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# Environmental Variability, Opportunism, Trust and Network Effect in Channel Relationships

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## Abstract

**Purpose:** The study explores how environmental variability influences opportunism and trust in inter-firm channel relationships. It further examines the moderating role of network embeddedness, particularly the effects of strong and weak ties, in shaping these dynamics under uncertain conditions. **Research design, data and methodology:** To investigate these relationships, the study develops hypotheses suggesting that environmental variability increases opportunism while reducing trust. It also proposes that network embeddedness moderates these effects, with strong and weak ties playing distinct roles. The analysis draws on empirical data from firms engaged in inter-firm exchanges. Statistical analyses are conducted to assess how different levels and types of embeddedness impact the effects of environmental variability on opportunism and trust. **Results:** The results support all proposed hypotheses. Environmental variability is positively associated with opportunism and negatively associated with trust. Network embeddedness significantly moderates these relationships. Firms embedded in strong tie networks experience reduced opportunism and enhanced trust, as these ties function as informal control mechanisms and promote mutual understanding. Weak ties show limited moderating effects. **Conclusions:** The research underscores the importance of network embeddedness in managing opportunism and promoting trust amid environmental variability. Strong ties enhance information sharing, mutual understanding, and relational stability, helping firms navigate volatile conditions more effectively. The study contributes to the literature by integrating social exchange theory and social network theory, highlighting the need for firms to strategically manage their network relationships to foster cooperation and reduce risks associated with uncertainty.

**Keywords :** Environmental Variability, Opportunism, Trust, Interfirm Network, Channel Relationships

**JEL Classification Code:** C42, D3, D81, D83

## 1. Introduction

The operations of an organization are profoundly embedded within the intricate social networks that define its respective industry. According to Kadushin (2012), economic actions are shaped by the broader social context in which they occur, with the positioning of actors within a social network serving as a crucial determinant of these

actions. Furthermore, Johnson (2003) states that the competitive production market is shaped by networks connecting organizations, rather than by a group of entirely separate and independent firms.

Similarly, Uzzi (1996) discusses how economic actions and outcomes within a network are influenced not only by individual dyadic relationships but also by the overall structure of the network.

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Therefore, when studying inter-organizational relationships, network embeddedness should be considered the most critical contextual factor. This is because all firms' economic actions take place within the network of their exchange partners. The degree to which an organization is integrated into a network determines the flow of resources, the potential for collaboration, and the intensity of competition, all of which directly or indirectly impact a firm's performance. Thus, analyzing the network context is an essential process in strategic decision-making for organizations.

This study aims to explore network embeddedness as a contextual factor influencing inter-firm relationships in environments characterized by variability. Under such conditions, firms encounter external environmental changes that are beyond their control and difficult to predict (Mason, 2008), including market unpredictability and variability (Tushman & Anderson, 1986).

Variability, in particular, denotes the pace and unpredictability of environmental fluctuations over time, thereby generating uncertainty about future market conditions (Child, 1972). However, because predicting all potential future contingencies in advance is challenging, adjustments after the fact often become necessary in variable environments. In this context, variability creates conditions that facilitate opportunistic behavior, thereby heightening the likelihood of its occurrence. Environmental variability compels firms to depend more heavily on formal enforcement mechanisms, such as detailed and complex contractual agreements, to resolve disputes and mitigate the risks associated with opportunistic behavior by partners (Poppo & Zenger, 2002; Williamson, 1991). When firms perceive a heightened risk of opportunism from their partners, they tend to favor contract-based governance, which prioritizes legally binding agreements as a means of regulating inter-firm relationships (Poppo & Zenger, 2002). However, an increased dependence on detailed and highly structured contracts may hinder the cultivation of trust between exchange partners. Trust refers to the perception that one party is sincerely concerned about the well-being of the other and that both parties are driven by a shared interest in achieving mutually beneficial outcomes (Morgan & Hunt, 1994).

Under conditions of environmental variability, firms are susceptible to the opportunistic behavior of their exchange partners. Owing to the intrinsic variability of future contingencies, firms struggle to assess their partners' trust in advance, while apprehensions about potential opportunism remain afterward. Given that all economic activities are embedded within inter-organizational networks (Uzzi, 1997), firm relationships should be analyzed through the lens of network embeddedness. Network embeddedness is defined by two fundamental

dimensions: strong ties and weak ties (Uzzi, 1997; Coleman, 1988). Strong ties facilitate the exchange of complex and tacit knowledge while simultaneously serving as a mechanism for social governance (Nahapiet & Ghoshal, 1998). Conversely, weak ties do not incorporate the control and coordination structures that typically govern hierarchical and market-based interactions (Burt, 2017). These characteristics of firms' network embeddedness significantly influence the interplay between environmental variability and the mechanisms of opportunism and trust. The central objective of this study is to investigate the role of network embeddedness in shaping inter-firm relationships.

