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Effects of Environmental Uncertainty on Interfirm Governance Mechanisms: The Moderating Role of Structural Holes

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Abstract

Purpose: Manufacturers rely on interfirm governance mechanisms to reduce the risks inherent in uncertain environments; however, it is unclear which governance mechanisms are developed to manage relationships with suppliers. This study sought to enhance knowledge of how environmental uncertainty affects interfirm governance mechanisms under conditions reflecting varying levels of structural holes. To this end, the study investigated the relationships between manufacturers and major first-tier and sub-suppliers. In particular, the moderating effect of structural holes is examined. **Research design, data and methodology:** A questionnaire survey was conducted with a major first-tier supplier of a Korean engineering firm. Proposed hypotheses were tested using structural equation modeling. **Results:** The results show that while the relationship between environmental uncertainty and unilateral governance is positive but statistically insignificant, with bilateral governance is negative and statistically significant. The study also demonstrates that when structural holes are considered, the effects between environmental uncertainty and governance mechanisms are attenuated. **Conclusions:** This study suggests some theoretical and managerial contributions between exchange partners, especially, the results suggest that structural holes have a critical competitive advantage in uncertain environments. Therefore, manufacturers should carefully consider how they deal with environmental uncertainty when they make a business decision under structural holes situations.

Keywords : Structural Hole, Environmental Uncertainty, Governance Mechanism, Unilateral Governance Mechanism, Bilateral Governance Mechanism

JEL Classification Code : C42, D3, D81, D83

1. Introduction

Manufacturers in uncertain environments (e.g., parts supply uncertainty, supply shortages, fluctuations in raw material prices) find it difficult to accurately predict the environment's state (Achrol & Stern, 1988) and achieve their objectives. This difficulty spurs the manufacturer to develop governance mechanisms designed to diminish environmental risks (Heide, 1994). These include governance mechanisms for managing relationships with partners (Wang et al., 2017). Thus, manufacturers must

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determine which kind of governance mechanism is most suitable for dealing with their environmental uncertainty.

For example, Chrysler, after merging with Daimler-Benz in 1998, experienced unexpected part price increases and struggled to meet the demand in the automobile market. Chrysler therefore unilaterally forced its suppliers to lower their parts prices. The suppliers were forced to comply with Chrysler's demand, but they were reluctant to respond to Chrysler's urgent demands for additional parts. Chrysler also wanted to unilaterally control supplier decisions on supplier part prices and on-time delivery, leaving little room for the supplier to make efficient decisions. The absence of flexibility, which is the result of unilateral governance, may lead to hidden costs. Thus, a unilateral governance mechanism is not always the best option in uncertain environments. The manufacturer in an uncertain environment should consider which governance mechanism is best for managing their exchange partners.

Marketing researchers have developed numerous theories demonstrating how exchange partners develop governance mechanisms in uncertain environments (Carson et al., 2006; Krishnan et al., 2016). Among them, the most powerful theory is the transaction cost analysis framework (TCA; Williamson, 1975, 1985, 1993). This has proved beneficial for explaining governance mechanisms. An approach derived from TCA defines a unilateral governance mechanism as a process by which one party unilaterally controls a partner's key decisions (Bello & Gilliland, 1997) and claims that this mechanism is proper for uncertain environments (Stump & Heide, 1996). The TCA views environmental uncertainty as a feature of market failure. Uncertain environments create information asymmetries between exchange partners, which provide opportunities for the better-informed partner to behave opportunistically (Klein et al., 1990). Opportunism is self-interest-seeking behavior in which every situation is utilized to gain an advantage (Williamson, 1985). Opportunistic behavior includes subtle forms of dishonesty, such as distorting or withholding market information, cheating, and avoiding responsibility. The opportunistic behavior of the exchange party creates a safeguarding problem for the partner. Therefore, the TCA suggests that unilateral governance (i.e., vertical control) is the best option for managing the opportunistic behavior of the partner under environmental uncertainty.

However, the TCA fails to embrace the bilateral governance mechanism as an alternative to the unilateral governance mechanism (Gundlach & Achrol, 1993). Accordingly, there is a limitation in that it does not explain the nature of the bilateral governance mechanism, the active exchange of information and the flexible coordination between the parties to the exchange. The bilateral governance mechanism is based on a reliance on implicit agreements between both exchange parties (Weitz & Jap 1995; Heide, 1994). Relational contract theorists argue that manufacturers in uncertain environments tend to see improved performance when they select bilateral governance mechanisms, such as relational norms (Noordewier et al., 1990; Cannon et al., 2000).

However, as a way to manage relationships with exchange partners, it is not known which governance mechanisms (i.e., unilateral or bilateral) are most likely to develop in an uncertain environment. Some researchers (Dong et al., 2010; Abdi & Aulakh, 2017) have examined the relationships between uncertainty and governance, but—to our knowledge—no study has systematically examined these relationships in the network setting. In addition, most researchers have failed to consider the effect of network structure on governance mechanisms. One exception is the study by Ryu et al. (2013), which investigates the effects of an embedded network on the contractual relationship between exchange parties as well as the role of embeddedness, a critical network element. However, it does not investigate how disconnected networks, such as structural holes—brokerage opportunities created by separate ties (Burt, 1992, 1997)—affect governance mechanisms. Thus, the study fails to grasp the overall picture regarding network structures and the appropriate governance mechanisms.

According to the resource-based view (Barney, 1991), firms can acquire competitive advantages from internal knowledge, resources, and capabilities. Recently, this view has transformed into a network perspective that focuses on external resources obtained through interfirm relationships (Granovetter, 1985; Gulati et al., 2000; Uzzi, 1996). Since structural holes serve as a brokerage between one cluster and others by occupying an advantageous position, the firm enjoys interfirm exchange from within the network as well as from the external network (Burt, 1992). The value of a superior network position has been broadly demonstrated by network researchers (Reagans & Zuckerman, 2001; Tsai, 2002; Gulati et al., 2000; Portes, 1998). The network literature shows that a relatively advantageous position that does not overlap with other parties can connect dispersed networks and can provide a competitive advantage within the information flow. Granovetter (1973) argues that the potential benefits of bridging with other partners in the network are significant; this idea is central to the concept of "structural holes" developed by Burt (1992). Much recent empirical research has demonstrated that firms that connect structural holes in networks produce an important effect on interfirm relationships (Ford & McDowell, 1999). This research has stressed that exchange parties in a structural hole network enjoy nonoverlapping information and resource flows in

their relationships with other network members (Burt, 2002), but they also face serious challenges in terms of governing their relationships with exchange partners (Williamson, 1985). For the exchange parties, this raises two important questions: (1) what type of governance mechanism is most appropriate for these relationships, (2) when considering the characteristics of structural hole networks, how a firm's choice of governance mechanisms is affected by various levels of structural holes.

The main objective of the research is to provide a better understanding of the effects of environmental uncertainty on governance mechanisms under conditions reflecting varying levels of structural holes. No empirical study has been examined to determine which governance choices are effective for manufacturers in their relationships with partners in an uncertain environment.

Unlike any previous empirical study, this study examines the moderating role of structural holes on the relationship between environmental uncertainty and interfirm governance mechanisms. This study thus has academic contributions to network studies in two ways.

First, it irons out the conflicts between the TCA (unilateral governance mechanism) and relational contract theory (bilateral governance mechanism) under conditions reflecting structural holes. Research has shown that in an uncertain environment, the choice of governance mechanism (unilateral or bilateral) of an exchange partner can vary depending on the level of structural holes. Second, this study uses structural holes—a network structure—to explain governance mechanisms under environmental uncertainty. Structural holes improve the flow of information between exchange partners and decrease the information asymmetry arising from environmental uncertainty. Thus, they could be a critical variable in the choice of mechanism in uncertain environments. The study proposes that the party with structural holes in their exchange partners will tend to choose a bilateral governance mechanism. On the other hand, the party without structural holes is more likely to rely on unilateral governance mechanisms. In practical terms, a manufacturer should consider governance mechanisms and structural holes as safeguards against environmental uncertainty. For this reason, the use of structural holes is recommended for the mutual benefit of the manufacturer and the supplier. Therefore, firms should carefully consider the situation of structural holes in their exchange partners and networks when making business decisions under environmental uncertainties. The rest of the paper is organized as follows. In the next section, the study reviews the literature on the effects of environmental uncertainty and governance mechanisms and discusses the moderating effect of structural holes. The study then describes the conceptual framework that guides the study's hypotheses. Next, the study's research design and the analysis method are presented. Finally, the study concludes with a discussion of the key results and their theoretical and managerial implications. Figure 1 presents the study's conceptual framework. The empirical test of this study was conducted with a Samsung Engineering firm in the context of internal entities, manufacturer-supplier-subsupplier relationships.

