically significant, whereas that of compatible resources is positive but statistically significant only at the $p<0.1$ level. Additionally, human specific assets are positive and statistically significant.

6. Discussion and Conclusion

The results of our analysis have verified that complementary and compatible resources, as well as physical and human asset specificities, positively affect inter-organizational cooperation in product development. Conversely, in the production process, only complementary resources positively affect inter-organizational cooperation, whereas compatible resources and physical asset specificity have a negative influence on inter-organizational cooperation. The results of our research make contributions to the relevant academic research on the determinants of inter-organizational cooperation as follows.

First, in the presence of high physical-human asset specificities and complementary-compatible resources, inter-organizational cooperation in product development will increase. Therefore, it seems clear that complementary and compatible resources are two key determinants that influence inter-organizational cooperation in product development. In addition, we see that physical and human asset specificities are equally decisive factors that affect inter-organizational product development.

Moreover, if a firm's need for product development resources is high enough to continue inter-organizational cooperation, even at a low level of product development asset specificity, a firm will be motivated to cooperate with its transaction partner. In cases where the acquisition of specific resources determines a firm's competitive advantage, a firm will actively engage in obtaining resources through inter-organizational cooperation in product development. TCE argues that at a low level of asset specificity, a firm will discontinue inter-organizational product development cooperation. However, the results of this research clearly show that despite not incurring transaction costs from low asset specificity, if the firm needs to obtain product development resources, inter-organizational cooperation will continue.

Additionally, in cases where a low need for product development resources coexists with high asset specificity (which may cause a firm to incur additional transaction costs), a firm still tends to cooperate with its transaction partner as best it can. RBV asserts that at a low level of demand for product development, inter-organizational cooperation will decrease. However, the results of our analysis expressly demonstrate that if product development asset specificity is high, then a firm may still cooperate with its transaction partner, despite a low need for product development resources, without fear of incurring additional transaction costs.

A low level of need for product development resources and low product development asset specificity will not promote inter-organizational cooperation. A low need for product development resources will discourage a firm to cooperate with its transaction partner. Also, in cases of low asset specificity, it is unlikely that a firm will incur transaction costs. Consequently, in this situation a firm tends to resort to the open market.

Second, since complementary and compatible resources, as well as physical asset specificity, can factor into an explanation of how inter-organizational production cooperation is formed, resources and asset specificity adequately explain determinants of inter-organizational cooperation. As the characteristics of resources have been changing due to IT innovations and AI, inter-organizational cooperation in production has tended to gradually decline despite a high level of need for compatible production resources. Additionally, IT innovations and AI have brought about huge changes in physical production asset specificity, and thus have reduced transaction costs. Since in production not only transaction costs but also production costs are important, a firm tends to cooperate with its transaction partner so as to reduce production costs, even when a high level of production asset specificity exists. The results of this research show that owing to attributes of compatible resources and physical asset specificity in production caused by the ever-increasing importance of production cost reduction in severe international competition, inter-organizational cooperation in production drastically decreases in order to reduce production costs by reducing the overall number of communications. Therefore, it is necessary to explain the determinants of inter-organizational production cooperation based on the premise of production cost reduction. In the following section, we will review how complementary and compatible production resources, as well as physical production asset specificity, influence inter-organizational cooperation in production.

When compatible resources and physical asset specificity in production are low despite a high need for complementary resources, inter-organizational cooperation will be established. Unlike RBV, which posits that all resources needed for gaining competitive advantages promote inter-organizational cooperation, our research shows that whether inter-organizational cooperation will be enhanced or not depends on the characteristics of the tasks (i.e. product development vs. production). If a firm needs complementary resources in production for obtaining competitive advantages, inter-organizational cooperation will be enhanced. Contrariwise, even though a firm may acquire compatible resources from its transactional partner, inter-organizational cooperation in production will continue to decrease.

Inter-organizational cooperation will depend upon physical asset specificity, as well as on whether the characteristics of resources are complementary or compatible in production. A high need for complementary resources will encourage a firm to cooperate, whereas a high need for compatible resources will hinder inter-organizational cooperation in production. Therefore, when complementary and compatible resources strike a balance between encouraging and discouraging cooperation, the resultant level of physical asset specificity will determine inter-organizational cooperation. In this case, a low level of physical asset specificity will be a decisive factor encouraging inter-organizational cooperation, but under high physical asset specificity, inter-organizational cooperation in production will not be promoted. Since even at a high level of physical asset specificity a firm needs to reduce production costs in order to gain competitive advantages, it will minimize the total number of communications in production by adopting special-purpose machines. As a result, inter-organizational cooperation in production will decrease. Additionally, as advancing IT innovations and AI technologies allow special-purpose machines to become more flexible and able to meet the demands of multiple customers, transaction costs will continue to gradually decrease regardless of high physical asset specificity in production. Therefore, inter-organizational cooperation is deeply dependent upon the attributes of resources.