The study specifically aims to elucidate the moderating effect of a firm's network embeddedness on the relationship between environmental variability and the opportunistic behavior of its exchange partners, as well as on the relationship between environmental uncertainty and their trust (Uzzi, 1997). By examining these interactions, the study seeks to provide a deeper understanding of how network structures influence inter-firm dynamics under conditions of variability.

The study offers two key contributions. First, it highlights the significance of network embeddedness as a moderating factor in mitigating opportunistic behavior. Firms integrated into strong-tie networks are less likely to engage in opportunism despite facing environmental variability, as network embeddedness functions as a social governance mechanism that regulates inter-firm interactions (Uzzi, 1997; Coleman, 1988). Second, this study advances understanding of how firms cultivate trust inter-organizational relationships in variable environments. It posits that embedded networks play a crucial role in fostering trust-based partnerships among firms operating under environmental variability (Burt, 2005; Nahapiet & Ghoshal, 1998). The proposed conceptual model, which is empirically tested, is illustrated in Figure 1.

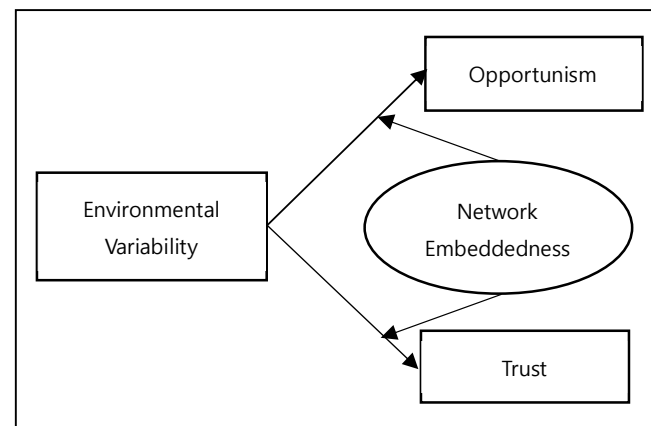


Figure 1: Research Model

## 2. Literature Review

### 2.1. Network Embeddedness

According to the social network perspective in organizational theory, the most critical aspect of an organization's environment is the network of social relationships in which it is embedded (Granovetter, 1985). Economic activities, like all forms of social action, do not occur in isolation but are deeply rooted in interconnected social structures. A social network can be described as a system of interconnected entities (e.g., individuals, institutions) linked through specific types of relationships, such as collaboration, resource exchange, or shared affiliations (Burt, 1992).

From a network perspective, economic behavior is shaped by the broader social context in which it is embedded, and actors' positions within these networks can significantly influence their actions (Coleman, 1990). Furthermore, Podolny (2001) argues that in competitive markets, firms are not isolated entities operating independently; rather, they are interconnected through embedded social and economic ties that shape their strategic interactions and market dynamics.

For organizations to effectively integrate into the social networks within their industries, they must cultivate strategic relationships that facilitate resource exchange, information flow, and competitive positioning. The concept of embeddedness suggests that economic actions and outcomes are significantly shaped by both direct interpersonal relationships and the broader structural network in which these relationships are situated (DiMaggio & Louch, 1998). These two dimensions—relational embeddedness and structural embeddedness—emphasize the importance of both dyadic interactions and the overall network configuration (Gargiulo & Benassi, 2000).

Building on insights from the social network literature, scholars define the strength of network ties based on four critical dimensions: (1) the frequency of interactions, (2) the intensity and significance of engagement, (3) the stability and longevity of relationships, and (4) the level of trust among network members (Brass et al., 2004; Walker et al., 1997). These factors collectively influence an organization's ability to leverage its network for sustained competitive advantage, fostering collaboration, innovation, and long-term resilience.

Consequently, researchers suggest that strong ties foster trust and facilitate detailed, high-quality information exchange among partners (Coleman, 1988; Gulati & Gargiulo, 1999). In contrast, weak ties play a crucial role in promoting innovation by granting access to diverse, non-redundant, and novel sources of information (Burt, 1992).