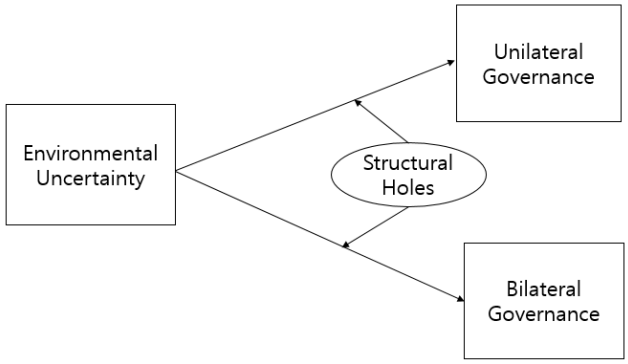

Figure 1: Conceptual Framework

2. Literature Review

2.1. Interfirm Network and Social Capital

Social capital, "a set of resources embedded in relationships that results from holding certain locations in a social network" (Burt, 1992, 2000), has become a general metaphor in the study of network relationships (Gargiulo & Benassi, 2000). The social network serves an important function in the development of social constraints directing information flows in the building and maintenance of social capital (Walker et al., 1997), and network researchers have identified two of its dimensions.

Marketing networks are critical competitiveness in terms of manufacturer's resource acquisition ability. The manufacturer requires not only extensive cooperation among entities of the network but external interaction for relationships with partners, which is one of their core competencies (Song & Montoya-Weiss, 1998; Brown & Eisenhardt, 1995). For example, engineering firms, which offer technical service and consulting to clients, with a finished product supplied by first-tier subcontractors need a huge amount of collaboration and communication between the exchange partner and the acquisition of new resources and information. Interactions between buyers and first-tier suppliers have been broadly studied (Mishra & Shah, 2009; Ragatz et al., 1997). Recently, researchers have moved their focus from manufacturer-supplier dyadic relationships to network studies. There is growing

evidence that network closure and structural holes play an important role in the relationship between firms.

The literature has highlighted network closure and structural holes as divergent mechanisms underlying advantageous locations in a social network (Podolny & Baron, 1997; Flap & de Graaf, 1986; Granovetter, 2018); Lin et al., 1981). Network closure facilitates trust and cooperation; a more central location in a social network leads to more bonding relationships and thus more social capital (Coleman, 1988). Coleman (1988) explains that the positive effect of network closure produces norms and sanctions. Since network closure facilitates cooperative exchange and trust, parties in a closed network are able to trust each other to honor obligations, which diminishes their exchange uncertainty and enhances their cooperation ability. Coleman's closure argument is a prominent perspective with respect to social capital, but it is not alone in predicting that dense networks facilitate trust and norms by facilitating effective sanctions.

Furthermore, Granovetter (1985) argues that the threat of sanctions makes trust more likely between people who have mutual friends (mutual friends being a condition of structural embeddedness). The group to which mutual friends belong can enjoy the positive effect of a third-party observer (Granovetter, 1985). Third-party observer effects, by which an observer's presence affects human behavior, play a role in restraining opportunistic behavior among exchange partners (Burt & Knez, 1995; Gulati, 1995). Third-party observers also help reduce the risk of opportunistic behavior that can hinder cooperative relationships and trust (Raub & Weesie, 1990). For example, failure to comply with the norms of cooperation may result in strong penalties for the parties involved in the third-party observer relationship as well as in damage to the honor of the defector. This damage makes it impossible to fully take advantage of the benefits of social capital.

Burt (1992, 1997) proposes an alternative to the social capital argument and emphasizes the importance of open rather than closed networks, in which the network positions lie between not within dense regions of relationships. Burt calls these sparse regions structural holes. A structural hole is defined as a gap between disconnected members in a social network. Instead of focusing on the value of sharing norms created by a cohesive network, the structural hole theory argues for the social capital benefits that can be obtained as a result of information diversity and brokerage opportunities created by the lack of connection between separate clusters of social networks. The parties who connect these clusters are better able to access information and are in a position favorable to negotiating relationships, allowing them to be aware of more opportunities and to obtain more favorable conditions from them.

2.2. Structural Holes

A structural hole is defined as the absence of a network between disconnected parties (Rodan, 2010). The structural hole theory (Burt, 1992, 1997, 2000) argues that the advantages of social capital stem from the brokerage opportunities resulting from bridging disconnected members (Burt, 1992). Previous studies have shown that structural holes have critical roles of brokering opportunities that result from connecting segregated clusters of networks in multiple information and network (Ahuja, 2000; Hargadon &Sutton, 1997; Burt, 1992, 1997). In addition, Burt (2002) focuses on characteristics at the aspect of network structure and specific condition that the member who occupies strategic position can obtain their autonomy and utilize their control for information and resources, and finally derive benefits from taking the advantageous position.

Since the holes serve as a tertius gaudens, two separate parties can connect, as indicated in Figure 2. Through the hole between them, network benefits are provided by the two parties. The benefits are additive rather that overlapping (Burt, 1992). Parties can receive benefits from occupying positions rich in structural holes among their network partners (Baum et al., 2000; Hargadon & Sutton, 1997; Burt, 1992). Consequently, the more non-redundant parties there are between networks, the more benefits the structural holes provide to the parties.

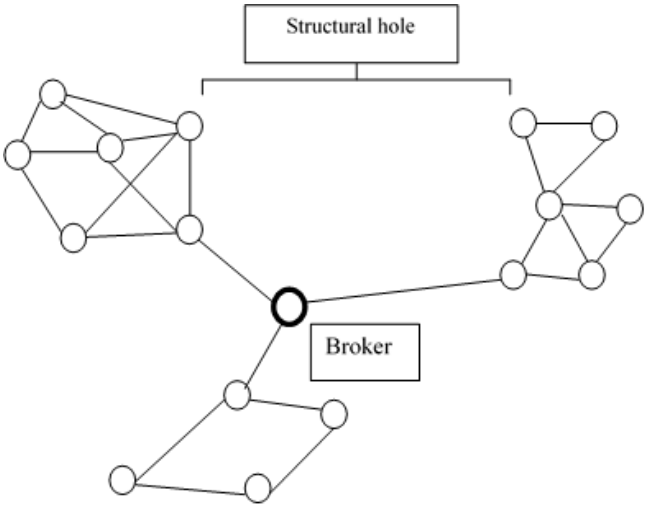

Figure 2: Structural Hole (Burt, 1992,1997)

The key underlying mechanism that determines whether a social network will provide such brokerage

opportunities is the extent to which the tie spans a structural hole (Burt, 1992, 1997, 2000). By holding a structural hole, the broker in a network gains two advantages: information and control (Xiao & Tsui, 2007).

Further, social networks bridging disconnected groups provide individuals access to a broader array of ideas, non-redundant information, and opportunities (Granovetter, 1973). Empirical studies applying structural hole theory confirm that structural holes provide firms and organizations access to new information (Beckman et al., 2004) and non-redundant resources (Arya & Lin, 2007). A bridging position provides a firm with diversified information and opportunities inherent in the holes and can help the firm better leverage its internal strength and utilize external resources (McEvily & Zaheer, 1999)

The information the partners transmit to the broker is likely to be complex and heterogeneous, since it carries insights into the differing interests, difficulties, practices, processes, languages, and behaviors of members who belong to separate, unconnected clusters (Burt, 2007). By contrast, the absence of structural holes means that parties are connected to partners with shared interests, problems, practices, languages, and behaviors; thus, the information received from their partners is less complex and heterogeneous (Burt, 2007). Having access to diverse information is essential for a network member, particularly when the information is not widely available to other members. Firms holding these bridging positions in a sparsely connected network have more exclusive access to diverse information.