At high levels of physical asset specificity, the extent to which complementary and compatible resources are employed will influence inter-organizational production cooperation. If the need for complementary production resources is higher than those for compatible resources under high physical production asset specificity, then inter-organizational cooperation will increase. Additionally, under conditions of high physical production asset specificity, low complementary, and high compatible production resources, inter-organizational cooperation will be hindered.

There are two issues raised in this research both explicitly and implicitly, which will require further investigation outside of this paper in order to provide a fuller context for our results. These subjects are as follows. First, since this research does not directly estimate transaction costs or production costs, it is necessary to examine how transaction costs and production costs directly influence inter-organizational cooperation. Second, since the cooperation style in product development may differ from one in production due to differing determinants of inter-organizational cooperation, we must investigate these different styles of cooperation. If inter-organizational cooperation styles differ between product development and production processes, then this may explain why, in several industries product development is conducted in-house while production is outsourced.

References

Anderson, E. and C. Schmittlein (1984), "Integration of the Sales Force: An Empirical Examination", *The RAND Journal of Economics*, 15(3), 385-395.

Barney, B. (1991), "Firm Resources and Sustained Competitive Advantage", *Journal of Management,* 17, 99-120.

Bello, C. and R. Lohtia (1995), "Export Channel Design: The Use of Foreign Distributors and Agents", *Journal of the Academy of Marketing Science*, 23(2), 83-93.

Bensaou, M. (1997), "Inter-organizational Cooperation: The Role of Information Technology an Empirical Comparison of U.S. and Japanese Supplier Relations", *Information Systems Research*, 8, 107-124.

Bensaou, M. and N. Venkatraman (1995), "Configurations of Interorganizational Relationships: A

Comparison between U.S. and Japanese Automakers", *Management Science*, 41(9), 1471-1492.

Bleeke, J. and D. Ernst (1995), "Is your Strategic Alliance really a Sale?", *Harvard Business Review*, 73, 97-105.

Blomqvist, K., H. Veikko, J. Koivuniemi and T. Äijö (2004), "Towards Networked RandD Management: the RandD Approach of Sonera Corporation as an Example", *RandD Management*, 34(5), 591-603.

Brynjolfsson and McAfee (2012), *Race Against The Machine : How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*, Cambridge, MA: The MIT Center for Digital Business.

Carter, R. and M. Hodgson (2006), "The Impact of Empirical Tests of Transaction Cost Economics on the Debate on the Nature of the Firm", *Strategic Management Journal*, 27(5), 461-76.

Chung, S., H. Singh and K. Lee (2000), "Complementarity, Status Similarity and Social Capital as Drivers of Alliance Formation", *Strategic Management Journal*, 21, 1-22.

Combs, J. and D. Ketchen (1999), "Explaining Interfirm Cooperation and Performance: Toward a Reconciliation of Predictions from the Resource-based View and Organizational Economics", *Strategic Management Journal,* 20(9), 867-888.

Das, K. and B. Teng (1998), "Between Trust and Control: Developing Confidence in Partner Cooperation in Alliances", *Academy of Management Review*, 23, 491-512.

David, J. and K. Han (2004), "A Systematic Assessment of the Empirical Support for Transaction Cost Economics", *Strategic Management Journal*, 25(1), 39-58.

Doz, Y. (1998), "The Evolution of Cooperation in Strategic Alliances: Initial Conditions or Learning Processes?", *Strategic Management Journal*, 17, 55-83.

Dyer, J. (1996), "How Chrysler Created an American Keiretsu", *Harvard Business Review,* July-August, 2-11.

Dyer, J. (1997), "Effective Interfirm Collaboration: How Firms Minimize Transaction Costs and Maximize Transaction Value", *Strategic Management Journal*, 18(7), 535-556.

Dyer, J. and H. Singh (1998), "The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage", *Academy of Management Review,* 23(4), 660-679.

Ganesan S. (1994), "Determinants of Long-Term Orientation in Buyer–Seller Relationships", *Journal of Marketing,* 58, 1-19.

Gulati, R. (1995), "Does Familiarity Breed Trust? The Implications of Repeated Ties for Contractual Choice in Alliances", *Academy of Management Journal,* 38(1), 85-112.

Harrigan, R. (1985), *Strategies for Joint Ventures,* Lexington, MA: Lexington Books.

Harrison, J., M. Hitt and R. Hoskisson (1991), "Synergies and Postacquisition Performance: Differences versus Similarities in Resource Allocations", *Journal of Management,* 17(1), 173-190.

Hofer, W. and D. Schendel (1978), *Strategy Formulation: Analytical Concepts.* St. Paul, MN: West Publishing Company.