### 2.2. Strong Ties

Consequently, researchers suggest that strong ties foster trust and facilitate detailed, high-quality information exchange among partners (Coleman, 1988; Gulati & Gargiulo, 1999; Reagans & McEvily, 2003). In a comprehensive review of research on social network ties, Burt (1997) highlights that strong ties play a crucial role that should not be underestimated. While weak ties facilitate access to diverse and non-redundant information beyond an individual's immediate network, strong ties offer a higher degree of commitment and are more readily available for support. Citing Lin (2001), research suggests that strong ties become particularly critical in situations of uncertainty or vulnerability, as they provide consistent support and access to essential resources. Burt (2003) posits that individuals in precarious situations are inclined to establish strong social connections to enhance stability and reduce variability. In a similar vein, Coleman (1990) argues that the structure of informal networks within an organization significantly influences its ability to manage crises. Empirical studies suggest that organizations fostering cross-departmental social ties are better positioned to respond to environmental variability and adapt to changing external conditions.

Within the social network theory framework, strong ties are recognized for offering organizations two key benefits: facilitating detailed information exchange and fostering trust-based governance. First, strong ties contribute to the transfer of high-quality information and tacit knowledge. For instance, Saxenian (1996), in her study of Silicon Valley, highlights that firms embedded in strong network relationships can effectively share nuanced and specialized knowledge. Moreover, as strong ties develop, inter-organizational partners gain deeper insights into each other's operations, increase their mutual dependence, and cultivate relational trust (Powell, 2003).

A comprehensive understanding of a partner's operations facilitates the transfer of tacit knowledge across organizational boundaries (Nonaka & Takeuchi, 1995). Additionally, strong ties function as a mechanism of social control that regulates behaviors within partnerships. Organizations engage in strategic alliances, including collaborations with competitors, to access external resources, distribute risks and costs, and integrate complementary capabilities (Gulati, 1998; Dyer & Singh, 1998).

Nevertheless, inter-organizational alliances with competitors inherently carry risks, particularly concerning the potential for opportunistic behavior by alliance partners. As noted by Williamson (1975), firms engaged in strategic alliances remain vulnerable to opportunism, as such alliances, by themselves, lack the necessary social control mechanisms to regulate opportunistic tendencies. In this

context, Granovetter (1985) argues that strong ties gradually cultivate trust, reciprocity, mutual benefits, and a long-term orientation, thereby functioning as an informal governance mechanism. As a result, firms embedded in strong ties are less likely to prioritize short-term individual gains and are more inclined to engage in collaborative problem-solving processes (Dyer & Singh, 1998; Gulati, 1995).

Strong ties are both shaped by and regulated through relational trust and norms of mutual benefit and reciprocity, which evolve over repeated interactions (Granovetter, 1985; Dyer & Singh, 1998). Aligning with Powell's (2003) proposition that networks constitute a distinct organizational form, Nonaka and Takeuchi (1995) conceptualize trust-based governance as an embedded system that facilitates knowledge exchange and collaboration. This perspective is further supported by Gulati (1995), who argues that the development of cohesive and intensive ties underpins the logic of embeddedness. Likewise, Dyer and Nobeoka (2000) establish a positive correlation between relational capital—strong trust-based ties—and the extent of inter-firm learning.

Although strong ties provide two key advantages—namely, fine-grained information exchange and trust-based governance—they also present limitations. Granovetter (1973) contends that strong ties primarily connect individuals with similar backgrounds, leading to network clustering where members are mutually connected. As a result, the information circulated within such networks tends to be redundant, thereby limiting access to novel insights and reducing the network's potential as a conduit for innovation. This structural constraint suggests that while strong ties foster stability and trust, they may simultaneously hinder the introduction of diverse perspectives and creative solutions (Burt, 1992; Coleman, 1988).

### **2.3. Weak Ties**

Burt (2003) contends that weak ties are particularly effective in connecting individuals to diverse social circles, thereby granting them access to novel perspectives and alternative approaches. His argument is based on the premise that weak ties often function as "structural holes," bridging otherwise disconnected segments of a social network. Consequently, weak ties serve as critical channels for transmitting new information across different parts of the system. Moreover, Coleman (1988) highlights that weak ties facilitate knowledge diffusion, as they are more likely than strong ties to link individuals to distant actors who possess unique and non-redundant insights (Granovetter, 1985; Reagans & McEvily, 2003).