By contrast, a dense network consists of members who are better connected with each other. Since most firms are connected either directly or indirectly, interaction among these well-linked network members increases the probability that the firms within the network have access to the same information. As much of the information in dense networks is likely to be redundant and available to other network members, firms spanning structural holes have only limited information advantages.

Since the structural holes that serve as the third party are located in a superior network position, the holes allow parties to take advantage of their control over their exchange partner (Burt, 1992). A party can derive benefits from the network by arbitraging the information flow between two otherwise disconnected actors in the network (Burt, 1992; Shipilov & Li, 2008). Sparse networks can be of use when the contacts are sources of non-redundant knowledge or information and the network structure affords the broker the opportunity to exploit it through arbitrage. Information arbitrage benefits are obtained by acquiring more information than others in the organization, with the broker becoming a focal point for information exchange. The broker generates social obligations and debts in its favor and gains a reputation for being knowledgeable.

Disconnections in the social structure could also enable parties to secure favorable terms from their partners. The brokers can manage their relationships with partners through the tertius gaudens ("the third who benefits") strategy (Simmel, 1919). Through this network position, parties can control exchange partners to gain resources (Burt, 1992; Aldrich, 1999), and the problems between exchange partners can be solved through control (Zaheer & Bell, 2005).

Parties located in the brokerage position have a stronger bargaining power than other parties because of the options their position gives them. For instance, parties who occupy brokerage positions between those clusters have better access to information and enjoy comparative advantages in negotiating relationships, which allow them to know about more opportunities and to secure more favorable terms in the opportunities they choose to pursue. Conversely, parties strongly tied to cohesive contacts have little autonomy with which to negotiate their role vis-à-vis their contacts. According to Burt (1997), managers with contact network rich in structural holes "monitor information more effectively than it can be monitored bureaucratically. They move information faster, and to more people, than memos." In support of his theory, Burt (1992, 1997) furnishes evidence showing how managers with networks rich in structural holes enjoy comparatively early promotions or high bonuses, which are assumed to reflect their superior ability to add value to their organizations. Thus, this control benefit means that it can enjoy an advantageous position in negotiations among exchange partners (Prell, 2012). Hence, network positions rich in structural holes can provide brokers with an information benefit (based on access to non-redundant information) and a control benefit (based on the ability of the broker).

2.3. Interfirm Governance Mechanisms

The term governance has traditionally been defined as a "multidimensional phenomenon which encompasses the initiation, termination, and ongoing relationship maintenance between a set of parties" (Heide, 1994). Governance mechanisms are "those tools that are used to establish and structure exchange relationships" (Heide, 1994). The literature has investigated various governance mechanisms.

Studies have identified two types of interfirm governance mechanisms: unilateral and bilateral governance mechanisms (Ouchi, 1979; Heide, 1994). The main distinction between unilateral and bilateral governance depends on the extent of mutual participation

in the decision-making process (Weitz & Jap, 1995). In unilateral governance, the parties "force" their partners to follow their requests (Park et al., 2020). In bilateral systems, governance is grounded in shared norms and values between exchange parties.

A unilateral governance mechanism is driven by one party's directives aimed at controlling the activities of its partners. One example of a unilateral governance mechanism is controlling the output or performance of exchange partners vertically (Celly & Frazier, 1996; Heide, 1994). For instance, a manufacturer can exert vertical control over a supplier by imposing formal evaluation programs on its outputs or reviewing its performance (Celly & Frazier, 1996; Heide, 1994). The manufacturer is likely to check the quality of the supplied items or the delivery performance. Vertical control reduces the information asymmetry between exchange parties by allowing one party to monitor how well the supplier follows the agreed-upon terms (Lal, 1990; Balakrishnan & Koza, 1993). With the information acquired by the vertical control over the supplier, the manufacturer can detect opportunistic behavior, protect itself from risk, and also achieve the control necessary to pursue its own interests (Stump & Heide, 1996; Lee, 1992). Hence, vertical control can be deemed a kind of unilateral governance mechanism.

In a bilateral governance mechanism, both exchange parties participate actively in decision-making. Bilateral governance focuses on behavior that is acceptable and proper to all parties rather than on controlling behavior unilaterally (Heide, 1994). Exchange parties that adopt bilateral governance exhibit mutual adjustments to uncertain environments and high levels of information flow, wherein the parties intend to show cooperative behavior and will renegotiate when unexpected environmental change occurs (Noordewier et al., 1990). Bilateral governance, therefore, establishes relational norms, which is a subset of norms relating to the cooperative behavioral domain, concerned with maintaining relationships and reducing self-interested behaviors (Heide & John, 1992; Heide, 1994; Aulakh et al., 1996; Artz, 1999). One kind of relational norm is the norm of flexibility, which is defined as a willingness to adapt to exchange partners' circumstances without changing existing contracts and renegotiations (Young et al., 2003; Heide & John, 1992). This implies that flexibility enables a party to easily change in response to changing environmental circumstances if it turns out that certain practices have a negative effect on either party (Noordewier et al., 1990; Lusch & Brown, 1996; Griffith & Myers, 2005). Exchange parties that rely upon bilateral governance are flexible in responding to each other's requirements because they form shared values through negotiation in response to changing market conditions (Noordewier et al., 1990). For instance, when a supplier fails to supply equipment parts on a promised date because of unexpected events, such as a strike or a natural disaster, a good faith modification will be made by both parties.

Relational norms lead the exchange parties to seek mutual benefits for both the manufacturers and suppliers (Gundlach & Achrol, 1993). The importance of relational norms within a relationship is that they regulate and establish the permissible limits on behavior for both the manufacturer and supplier (Macneil, 1980; Heide & John, 1992). Each party's roles are therefore combined with those of the exchange partners. Within interfirm exchange relationships, relational norms have been found to be a governance mechanism that leads both exchange parties to behave in a way that moves toward the establishment of shared values (Heide & John, 1992; Aulakh et al., 1996; Lusch & Brown, 1996).

2.4. Environmental Uncertainty and Interfirm Governance Mechanisms

According to Anderson et al.'s (1994) definition, environment refers to "anything not part of the organization itself." The environment is everything that surrounds the firm and includes everything that can affect it. Thus, in this study, the environment comprises everything that is not generated in the firm itself in its core exchange relationship. This includes what occurs both inside and outside of the network in which the focal firms reside.

The literature has provided various definitions of "environmental uncertainty." Knight (1921) focuses on the lack of information about the environmental conditions related to decision-making. Dess and Beard (1984) describes environmental uncertainty as "changes in the external environmental factors faced by an organization that are difficult to anticipate and are beyond its control." Following Dess and Beard (1984), this study defines environmental uncertainty as the degree to which the environment changes quickly as well as the difficulty of making accurate predictions concerning the environments surrounding the networks (Klein et al., 1990). Exchange parties are confronted with environmental uncertainty due to various sources (e.g., vertical or horizontal) in their decision-making (Scott & Davis, 2015). The environmental uncertainty experienced by the manufacturer can be described as vertical because it includes unstable component supply and fluctuations in component prices. This study focuses on the manufacturer's vertical environmental uncertainty.

Exchange parties experience uncertainty when they do not obtain appropriate information about the supply of raw materials or when unpredictable events are too frequent

(Argote, 1982; Stump & Heide, 1996). For instance, if the part supplier does not provide enough resources to the manufacturer due to a lack of raw materials, the manufacturer will have difficulty obtaining the parts required to complete the final assembly.

In an uncertain environment, achieving a stable resource supply is problematic for manufacturers that require steady resource exchanges to operate (Salancik & Pfeffer, 1978). Unstable supply makes it difficult for the manufacturer to provide the appropriate quantity of products in time to match the consumer demand (Frazier & Antia, 1995). Therefore, environmental uncertainty makes it difficult for exchange partners to make accurate forecasts about the environment (Jaworski, 1988; Acrol & Stern, 1988).