John, G. and B. Weitz (1988), "Forward Integration into Distribution: An Empirical Test of Transaction Cost Analysis", *Journal of Law, Economics and Organization*, 4 (Fall), 337-355.

Kale, P., H. Singh and H. Perlmutter (2000), "Learning and Protection of Proprietary Assets in Strategic Alliances: Building Relational Capita", *Strategic Management Journal,* 21(3), 217-237.

Kogut, B. and U. Zander (1992), "Knowledge of the Firm, Combinative Capabilities and the Replication of Technology", *Organization Science,* 3, 383-397.

Kumar, N., K. Scheer and J. Steenkamp (1995), "The Effects of Perceived Interdependence on Dealer Attitudes", *Journal of Marketing Research*, 32 (August), 348-358.

Lui, S., H. Ngo and H. Hon (2006), "Coercive Strategy in Interfirm Cooperation: Mediating Roles of Interpersonal and Interorganizational Trust", *Journal of Business Research*, 59, 466-474.

Ménard, C. (2004), "The Economics of Hybrid Organization", *Journal of Institutional and Theoretical*

Economics,160, 345-376.

Miller, D. and J. Shamsie (1996), "The Resourcebased View of the Firm in Two Environments: The Hollywood Film Studios From 1936–1965", *Academy of Management Journal,* 39 (3), 519-543.

Narayandas, D. and K. Rangan (2004), "Building and Sustaining Buyer–Seller Relationships in Mature Industrial Markets", *Journal of Marketing*, 68, 63-77.

Parkhe, A. (1991), "Interfirm Diversity, Organizational Learning, and Longevity in Global Strategic Alliances", *Journal of International Business Studies*. 22(4), 579-601.

Poppo, L. and T. Zenger (2002), "Do Formal Contracts and Relational Governance Function as Substitutes or Complements?", *Strategic Management Journal*, 23, 707-725.

Poppo, L., K. Zhou, S. Ryu, S. Carson, A. Madhok and T.Wu (2006), "Uncertainty, Opportunism, and Governance: the Effects of Volatility and Ambiguity on Formal and Relational Contract", *Academy of Management Journal*, 49, 1058-1077.

Rumelt, P. (1984), Towards a Strategic Theory of the Firm. In B. Lamb (Ed.), *Competitive Strategic Management* (556–570), Englewood Cliffs, NJ: Prentice-Hall.

Sako, M. (1996), "Suppler Associations in the Japanese Auto Industry: Collective Action for Technology Diffusion?", *Cambridge Journal of Economic*, 20(3), 651-667.

Sako, M. and S. Helper (1998), "Determinants of Trust in Supplier Relations: Evidence from the Automotive Industry in Japan and the United States", *Journal of Economic Behavior and Organization*, 34, 387-417.

Sarkar, B., R. Echambadi, T. Cavusgil and S. Aulakh (2001), "The Influence of Complementarity, Compatibility, and Relationship Capital on Alliance Performance", *Journal of the Academy of Marketing Science*, 29(4), 358-373.

Saxton, T. (1997), "The Effects of Partner and Relationship Characteristics on Alliance Outcomes", *Academy of Management Journal*, 40, 443-461.

Sivadas, E. and R. Dwyer (2000), "An Examination of Organizational Factors Influencing New Product Success in Internal and Alliancebased Processes", *Journal of Marketing,* 64(1), 31-49.

Stuart, E. (2000), "Interorganizational Alliances and the Performance of Firms: A Study of Growth and Innovation Rates in a High Technology Industry", *Strategic Management Journal*, 21, 791-811.

Ulrich, K. (1995), "The Role of Product Architecture in the Manufacturing Firm", *Research Policy,* 24, 419-440.

Walker, G. and D. Weber (1984), "A Transaction Cost Approach to Make-orbuy Decisions", *Administrative Science Quarterly*, 29(3), 373-391.

Williamson, O. (1985), *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting,* New York, NY: Free Press.

Williamson, O. (1991), "Comparative Economic Organization: The Analysis of Discrete Structural Alternatives", *Administrative Science Quarterly*, 36(2), 269-296.

Woodruff, C. (2002), "Non-Contractible Investments and Vertical Integration in the Mexican Footwear Industry", *International Journal of Industrial Organization*, 20(8), 1197-1224.

Ybarra, Y. and M. Wiersema (1999), "Strategic Flexibility in Information Technology Alliances: The Influence of Transaction Cost Economics and Social Exchange Theory", *Organization Science*, 10, 439-459.

Yu, M., J. Liao and D. Lin (2006), "Formal Governance Mechanisms, Relational Governance Mechanisms, and Transaction-Specific Investments in Supplier–Manufacturer Relationship", *Journal of Industrial Marketing Management,*35, 128-139.

Zaheer, A. and N. Venkatraman (1994), "Determinants of Electronic Integration in the Insurance Industry: An Empirical Test", *Management Science*, 40, 549-566.