The strength of the weak ties argument is rooted not only in relational embeddedness but also in structural embeddedness. Weak ties are valuable because they serve as local bridges, facilitating the flow of novel information

within a network and fostering system-wide innovation. Perry-Smith and Mannucci (2017) propose that an optimal balance of weak ties enhances creativity by integrating two key network characteristics: size and strength. This perspective suggests that cultivating an ideal number of ties—regardless of whether they connect actors to distant or proximate sources of information—drives higher levels of creative output. Since each tie functions as a conduit for accessing diverse knowledge, expanding the number of idea-generating connections up to an optimal threshold increases the breadth of available information (Fleming et al., 2007). A greater pool of accessible knowledge, in turn, amplifies the potential for novel idea combinations and enhances the likelihood of creative breakthroughs (Hargadon & Sutton, 1997).

While weak ties provide access to novel information that fosters innovation, they also entail significant risks. A key challenge is that inter-organizational collaborations formed through weak ties often lack effective control and coordination mechanisms to manage interfirm relationships. Consequently, firms engaged in such alliances face a heightened risk of opportunistic behavior from their partners (Gulati, 1995). Without adequate governance structures, weak ties may lead to issues such as knowledge leakage, misaligned objectives, and difficulties in maintaining long-term cooperation (Dyer & Singh, 1998).

### **2.4. Environmental Variability**

Numerous definitions of variability emphasize shared aspects concerning the effects of inadequate information, limited knowledge, and, consequently, constrained understanding (e.g., Knight, 1921; Lipshitz & Strauss, 1997).

Knight (1921) examines the link between variability and the absence of sufficient information and knowledge. Galbraith (1973) conceptualizes variability in relation to the nature of missing information, proposing that environmental variability arises from an inability to comprehend shifts, events, and causal dynamics in the external environment.

This, in turn, leads to challenges in forecasting their impact on the organization and hinders the development of strategic responses and the anticipation of their outcomes. Daft and Lengel (1986) highlight varying levels of knowledge and the role of judgment and reasoning in navigating uncertain contexts. Similarly, Lipshitz and Strauss (1997) categorize variability based on a lack of knowledge regarding specific external environmental factors and the resulting deficiency in understanding. Collectively, these perspectives converge on key themes: the insufficiency of information and knowledge, the limitation of understanding, and the challenge of anticipating changes in the external environment.

Variability can also be understood as the gap between the information necessary to complete a task and the information currently available within an organization (Galbraith, 1973). External variability may arise from shifts in environmental conditions that organizations cannot control and struggle to predict (Dess & Beard, 1984), including factors such as market volatility and unpredictability (Aldrich, 1979). Additionally, heightened environmental variability amplifies the perceived likelihood of opportunistic behavior among exchange partners (Hill, 1990).

Variability is a crucial concept within the transaction cost economics (TCE) framework. According to Williamson (1975, 2007), variability arises from the constraints of bounded rationality, as decision-makers cannot anticipate all possible contingencies at any given moment. This limitation generates variability, particularly when the number of contingencies surpasses the information-processing capacity of the involved party. Under such conditions, constructing a comprehensive decision tree becomes unfeasible (Williamson, 1975). Empirical research in TCE has often equated variability with volatility, aligning with Williamson's (2007) emphasis on the governance dimension of TCE. This perspective underscores environmental volatility and asset specificity as key determinants, avoiding concerns related to measurement challenges.

Market dynamism refers to the pace and unpredictability of environmental fluctuations over time, leading to variability in future conditions. Given the challenges in forecasting all potential contingencies in advance, organizations operating in dynamic environments often need to make post-hoc adjustments to their strategies and operations (Daft & Lengel, 1986). In contrast, interpretive complexity pertains to the degree of variability embedded in the perception of the external environment, independent of temporal fluctuations. Rather than focusing on uncertain future developments, interpretive complexity emphasizes ambiguity in understanding present circumstances and past occurrences (Thompson, 1967).

Market volatility heightens the risk of opportunistic behavior in exchanges, increasing the likelihood of its occurrence. It creates a necessity for renegotiating agreements to prevent maladaptation to shifting external conditions. Such renegotiations often involve conflict and non-cooperative bargaining, as self-interested parties seek to maximize their individual gains (North, 1990). In contrast, the measurement perspective within transaction cost economics (TCE) highlights the challenges associated with evaluating contributions and performance, often referred to as the metering problem or assessment ambiguity (Masten, 1993). Ambiguity, in this context, facilitates opportunities for individuals to underperform, misrepresent efforts, or

otherwise engage in opportunistic behavior without detection (Molleman et al., 2023). When perceptions of a partner's actions are unclear, certain instances of opportunism may remain unnoticed, thereby weakening accountability mechanisms and reducing the likelihood of punitive measures. Consequently, ambiguity increases the propensity for opportunistic behavior within transactional relationships.