3. Hypotheses Development

3.1. Environmental Uncertainty and Unilateral Governance Mechanism

Environmental uncertainty usually leads to opportunistic behavior in which exchange parties take advantage of the uncertain situation to pursue their own interests (Klein et al., 1990). Opportunism is a lack of candor or honesty in transactions, including self-interest seeking with guile (Nooteboom, 1996). For example, if the manufacturer is not sure whether it is possible to obtain the required amount of components due to the uncertain supply of parts in the market, the supplier can take advantage of the uncertainty. The supplier can sell parts to other manufacturers willing to pay higher prices and lie to the current partner by saying that the parts are in short supply. Opportunism becomes more severe when market information is asymmetrically distributed among the exchange parties because the party who holds information can behave opportunistically by taking advantage of the information gap (Wathne & Heide, 2000; Heide, 2003). Consequently, opportunism increases transaction costs. In an uncertain market environment, as a countermeasure against the potential opportunism of exchange partners, parties need to develop interfirm governance mechanisms that work best for conditions of uncertainty (John & Weitz, 1989). In this situation, the manufacturer tends to increase vertical control over suppliers due to fear of opportunistic behavior in the uncertain environment. The manufacturer is thus motivated to rely on the unilateral governance mechanism over its supplier in an effort to reduce uncertainty. Thus, the following hypothesis is proposed:

H1: The higher the environmental uncertainty, the greater the manufacturer's reliance on a unilateral governance mechanism.

3.2. Environmental Uncertainty and Bilateral Governance Mechanism

A fixed set of routines for handling environmental factors are developed in a stable environment (Thomas & Grashof, 1982). Environmental stability is achieved through repetitive and long-term transactions between exchange parties. For example, when a manufacturer experiences unstable parts supply in an uncertain environment, the manufacturer is likely to switch to other suppliers, making it difficult for the two parties to repeat transactions. If the information on the supply situation is not readily available (i.e., information asymmetry) between the exchange parties, the manufacturer may wonder if the supplier is manipulating the market situation to achieve their own goals (Mishra et al., 1998). In this uncertain environment, it is difficult for bilateral governance to develop between the manufacturer and the supplier because the manufacturer may try to replace the supplier with another to ensure stable parts supply. In this case, the manufacturer is unlikely to develop a bilateral governance mechanism in relation to the current supplier. Thus, we propose the following:

H2: The higher the environmental uncertainty, the lower the manufacturer's reliance on a bilateral governance mechanism.

3.3. The Moderating Effect of Structural Holes

New suppliers that bridge structural holes provide novel information about the external environment to the manufacturer when they are involved in an interfirm relationship. This helps the manufacturer to deal with an uncertain environment. Structural holes serve as a governance mechanism through their network position, which naturally reduces the potential for opportunistic partner behavior (Zaheer & Bell, 2005) because the new information and resources obtained from the structural holes can decrease information asymmetry among the exchange parties (Wathne & Heide, 2000).

Firms bridging structural holes may be able to access resources from unique parts of their network and may hear about impending threats and opportunities sooner. Furthermore, the firms may learn about the quality of possible exchange partners and potential members (Jackson, 2009; Uzzi, 1996). Nahapiet and Ghoshal (1998) suggest that interactions among firms can help develop knowledge. Therefore, parties that bridge structural holes are likely to assist in developing new knowledge. Since structural holes allow network parties to obtain new

information and resources (Burt, 2008), this may help solve the problem of information asymmetry among exchange partners.

Structural holes play a moderating role that influences how environmental uncertainty affects interfirm governance mechanisms. A party that faces difficulty in making decisions in an uncertain environment requires information from its partner to mitigate the difficulty. For instance, when an unexpected part supply shortage occurs, the manufacturer requires short- and long-term information on the situation from its supplier.

A manufacturer that can obtain new information or resources (e.g., on stable part quality, delivered lot sizes) that can be utilized to make forecasts from an exchange partner through structural holes will seek less vertical control over the supplier because the manufacturer is able to anticipate and respond to information about opportunistic behavior and eliminate information asymmetry. When a manufacturer obtains information about its supplier through structural holes, the perception of uncertainty is diminished regardless of whether the manufacturer can control its supplier's behavior vertically (Anderson & Narus, 1990; Moorman et al., 1992). Accordingly, the manufacturer will be less likely to adopt unilateral governance. Moreover, due to the resolution of the information asymmetry issue through structural holes, the manufacturer is less anxious about being exploited by its supplier. Reducing the perceived risk level reduces the manufacturer's unilateral governance over its supplier. The opposite is also true: If there are no structural holes, the manufacturer is more likely to maintain vertical control to prevent opportunistic supplier behavior. Thus, the following hypothesis is proposed:

H3: The positive relationship between environmental uncertainty and the manufacturer's reliance on a unilateral governance mechanism is moderated by structural holes.

If a manufacturer does not receive information about its partner from structural holes, it may have doubts about the opportunistic behavior of the supplier, and shared values like relational norms will not develop. Structural holes therefore allow the manufacturer to rely on bilateral governance to help them adapt to uncertain supply environments.

For example, if there are no structural holes bridging exchange parties in their interfirm relationships, the manufacturer will obtain more redundant information than additive information about the market situation (Dirks & Ferrin, 2001). The manufacturer may thus be suspicious of the information received from its supplier, making it difficult to agree on mutual adjustments to environmental changes (Noordewier et al., 1990). Thus, the manufacturer cannot adopt a bilateral governance mechanism in dealing with environmental uncertainty. The study therefore proposes the following:

H4: The negative relationship between environmental uncertainty and the manufacturer's reliance on a bilateral governance mechanism is moderated by structural holes.

4. Methodology

4.1. Research Context and Data

This study explores the relationships between the manufacturer, its major first-tier suppliers, and the sub-suppliers to test the hypotheses regarding the effects of environmental uncertainty on governance mechanisms (unilateral and bilateral). The manufacturer and its suppliers engage in substantial interactions to increase information exchange and cooperation. The study assumes that major first-tier suppliers display the highest level of dependence and the most intensive interaction with the manufacturer. The study selects the major first-tier suppliers through systematic random sampling from a mailing list of a major manufacturing firm. The firm provides technical services and consulting to customers with finished products supplied by the first-tier suppliers.

The study surveys the procurement managers of the first-tier suppliers who are qualified to respond to items about their firms and exchange partners because they have relationships with second-tier suppliers and are strongly engaged in interactions with the manufacturer. Surveying first-tier suppliers that have intense relationships with their exchange partners (i.e., manufacturer, second-tier suppliers) allows the study to examine the influence of environmental uncertainty on governance mechanisms amid structural holes.

The study contacted the procurement managers of the firm by telephone and mailed them a questionnaire. Since the procurement managers are in charge of securing materials and parts from its sub-suppliers, the study expects them to have close relationships with sub-suppliers who have expert knowledge about procurement items (Hutt & Speh, 2000) and engage in interactions with the manufacturer based on its requirements. After further phone calls and a second mailing, the study collected 148 responses out of 520 delivered (for a response rate of approximately 28%).

To address the potential for non-response bias, the study compared early respondents with late respondents (Armstrong & Overton, 1977) and then compared the mean values for each scale (i.e., environmental uncertainty, structural holes, unilateral and bilateral governance). No

significant differences were found between the groups, meaning that non-response bias does not appear to be a crucial problem.

4.2. Measurement Scale Development

The study developed the measurement scale in two stages. First, the study obtained existing measures of the focal variables from previous studies and developed measures based on the theory. Second, the study conducted in-depth interviews with three procurement managers to assess the relevance of the collected measures and revised the wording of some items based on the assessment results in consideration of the research setting. All items were measured using a seven-point Likert-scale ranging from "strongly agree" (7) to "strongly disagree" (1).

The study employs structural holes to measure the benefits generated from the social capital gained from brokerage opportunities among the first-tier suppliers (Burt, 1997). As the number of non-redundant contacts between or among networks increases, the benefits of the structural holes increase. The study developed items for structural holes following Ahuja (2000) and Burt (1997).

The study utilizes environmental uncertainty to measure the major first-tier suppliers' perception of uncertainty with regard to several aspects of the supplied components: production, price, provision of supplied products, and availability (Noordewier et al., 1990). As the level of environmental uncertainty increases, the inability to forecast accurately increases. The study adapts the items for environmental uncertainty used in Heide and John (1992) and modifies them according to the research setting.

The study measures governance types to distinguish between unilateral and bilateral governance. The study defines unilateral governance as a party's unilateral control over the exchange partner's actions (Bello & Gilliland, 1997). The study defines bilateral governance as the extent to which the manufacturer gives its suppliers flexibility in responding to changing business conditions (Heide & John, 1992). Items for governance are also drawn from Heide and John (1992) and modified for the research setting.

4.3. Measurement

The study assesses the validity of the constructs (i.e., structural holes, environmental uncertainty, unilateral governance, bilateral governance). The study conducts an item-total-correlation test in order to eliminate ill-fitting items. The study employs exploratory factor analysis (EFA) for the variable screening.

The remaining items are then subjected to confirmatory factor analysis (CFA) to assess construct validity (e.g., Kline, 1998) using AMOS. Finally, the study measures Cronbach's alpha for each construct to measure reliability. Based on this procedure, the study finds that the measurement model has acceptable fit indices: χ^2 (59) = 155.858 (p = .000), GFI = .910 AGFI = .875, CFI = .972, RMSEA = .045. All factor loadings are significant, indicating the unidimensionality of the measures and sufficient convergent validity (Anderson & Gerbing, 1988). These values indicate that the measurement is well-fitted. All factor loadings are above 0.5 ($p < .01$), showing the convergent validity of each construct. The AVE is also calculated for convergent validity. The AVE values of each construct range from .541 to .777, thus exceeding the minimum threshold of .50.

The study evaluates the discriminant validity of all latent variables through their AVE values (Fornell & Larker, 1981). The study calculates all the AVE values to identify whether they are greater than the squared values of the coefficients of the correlations between variables. The results range between .00 and .24. The highest square root (.24) is smaller than the lowest AVE (AVEBilateralGovernance = .541).

Finally, the study measures construct reliability, finding that each factor shows a satisfactory level. Overall, these results indicate appropriate measure reliability and validity. Table 1 describes each construct's CR, presents the factor loadings, reliability measures, goodness-of-fit indices, and AVE values for each construct. Table 2 shows the inter-construct correlations.

Table 1: Construct Measurement Summary

	CR	AVE	SFL
Structural Holes (Reliability = .902) [Company A, which has a relationship with our company, has important technology, resources, and information required by our company.]	.931	.777	
-Our company's buying companies and suppliers have established a relationship with our company and are obtaining information from Company A that could not otherwise be obtained.			.53
-Our company's buying companies and suppliers have established a relationship with our company and are obtaining important technology from Company A that could not otherwise be obtained.			.76
-Our company's buying companies and suppliers have established a relationship with our company and are obtaining resources from Company A that could not otherwise be obtained.			.86
Environmental Uncertainty (Reliability = .733)	.802	.569	
-The availability of major products in the market is highly uncertain.			.55

-The uncertainty of the production of major products is a real problem in the market. -The supply of major products is not stable. -The prices of major products in the market are uncertain.			.66 .69 .64
Unilateral Governance (Reliability = .714) -Our firm monitors the supplier's inventory level. -The relationship our firm has with the supplier makes use of many controls. -Our firm regularly monitors the price of parts supplied by the supplier.	.704	.593	 .74 .73 .87
Bilateral Governance (Reliability = .751) -Both our firm and our major supplier expect that each company will be flexible about the other company's request for changes. · Both our firm and our major supplier expect to be able to make any adjustments necessary to cope with changing circumstances. · Both our firm and our major supplier expect to be flexible with each other if it can help the other company.	.810	.541	 .51 .57 .73

Note: $\chi^2(59) = 155.858$ (p = .000); goodness-of-fit index = .910; adjusted goodness-of-fit index = .875; comparative factor index = .972; root mean square error of approximation = .045; SFL = standardized factor loading; AVE = average variance extracted.

Table 2: Correlations, Means, and Standard Deviations

	Environmental Uncertainty	Structural Holes	Unilateral Governance	Bilateral Governance
1. Environmental Uncertainty	1.000			
2. Structural Holes	-.077*	1.000		
3. Unilateral Governance	.208**	.163**	1.000	
4. Bilateral Governance	-.231***	.040*	-.536***	1.000
M	3.896	4.410	2.750	2.506
SD	0.997	1.454	0.955	0.984

Note: sample size = 148, * p < .05, ** p < .01, *** p < .001

4.4. Model

This study's hypotheses investigate the effects of a variable (i.e., environmental uncertainty) on governance mechanisms (unilateral and bilateral). These effects change across structural hole levels. The hypotheses are tested using structural equation modeling (SEM). The study estimates the following regression model:

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Quantile regression essentially transforms a conditional distribution function into a conditional quantile function by splitting it into segments. In OLS, modelling a conditional distribution function of a random sample (y1,……yn) with a parametric function m(xi,β) where xi represents the independent variables, β the corresponding estimates and m the conditional mean, can cause the following minimization problem:

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_1 Z + \varepsilon_1 \quad (1)$$

$$Y_2 = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_1 Z + \varepsilon_2 \quad (2)$$

where
Y_1= Unilateral governance,
Y_2= Bilateral governance,
X_1= Environmental uncertainty,
Z= Structural holes,
β_i= Coefficient of unilateral governance,
γ_i= Coefficient of bilateral governance,
ε_1= Error term.

5. Results

5.1. Main Effect

The results of the structural models show that environmental uncertainty does not affect the manufacturer's adoption of a unilateral governance mechanism (β_1= .041, t = .877), which does not support H1. Decisions made in buyer-supplier relationships do not involve just the economic context but also deeply involve the social context (Hill, 1990; Hagen & Choe, 1998; Granovetter, 1985). By contrast, environmental uncertainty negatively influences a manufacturer's adoption of the bilateral governance mechanism (γ_1= -.145, t = -2.119**), supporting H2 (see Table 3).

Table 3: Main Effects on Unilateral Governance and Bilateral Governance

Constructs	Hypotheses	Estimates	T Stats	p-value	Support
Environmental uncertainty → Unilateral governance	H1	.041	.877	.380	
Environmental uncertainty → Bilateral governance	H2	-.145*	-2.119	.007	√

Note: * p < .05, ** p < .01, *** p < .001

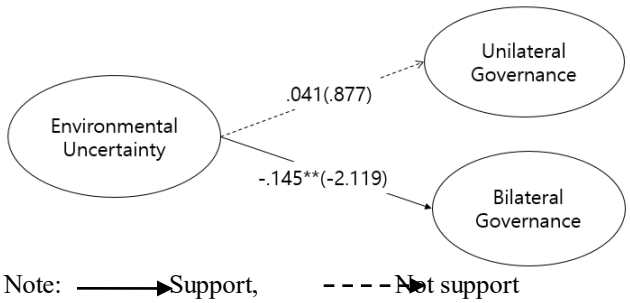

Figure 3 Results of the Main Effects

5.2. Moderating Effect

The study explores the moderating effect of structural holes (i.e., H3 and H4) through a multi-sample analysis using AMOS, following Jaccard and Wan (1996). The sample is divided into two groups, STRUCTURALHOLESH and STRUCTURALHOLESL, at the median value of structural holes, and then the study runs the two subgroups through the nested structural model in which environmental uncertainty is the exogenous variable and unilateral governance and bilateral governance are the endogenous variables. Typically, moderating effect analysis is conducted using two methods: the chi-square difference test via multi-sample analysis and a pairwise parameter comparison. The latter is used to verify the difference of parameters—which can be seen as the z-statistic—in the non-constrained model. It has the advantage of being simpler than the chi-square difference test because only the non-constrained model needs to be estimated. However, it is less accurate than the chi-square difference test because it is a decision based on a univariate function. Hence, the chi-square difference test is utilized to examine the moderating effects.

The moderating effect analysis via the chi-square difference test evaluates the fitness of the unconstrained model and constrained model. Following Jaccard and Wan's (1996) two-step approach, the study first employs two groups of pooled data (i.e. pooled-sample models) to estimate the structural model and to check the goodness-of-fit before testing the multi-sample structural model. The pooled-sample model demonstrates a good fit (i.e., statistically insignificant; χ^2= 53.61, df = 48), indicating that the multi-sample model can be utilized for hypothesis testing. Conversely, if the chi-square value is statistically significant, at least one of the groups is not well-fitted. This first-step analysis cannot assess the moderating effects.