Likewise, in conditions of ambiguity, certain cooperative behaviors may be mistakenly penalized as opportunistic, thereby diminishing incentives for collaboration (March & Olsen, 1976). Duncan (1972) proposed that external environmental factors can be categorized into environmental complexity and environmental dynamism. Environmental complexity pertains to the diverse external forces with which an organization engages, while environmental dynamism relates to the velocity of change and the unpredictability of environmental shifts. Complexity is linked to the variability present in a specific situation at a given moment, whereas dynamism reflects the variability that unfolds over time (Lawrence & Lorsch, 1967).

Lawrence and Lorsch (1967) observed that environmental dynamism exerts a significantly greater influence on perceived environmental variability than environmental complexity. This is largely because, over time, decision-makers can mitigate complexity by acquiring additional information and improving their understanding. In contrast, dynamism, by its very nature, remains inherently unpredictable. For organizations operating in volatile environments, dynamism may represent a more critical source of variability than complexity, as firms often lack the necessary resources to fully comprehend and formulate effective responses to rapid and unforeseen environmental changes (Thompson, 1967).

In volatile environments, firms tend to favor formal governance mechanisms, such as detailed contractual agreements for dispute resolution, rather than informal mechanisms based on relational norms (Mayer & Argyres, 2004). When the risk of opportunistic behavior from partners increases, firms are more inclined to adopt contract-based governance rather than trust-driven relational governance (Gulati & Nickerson, 2008). Contract-based governance relies on legally binding agreements to regulate inter-firm relationships, ensuring compliance through formalized terms. In contrast, relational governance is built on mutual trust, long-term commitment, and relational capital, fostering cooperation without the need for extensive legal oversight (Dyer & Singh, 1998).

An increased dependence on detailed and highly complex contractual agreements poses the risk of undermining inter-partner trust. Investigating the interaction between formal governance structures and relational

governance within strategic alliances, Lumineau and Malhotra (2011) found that comprehensive contracts facilitate trust-building, whereas narrowly defined contracts may impede its development. Since trust inherently requires a willingness to accept risk and embrace vulnerability (McEvily et al., 2003), firms operating in volatile market conditions may be hesitant to cultivate inter-organizational trust with their partners and suppliers due to concerns over potential opportunistic behavior.

## **2.5. Opportunism**

Opportunism is defined as the pursuit of self-interest through deceptive or manipulative tactics (North, 1990). This behavior includes a variety of unethical practices, such as misrepresentation, contractual breaches, data distortion, strategic ambiguity, transactional obfuscation, issuing misleading threats or promises, circumventing regulations, concealing critical information, and other forms of deception (Granovetter, 1985; Barney, 1990). Fundamentally, opportunism represents an aggressive form of self-interest that disregards the broader impact of an entity's actions on external stakeholders (Dyer & Singh, 1998). Furthermore, Granovetter (1985) differentiates between active opportunism, which occurs within existing agreements, and passive opportunism, which emerges in response to evolving circumstances.

For instance, opportunistic behavior in the form of quality reduction occurs when a party withholds effort or passively fails to fulfill its contractual obligations. In contrast, violating a distribution agreement by selling in an unauthorized region constitutes an active breach. Based on the typology of opportunism outlined by Granovetter (1985) and Nooteboom (1996), passive opportunism within established conditions manifests as shirking responsibilities or evading commitments. Under evolving circumstances, passive opportunism appears as rigidity, or an unwillingness to adapt. Conversely, active opportunism in existing agreements involves explicit or implicit violations of contractual terms. When new circumstances arise, active opportunism takes the form of strategic exploitation, where one party leverages the changing conditions to demand concessions, such as forcing renegotiations (Dyer & Singh, 1998).

The presence of opportunism in exchange relationships carries significant practical implications. When the likelihood of opportunistic behavior in a given transaction is high, firms must allocate substantial resources toward oversight and enforcement—resources that could otherwise be utilized more efficiently for value-generating activities. Moreover, the risk of opportunism can lead to considerable opportunity costs, as it may prevent mutually beneficial

agreements from being realized, ultimately resulting in "valuable deals left unexecuted" (Williamson, 2007).