Second, the multi-sample model (i.e., STRUCTURALHOLESH and STRUCTURALHOLESL) is estimated with coefficients that are the same between the two subgroups to limit the effect of the interaction. This model implies no interaction between the independent and moderating variables. If structural holes exert a moderating effect, the multi-sample model (in which the coefficients of the two subgroups are equally limited) indicates that the model coefficients are a worse model fit relative to the pooled-sample model (in which the coefficients are not constrained; Jaccard and Wan, 1996). The χ^2 difference between the multi-sample model (χ^2= 70.03, df = 50) and the pooled-sample model (χ^2 = 53.61, df = 48) demonstrates the presence of the moderating effect of structural holes (χ^2= 16.42, df = 2, p < .01).

The multi-sample model is then further tested to determine whether environmental uncertainty and governance mechanisms have significant correlations for these two groups (Mendenhall et al., 2003; Jaccard & Wan, 1996). The γ coefficients for the high- and low-structural groups demonstrate that the main effect of environmental uncertainty on unilateral governance in the low-structural holes group is both positive and significant (γ_{12} = .43, t = 2.63), while the main effect of environmental uncertainty on unilateral governance in the high-structural holes group is not significant (γ_{11}= -.15, t = -.65), which supports H3. The effect of environmental uncertainty on bilateral governance in the low-structural holes group is significant and negative (γ_{21}= -.37, t = -2.42), whereas the effect in the high-structural holes group is not significant (γ_{22}= .13, t = .85), supporting H4 (see Table 4). In sum, structural holes are found to be a moderator in the environmental uncertainty–unilateral governance link and the uncertainty–bilateral governance link.

Table 4: Moderating Effect of Structural Holes

Constructs	Hypotheses	High structural holes		Low structural holes	
		Coefficient	T value	Coefficient	T value
Environmental uncertainty →Unilateral governance	H3	-.15	-.65	.43*	2.63
Environmental uncertainty → Bilateral governance	H4	.13	.85	-.37*	-2.42

Note: * p < .05, ** p < .01, *** p < .001

6. Conclusion and Discussion

6.1. General Discussion and Implication

This study shows that manufacturers rely on different governance mechanisms under uncertain environmental conditions. The study also demonstrates that the relationship between environmental uncertainty and governance mechanisms is moderated by structural holes. These results indicate that the environmental uncertainty–unilateral governance relationship is positive but statistically insignificant. By contrast, the environmental uncertainty–bilateral governance relationship is, as the literature suggests, negative and statistically significant. One possible reason for the statistical insignificance of the environmental uncertainty–unilateral governance relationship is that decisions in the manufacturer–supplier relationship may now go beyond economics and be deeply involved in social contexts, as the literature has proposed (Hagen & Choe, 1998; Hill, 1990; Granovetter, 1985).

This study makes several significant contributions. First, it discusses structural holes as part of the network structure in business relationships and demonstrates that they can influence a manufacturer's tendency toward a specific kind of interfirm governance mechanism. Few studies have investigated structural holes in interfirm relationships.

Examining structural holes contributes to a better understanding of how governance mechanisms develop in uncertain environments. This study hypothesized that manufacturers rely on unilateral governance under environmental uncertainty when they lack structural holes with their suppliers. On one hand, when structural holes are considered, the relationship between environmental uncertainty and unilateral governance is mitigated. On the other hand, when structural holes are absent between manufacturers and suppliers, environmental uncertainty hinders the development of a bilateral governance mechanism. When structural holes are involved in the relationships, environmental uncertainty no longer hinders the exchange partner's willingness to develop bilateral governance (i.e., the norm of flexibility). In turn, environmental uncertainty affects the party's decision to rely on bilateral governance, which is moderated by structural holes.

Specifically, structural holes reduce opportunistic behaviors among exchange parties because firms with structural holes can solve the problem of information asymmetry by obtaining new, additive information from their exchange partners; this means that firms need not worry about the exchange party's opportunism. Consequently, firms are likely to adopt bilateral governance. Even though unilateral governance can be an option for exchange partners under conditions of environmental uncertainty, unilateral governance cannot provide complete protection for the exchange parties because it is less flexible if structural holes are considered (Andaleeb, 1995). Firms that can benefit from structural holes will realize the limitations of this weakness of unilateral governance and eventually turn to bilateral governance as an alternative.

Thus, only when structural holes are considered as a moderator is the manufacturer's decision regarding unilateral governance clarified in a statistically significant manner. By contrast, the manufacturer's adoption of bilateral governance is explained as hypothesized both when environmental uncertainty is employed as a sole exogenous variable and when it is considered as an exogenous variable while structural holes is considered as a catalyst.

6.1.1. Theoretical Implications

The study has several important theoretical implications. First, while most studies based on TCA have focused on dyadic relationships, this study included a network perspective in which exchange parties have relationships with partners in the web of a firm network. The greatest difference between the dyadic and network contexts is the number of parties involved. A network comprises multiple actors that interact; they are affected by single as well as numerous actors through exchange relationships (Gummesson & Mele, 2010). Despite the growing number of studies on network relationships, there are few empirical studies on network structure and interfirm governance mechanisms in business relationships. To help address that gap, this study investigated the effectiveness of structural holes in network relationships.

According to the TCA, an uncertain environment causes

an adaptation problem between exchange parties (Williamson, 1985). It is therefore important for exchange parties to develop flexible relationships (i.e., bilateral governance) to adapt to environmental uncertainty (Noordewier et al., 1990). This study extends the TCA and proves that structural holes can provide exchange parties with a critical factor for developing flexible relationships with partners. Thus, to deal with their external environments, exchange parties should consider structural holes as a crucial factor within the TCA framework.

Second, the results of this study extend the TCA and relational contracting theory (RCT) to explain manufacturer–supplier relationships. The TCA and RCT are based on two interfirm governance mechanisms: unilateral (TCA) and bilateral (RCT). While the TCA asserts that the manufacturer should adopt unilateral governance to reduce the opportunism of exchange partners in uncertain environments, the RCT proposes that manufacturers in uncertain environments should rely on bilateral governance to produce better outcomes. This study helps to iron out the differences between these two conflicting suggestions.

6.1.2. Managerial Implications

Few studies have examined the networks between exchange partners. However, it is important for firms to consider the level of networks they face in dealing with uncertain environments. This study's findings show that managers must be aware of how much their firms are included in their networks. It is critical that managers understand which types of governance mechanism should be adopted because this decision may impact firm performance directly. Managers who rely on unilateral governance to manage their exchange partners may unintentionally reduce the likelihood of partnerships because it provides protection against their opportunism. For example, a manufacturer that attempts to vertically control the supplier's behavior through a specific evaluation program may prevent the supplier from making its own decisions. Consequently, parties in an exchange relationship characterized by rules find it difficult to adapt flexibly to changing circumstances (Andaleeb, 1995). If the manufacturer seeks to benefit from unilateral governance, negative word-of-mouth communication is likely to occur between network members, which can cause various management difficulties. Managers thus require a clear understanding of their firm's networks in order to deal with uncertain environments and maintain relationships with their partners. In this regard, a high level of unilateral governance over the supplier is not always the best option when manufacturers face an uncertain environment. Since unilateral governance over the supplier incurs costs such as monitoring supplier's behavior or enforcing costs, manufacturers should find a way to reduce transaction costs. When a manufacturer can estimate how much it can rely on structural holes, it can reduce unilateral governance over the supplier. Therefore, structural holes are a valuable economic asset and benefit that the parties to the exchange can trust in the face of an uncertain environment. Specifically, managers should be aware of the influence of the structural holes around their firms. The motives guiding interfirm governance in a network rich in structural holes are different from the motives that guide governance choices in their absence. When the structural holes are many, managers can select bilateral governance because they promote new, additive information and resources and therefore prevent partner opportunism and increase relational norms, such as flexibility. Even in an environmentally uncertain situation, there would be no need to worry about unstable performance because of the opportunism of the exchange partners.

6.2. Limitations and Future Research

This study has several limitations that provide avenues for future research. First, this study investigates the effects of environmental conditions on the governance choices of manufacturers, but studies on the impact of governance choice on manufacturer performance are scant. Since it is important for firms to improve the efficacy of interfirm governance by reducing transaction costs (Sydow & Windeler, 1998), it might be interesting to measure firm performance empirically. Thus, future studies should assess the impacts of each governance mechanism on buying performance under uncertain environments.

Second, the theoretical scope of this study is limited in that it focuses on the moderating effect of structural holes in the relationship between environmental uncertainty and the manufacturer's interfirm governance mechanism decision. However, this decision is likely to be influenced by other determinants, such as transaction-specific investment (TSI), a unique investment focusing on specific transactions that cannot be transferred to other firms (Williamson, 1985). This has been theorized to foster a hostage situation in which the TSI holder can be exploited by their exchange partners. The TSI holder is likely to unilaterally monitor its exchange partner in order to safeguard the TSI. Thus, future research should consider TSI as a potential determinant of interfirm governance.

References

Abdi, M., & Aulakh, P. S. (2017). Locus of uncertainty and the relationship between contractual and relational governance in cross-border interfirm relationships. *Journal of Management*, *43*(3), 771-803.

Achrol, R. S., & Stern, L. W. (1988). Environmental determinants of decision-making uncertainty in marketing channels. *Journal of marketing research*, *25*(1), 36-50.

Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative science quarterly*, *45*(3), 425-455.

Aldrich, H. (1999). *Organizations evolving*. Sage.

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of marketing research*, *14*(3), 396-402.

Arya, B., & Lin, Z. (2007). Understanding collaboration outcomes from an extended resource-based view perspective: The roles of organizational characteristics, partner attributes, and network structures. *Journal of management*, *33*(5), 697-723.

Andaleeb, S. S. (1995). Dependence relations and the moderating role of trust implications for behavioral intentions in marketing channels. *International Journal of Research in Marketing*, *12*(2), 157-172.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, *103*(3), 411.

Anderson, J. C., Håkansson, H., & Johanson, J. (1994). Dyadic business relationships within a business network context. *Journal of marketing*, *58*(4), 1-15.

Anderson, J. C., & Narus, J. A. (1990). A model of distributor firm and manufacturer firm working partnerships. *Journal of marketing*, *54*(1), 42-58.

Argote, L. (1982). Input volatility and organizational coordination in hospital emergency units. *Administrative Science Quality*, *27*(September), 420–434.

Artz, K. W. (1999). Buyer–supplier performance: the role of asset specificity, reciprocal investments and relational exchange. *British Journal of Management*, *10*(2), 113-126.

Aulakh, P. S., Kotabe, M., & Sahay, A. (1996). Trust and performance in cross-border marketing partnerships: A behavioral approach. *Journal of international business studies*, *27*(5), 1005-1032.

Balakrishnan, S., & Koza, M. P. (1993). Information asymmetry, adverse selection and joint-ventures: Theory and evidence. *Journal of economic behavior & organization*, *20*(1), 99-117.

Baum, J. A., Calabrese, T., & Silverman, B. S. (2000). Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology. *Strategic management journal*, *21*(3), 267-294.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, *17*(1), 99-120.

Beckman, C. M., Haunschild, P. R., & Phillips, D. J. (2004). Friends or strangers? Firm-specific uncertainty, market uncertainty, and network partner selection. *Organization science*, *15*(3), 259-275.

Bello, D. C., & Gilliland, D. I. (1997). The effect of output controls, process controls, and flexibility on export channel performance. *Journal of Marketing*, *61*(1), 22-38.

Brown, S. L., & Eisenhardt, K. M. (1995). Product development: Past research, present findings, and future directions. *Academy of management review*, *20*(2), 343-378.

Burt, R. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Burt, R. S. (1997). A note on social capital and network content. *Social networks*, *19*(4), 355-373.

Burt, R. S. (2000). The network structure of social capital. *Research in organizational behavior*, *22*, 345-423.

Burt, R. S. (2002). The social capital of structural holes. *The new economic sociology: Developments in an emerging field*, *148*(90), 122.

Burt, R. S. (2007). *Brokerage and closure: An introduction to social capital*. OUP Oxford.

Burt, R. S. (2008). Information and structural holes: comment on Reagans and Zuckerman. *Industrial and Corporate Change*, *17*(5), 953-969.

Burt, R. S., & Knez, M. (1995). Kinds of third-party effects on trust. *Rationality and society*, *7*(3), 255-292.

Cannon, J. P., Achrol, R. S., & Gundlach, G. T. (2000). Contracts, norms, and plural form governance. *Journal of the Academy of Marketing Science*, *28*(2), 180-194.

Carson, S. J., Madhok, A., & Wu, T. (2006). Uncertainty, opportunism, and governance: The effects of volatility and ambiguity on formal and relational contracting. *Academy of Management Journal*, *49*(5), 1058-1077.

Celly, K. S., & Frazier, G. L. (1996). Outcome-based and behavior-based coordination efforts in channel relationships. *Journal of marketing research*, *33*(2), 200-210.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American journal of sociology*, *94*, S95-S120.

Dess, G. G., & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative science quarterly*, *29*, 52-73.

Dong, M. C., Tse, D. K., & Hung, K. (2010). Effective distributor governance in emerging markets: the salience of distributor role, relationship stages, and market uncertainty. *Journal of International Marketing*, *18*(3), 1-17.

Dirks, K. T., & Ferrin, D. L. (2001). The role of trust in organizational settings. *Organization science*, *12*(4), 450-467.

Flap, H. D., & DeGraaf, N. D. (1986). Social capital and attained occupational-status. *Netherlands Journal of Social Sciences*, *22*(2), 145-161.

Ford, D., & McDowell, R. (1999). Managing business relationships by analyzing the effects and value of different actions. *Industrial Marketing Management*, *28*(5), 429-442.

Fornell, C., & Larker, D. (1981). Structural equation modeling and regression: guidelines for research practice. *Journal of Marketing Research*, *18*(1), 39-50.

Frazier, G. L., & Antia, K. D. (1995). Exchange relationships and interfirm power in channels of distribution. *Journal of the Academy of Marketing Science*, *23*(4), 321-326.

Gargiulo, M., & Benassi, M. (2000). Trapped in your own net? Network cohesion, structural holes, and the adaptation of social capital. *Organization science*, *11*(2), 183-196.

Granovetter, M. S. (1973). The strength of weak ties. *American journal of sociology*, *78*(6), 1360-1380.

Granovetter, M. (2018). *Getting a job: A study of contacts and careers*. University of Chicago press.

Granovetter, M. S. (1973). The strength of weak ties. *American journal of sociology*, *78*(6), 1360-1380.

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American journal of sociology*, *91*(3), 481-510.

Griffith, D. A., & Myers, M. B. (2005). The performance implications of strategic fit of relational norm governance strategies in global supply chain relationships. *Journal of International Business Studies*, *36*(3), 254-269.

Gulati, R. (1995). Social structure and alliance formation patterns:

A longitudinal analysis. *Administrative science quarterly*, *40*, 619-652.

Gulati, R., Nohria, N., & Zaheer, A. (2000). Strategic networks. *Strategic management journal*, *21*(3), 203-215.

Gummesson, E., & Mele, C. (2010). Marketing as value co-creation through network interaction and resource integration. *Journal of business market management*, *4*(4), 181-198.

Gundlach, G. T., & Achrol, R. S. (1993). Governance in exchange: contract law and its alternatives. *Journal of Public Policy & Marketing*, *12*(2), 141-155.

Hagen, J. M., & Choe, S. (1998). Trust in Japanese interfirm relations: Institutional sanctions matter. *Academy of management Review*, *23*(3), 589-600.

Hargadon, A., & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. *Administrative science quarterly*, *42*(4),716-749.

Heide, J. B. (1994). Interorganizational governance in marketing channels. *Journal of marketing*, *58*(1), 71-85.

Heide, J. B. (2003). Plural governance in industrial purchasing. *Journal of marketing*, *67*(4), 18-29.

Heide, J. B., & John, G. (1992). Do norms matter in marketing relationships? *Journal of marketing*, *56*(2), 32-44.