In addressing various forms of opportunism, transaction cost literature has identified several strategic approaches to mitigate opportunistic behavior. Early research in this field primarily emphasized the role of monitoring mechanisms and incentive structures. In fact, the justification for vertical integration as a governance mechanism is largely based on its capacity to regulate opportunism through enhanced oversight and structured incentives (North, 1990). When information asymmetry exists within a transaction, one party may exploit it opportunistically without immediate detection. This challenge can be mitigated by implementing monitoring systems that focus either on the partner's actions or the observable outcomes of their behavior (Barney & Hesterly, 2006).

Theoretically, two primary arguments support the idea that monitoring can mitigate opportunistic behavior. From a behavioral standpoint, the act of monitoring itself may create social pressure, making opportunistic actions more uncomfortable and thereby fostering greater compliance (Murry & Heide, 1998). From an economic perspective, monitoring enhances the detection of opportunism and strengthens the ability to align rewards and sanctions appropriately with a partner's actions. Within the original transaction cost framework (North, 1990), one of the key advantages of hierarchical governance structures, including monitoring mechanisms, is their capacity to implement incentive systems that diminish the benefits of opportunistic behavior.

Research on self-enforcing agreements (Greif, 1993) suggests that similar mechanisms can be applied to relationships between independent firms. The fundamental premise of these agreements is to align the interests of both parties by establishing an incentive structure in which the long-term benefits of cooperation surpass the short-term gains from opportunistic behavior. When effectively designed, such agreements help deter opportunism before it emerges. Subsequent research on transaction costs has demonstrated how monitoring and incentive structures traditionally associated with hierarchical governance can be adapted for inter-firm relationships (Greif, 1993; Gibbons, 2005). More recent studies have extended this perspective by suggesting that opportunistic behavior can be managed not only through oversight and incentives but also through strategic partner selection and socialization processes (Dyer & Singh, 1998; Gulati, 1995).

A fundamental approach to mitigating opportunism is the proactive selection of exchange partners who exhibit a low propensity for opportunistic behavior or demonstrate a natural inclination toward cooperation in specific tasks (Das & Rahman, 2010). In marketing and business contexts, selection efforts are executed through various screening and

qualification mechanisms. For instance, franchisors minimize the risk of quality shirking by subjecting prospective franchisees to rigorous evaluation procedures. Likewise, automobile manufacturers implement structured supplier qualification programs to ensure compliance with quality standards and prevent future performance deficiencies (Dyer & Singh, 1998). An alternative approach to managing opportunism involves socialization processes, which encourage agents to internalize the principal's objectives, fostering alignment between their interests and the broader organizational goals (Gulati, 1995).

Uzzi (1997) contends that transaction cost theory overlooks the extent to which economic transactions are embedded within social networks, which play a crucial role in mitigating opportunistic behavior. From this perspective, an effective strategy for addressing opportunism is the intentional implementation of socialization mechanisms designed to foster shared goals and enhance alignment between exchange partners. Powell (2003) asserts that transaction cost theory has not fully acknowledged the extent to which economic exchanges are embedded within social networks, which serve to reduce the likelihood of opportunistic behavior. From this perspective, a viable approach to mitigating opportunism is the strategic use of socialization mechanisms that foster goal alignment and strengthen relational bonds between exchange partners.

## 2.6. Trust

Trust has been extensively studied across various disciplines, including social psychology (Rousseau et al., 1998), sociology (Coleman, 1990), economics (North, 1990), and marketing (Morgan & Hunt, 1994). Each of these fields provides distinct perspectives on the nature of trust, its conceptualization, and the mechanisms through which it emerges and evolves in interpersonal and interorganizational relationships.

Kramer (1999) conducted a comprehensive review of the trust literature and defined trust as "a confident positive expectation regarding another's behavior." At the inter-organizational level, Zaheer et al. (1998) conceptualized trust as an organization's belief that a partner firm will not engage in opportunistic behavior. A common theme across various academic disciplines highlights the role of mutual expectations of positive conduct in defining and measuring trust (Mayer et al., 1995). Consequently, in an inter-organizational setting, trust is understood as the expectation that a partner's commitments will be honored and that, in unforeseen situations, the partner will act cooperatively in good faith (Ring & Van de Ven, 1994). Extensive research has also examined the significance of trust in interpersonal relationships and dyadic interactions (McAllister, 1995).