Hill, C. W. (1990). Cooperation, opportunism, and the invisible hand: Implications for transaction cost theory. *Academy of management review*, *15*(3), 500-513.

Hutt, M., & Speh, T. (2000). *Business marketing management: a strategic approach.* New Jersey: Prentice Hall.

Jaccard, J., Wan, C. K., & Jaccard, J. (1996). *LISREL approaches to interaction effects in multiple regression* (No. 114). Sage.

Jackson, M. O. (2009). Networks and economic behavior. *Annu. Rev. Econ.*, *1*(1), 489-511.

Jaworski, B. J. (1988). Toward a theory of marketing control: environmental context, control types, and consequences. *Journal of Marketing*, *52*(3), 23-39.

John, G., & Weitz, B. (1989). Salesforce compensation: An empirical investigation of factors related to use of salary versus incentive compensation. *Journal of Marketing Research*, *26*(1), 1-14.

Kline, R. B. (1998). Software review: Software programs for structural equation modeling: Amos, EQS, and LISREL. *Journal of psychoeducational assessment*, *16*(4), 343-364.

Klein, S., Frazier, G. L., & Roth, V. J. (1990). A transaction cost analysis model of channel integration in international markets. *Journal of Marketing research*, *27*(2), 196-208.

Knight, F. H. (1921). Cost of production and price over long and short periods. *Journal of Political Economy*, *29*(4), 304-335.

Krishnan, R., Geyskens, I., & Steenkamp, J. B. E. (2016). The effectiveness of contractual and trust-based governance in strategic alliances under behavioral and environmental uncertainty. *Strategic Management Journal*, *37*(12), 2521-2542.

Lal, R. (1990). Improving channel coordination through franchising. *Marketing Science*, *9*(4), 299-318.

Lee, D. R. (1992). Managing Business Transactions: Controlling the Cost of Coordinating, Communicating, and Decision Making. *Southern Economic Journal*, *59*(1), 131-133.

Lin, N., Ensel, W. M., & Vaughn, J. C. (1981). Social resources and strength of ties: Structural factors in occupational status attainment. *American sociological review*, *46*(4), 393-405.

Lusch, R. F., & Brown, J. R. (1996). Interdependency, contracting, and relational behavior in marketing channels. *Journal of marketing*, *60*(4), 19-38.

Macneil, I. R. (1980). Power, contract, and the economic model. *Journal of Economic Issues*, *14*(4), 909-923.

McEvily, B., & Zaheer, A. (1999). Bridging ties: A source of firm heterogeneity in competitive capabilities. *Strategic management journal*, *20*(12), 1133-1156.

Mendenhall, W., Sincich, T., & Boudreau, N. S. (2003). *A second course in statistics: regression analysis* (Vol. 6). New York: Prentice Hall.

Mishra, A. A., & Shah, R. (2009). In union lies strength: Collaborative competence in new product development and its performance effects. *Journal of Operations Management*, *27*(4), 324-338.

Mishra, D. P., Heide, J. B., & Cort, S. G. (1998). Information asymmetry and levels of agency relationships. *Journal of marketing Research*, *35*(3), 277-295.

Moorman, C., Zaltman, G., & Deshpande, R. (1992). Relationships between providers and users of market research: the dynamics of trust within and between organizations. *Journal of marketing research*, *29*(3), 314-328.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, *23*, 242–266.

Noordewier, T. G., John, G., & Nevin, J. R. (1990). Performance outcomes of purchasing arrangements in industrial buyer-vendor relationships. *Journal of marketing*, *54*(4), 80-93.

Nooteboom, B. (1996). Trust, opportunism and governance: A process and control model. *Organization studies*, *17*(6), 985-1010.

Ouchi, W. G. (1979). A conceptual framework for the design of organizational control mechanisms. *Management science*, *25*(9), 833-848.

Park, M., Kim, M., & Ryu, S. (2020). The relationship between network governance and unilateral governance in dynamic consumer demand. *Industrial Marketing Management*, *84*, 194-201.

Wang, L., Sheng, S., Wu, S., & Zhou, K. Z. (2017). Government role, governance mechanisms, and foreign partner opportunism in IJVs. *Journal of Business Research*, *76*, 98-107.

Podolny, J. M., & Baron, J. N. (1997). Resources and relationships: Social networks and mobility in the workplace. *American sociological review*, *62*(5), 673-693.

Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual review of sociology*, *24*(1), 1-24.

Prell, C. (2012). *Social network analysis: History, theory and methodology*. Sage.

Ragatz, G. L., Handfield, R. B., & Scannell, T. V. (1997). Success factors for integrating suppliers into new product development. *Journal of Product Innovation Management: An International Publication of the Product Development & Management Association*, *14*(3), 190-202.

Raub, W., & Weesie, J. (1990). Reputation and efficiency in social interactions: An example of network effects. *American Journal of Sociology*, *96*(3), 626-654.

Reagans, R., & Zuckerman, E. W. (2001). Networks, diversity, and productivity: The social capital of corporate R&D teams. *Organization science*, *12*(4), 502-517.

Rodan, S. (2010). Structural holes and managerial performance: Identifying the underlying mechanisms. *Social Networks*, *32*(3), 168-179.

Ryu, S., Cho, H., & Kim, K. (2013). Effects of network embeddedness on the relationship between environmental volatility and interfirm contracts. *Journal of Business-to-Business Marketing*, *20*(3), 139-153.

Salancik, G. R., & Pfeffer, J. (1978). A social information processing approach to job attitudes and task design. *Administrative science quarterly*, *23*, 224-253.

Scott, W. R., & Davis, G. F. (2015). *Organizations and organizing: Rational, natural and open systems perspectives*. Routledge.

Simmel, G. (1919). *Philosophische kultur: gesammelte essais* (Vol. 27). A. Kroner.

Shipilov, A. V., & Li, S. X. (2008). Can you have your cake and eat it too? Structural holes' influence on status accumulation and market performance in collaborative networks. *Administrative Science Quarterly*, *53*(1), 73-108.

Song, X. M., & Montoya-Weiss, M. M. (1998). Critical development activities for really new versus incremental products. *Journal of Product Innovation Management: An International Publication Of The Product Development & Management Association*, *15*(2), 124-135.

Stump, R. L., & Heide, J. B. (1996). Controlling supplier opportunism in industrial relationships. *Journal of Marketing Research*, *33*(4), 431-441.

Sydow, J., & Windeler, A. (1998). Organizing and evaluating interfirm networks: A structurationist perspective on network processes and effectiveness. *Organization science*, *9*(3), 265-284.

Thomas, G. P., & Grashof, J. F. (1982). Impact of internal and external environmental stability on the existence of determinant buying rules. *Journal of Business Research*, *10*(2), 159-168.

Tsai, W. (2002). Social structure of "coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing. *Organization science*, *13*(2), 179-190.

Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American sociological review*, *61*(4), 674-698.

Walker, G., Kogut, B., & Shan, W. (1997). Social capital, structural holes and the formation of an industry network. *Organization science*, *8*(2), 109-125.

Wathne, K. H., & Heide, J. B. (2000). Opportunism in interfirm relationships: Forms, outcomes, and solutions. *Journal of marketing*, *64*(4), 36-51.

Weitz, B. A., & Jap, S. D. (1995). Relationship marketing and distribution channels. *Journal of the academy of Marketing Science*, *23*(4), 305-320.

Williamson, O. E. (1985). *The economic institutions of capitalism*. New York: Free Press.

Williamson, O. E. (1993). Transaction cost economics and organization theory. *Industrial and corporate change*, *2*(2), 107-156.

Xiao, Z., & Tsui, A. S. (2007). When brokers may not work: The cultural contingency of social capital in Chinese high-tech firms. *Administrative Science Quarterly*, *52*(1), 1-31.

Young, G., Sapienza, H., & Baumer, D. (2003). The influence of flexibility in buyer-seller relationships on the productivity of knowledge. *Journal of Business Research*, *56*(6), 443-451.

Zaheer, A., & Bell, G. G. (2005). Benefiting from network position: firm capabilities, structural holes, and performance. *Strategic management journal*, *26*(9), 809-825.