While some scholars debate whether organizations can themselves be objects of trust, a substantial body of research underscores that individuals can develop trust in public institutions (Mayer et al., 1995) and organizations (Zaheer et al., 1998), as well as in other individuals. Accordingly, trust literature suggests that in industrial purchasing contexts, buyers may place trust in both the supplier firm and its sales representatives. Furthermore, across different levels of analysis, trust requires a degree of vulnerability on the part of the trusting entity. Specifically, for trust to be meaningful, decision outcomes must carry a level of uncertainty and hold significance for the trusting party (Rousseau et al., 1998; McAllister, 1995; Ring & Van de Ven, 1994).

In the field of marketing, extensive research on trust has been conducted within the context of distribution channels (Jap & Ganesan, 2000; Zaheer & Venkatraman, 1995), where vulnerability arises from the high level of interdependence typically present in channel relationships (Heide & John, 1992; Joshi & Stump, 1999). In conventional distribution arrangements, such as manufacturer-distributor or manufacturer-retailer relationships, switching costs tend to be substantial. As a result, this body of research underscores the impact of trust on key constructs that contribute to the development of long-term partnerships with customers, including commitment (Jap & Anderson, 2003), long-term orientation (Ganesan & Hess, 1997), and the inclination of parties to maintain the relationship (Heide & John, 1990).

Marketing scholars examining inter-firm and group relationships differentiate trust into three key dimensions: integrity, reliability, and goodwill (Mayer et al., 1995; Zaheer et al., 1998). Integrity refers to a firm's belief that its partner is dependable, adheres to commitments, fulfills role obligations, and acts with sincerity (Heide & John, 1992; Moorman et al., 1993). Reliability pertains to the confidence that a partner's statements, whether verbal or documented, can be trusted (Rotter, 1967). Goodwill reflects a firm's belief that its partner genuinely prioritizes mutual well-being and is motivated by shared long-term benefits. A partner exhibiting goodwill will forgo immediate self-interest in favor of sustained collective gains and will refrain from unexpected actions that could harm the relationship (Ring & Van de Ven, 1994).

This study adopts this perspective on trust and emphasizes that the goodwill dimension of trust, as identified in marketing literature, best represents trust within inter-firm and group purchasing contexts. When operating under conditions of environmental volatility, a purchasing firm seeks a supplier or salesperson whom it perceives as both capable of delivering consistent and effective performance and genuinely committed to the buyer's well-being (Ganesan & Hess, 1997; Morgan & Hunt, 1994).

Goodwill in business relationships is demonstrated through attentiveness to the needs and interests of the

exchange partner, acting in ways that safeguard those interests, and refraining from opportunistic behavior for personal gain (McEvily et al., 2003). The role of goodwill in inter-firm relationships becomes particularly critical when transactions take place in uncertain environments. It reflects the extent to which a firm trusts that its partner's intentions and actions will be mutually beneficial, even when unforeseen circumstances arise that were not explicitly covered in prior agreements (Jap & Anderson, 2003). For instance, if supply chain disruptions occur due to inventory shortages, a supplier may exploit the situation by raising prices above the market rate or reallocating limited stock to another buyer willing to pay a premium. Conversely, the purchasing firm, anticipating such opportunistic behavior, may demand more detailed and binding contractual agreements to safeguard against potential exploitation (Heide & John, 1992).

However, contractual agreements alone cannot fully eliminate the possibility of future opportunistic behavior by suppliers. Furthermore, uncertain market conditions offer limited opportunities for buyers to demonstrate goodwill toward suppliers. In the context of inter-organizational relationships, marketing scholars argue that goodwill fosters a cooperative dynamic, which helps reduce transaction costs by minimizing opportunistic tendencies among exchange partners and decreasing the necessity for extensive safeguards against such behaviors (Gulati, 1995; Dyer & Singh, 1998). From a transaction cost perspective, opportunism is defined as conduct that undermines the cooperative spirit of agreements, violating implicit or explicit relational expectations (North, 1990; Williamson, 2007).

### 3. Hypotheses

Businesses encounter multiple sources of environmental variability when making strategic decisions. This variability arises from shifts in external conditions that are beyond a firm's control and difficult to predict (Miller, 1993), including factors such as market turbulence and economic volatility (Tushman & Anderson, 1986). Market volatility refers to the speed and unpredictability of environmental changes over time, which generate uncertainty regarding future conditions. Since it is impossible to foresee all potential contingencies in advance, firms often need to make reactive adjustments in response to volatile market dynamics (Teece et al., 1997).

Moreover, Simon (1957) and March (1988) argue that environmental variability is driven by the concept of 'bounded rationality', wherein decision-makers face cognitive and informational limitations that prevent them from fully anticipating all possible future scenarios. As a

result, uncertainty emerges as a fundamental challenge in organizational decision-making.

Williamson (1975) asserts that when contingencies become too numerous, they surpass the information-processing capacity of decision-makers, making it impossible to construct a fully comprehensive decision tree. Under such conditions, Variability in the external environment creates the necessity for frequent renegotiations of agreements to prevent misalignment with changing conditions. Such renegotiations often involve conflict and non-cooperative bargaining, as parties act in pursuit of their own self-interest (North, 1990).

Additionally, environmental variability heightens the risk of opportunistic behavior by reducing the likelihood of detection (Barney & Hesterly, 2006), thereby increasing its overall prevalence. Consequently, uncertainty within the business environment amplifies the perceived risk of opportunism among exchange partners. Based on this reasoning, the following hypothesis can be proposed:

**H1:** Environmental variability has a positive relationship with the opportunistic behavior of exchange partners.

Environmental variability heightens exchange partners' perceived risk of opportunism, as a focal firm struggles to predict and control market conditions due to fluctuations in the external environment. When faced with concerns over opportunistic behavior from exchange partners, firms often resort to formal enforcement mechanisms, such as detailed contractual agreements, to mitigate potential risks (Poppo & Zenger, 2002).

However, an overreliance on rigid and complex contractual governance may hinder the development of goodwill between exchange partners. Joshi and Stump (1999) describe contract-based governance as a system that relies on formal, legally binding agreements to regulate inter-firm relationships. Given that goodwill reflects the belief that a partner prioritizes mutual benefit and is committed to fostering collective gains (Morgan & Hunt, 1994; Ganesan & Hess, 1997; Jap & Anderson, 2003), firms operating under strict contract-based enforcement mechanisms may struggle to cultivate goodwill and relational trust. Lumineau and Malhotra (2011) further argue that while comprehensive contracts can facilitate trust-building, excessively narrow contracts may, in contrast, impede its development.

Based on this discussion, the following hypothesis can be proposed:

**H2:** Environmental variability has a negative relationship with the trust of exchange partners.

The economic behaviors and performance outcomes of firms, like all social interactions, are influenced both by their direct relationships with other actors and by the broader structure of their network connections. These concepts are referred to as relational embeddedness and structural embeddedness, respectively (Granovetter, 1985). Integrating these two dimensions, organizational theorists introduce the concepts of network embeddedness and the strength of network ties to explain how firms navigate their inter-organizational relationships (Uzzi, 1996, 1997; Granovetter, 1973).

Scholars suggest that strong network ties facilitate trust and enable detailed, high-quality information exchanges between partners (Uzzi, 1997). In contrast, weak ties contribute to innovation by granting access to novel and non-redundant information, broadening an actor's exposure to diverse knowledge sources (Granovetter, 1973). Krackhardt (1992) further argues that strong ties become particularly valuable when individuals find themselves in uncertain or unstable situations, as they provide a reliable support network.

Building on this perspective, Granovetter (1982) argues that individuals facing insecurity are more likely to cultivate strong ties as a means of protection and to mitigate uncertainty. Expanding this concept to the organizational level, Krackhardt and Stern (1988) propose that the presence of strong ties within an organization plays a crucial role in its ability to navigate crises effectively. Similarly, Krackhardt et al. (1992) demonstrates that strong ties foster incremental trust-building, reinforcing mutual benefits, reciprocity, and a long-term orientation, ultimately functioning as a form of social control within inter-organizational relationships.

As a result, partners engaged in strong ties are less likely to engage in opportunistic behavior and instead tend to adopt joint problem-solving approaches (Powell, 2003; Uzzi, 1996). In this regard, strong ties become particularly valuable in environments characterized by variability, as they help regulate exchange partners' behavior and mitigate opportunism. Conversely, weak ties present potential risks, as inter-organizational collaborations based on loosely connected networks lack the robust control and coordination mechanisms necessary to effectively manage opportunistic tendencies within the exchange relationship.

Therefore, firms operating in environments characterized by variability are particularly vulnerable to the risks of opportunistic behavior (Williamson, 2007). For instance, firms facing market instability may encounter opportunistic actions from suppliers, such as renegotiating contracts to demand higher prices or redirecting supply to competitors offering better financial incentives.

However, suppliers engaged in strong ties are less likely to prioritize short-term gains and instead adopt a long-term

perspective, reinforcing trust and functioning as an informal social control mechanism. In contrast, suppliers connected through weak ties are more inclined to act opportunistically, as the absence of strong relational governance limits mechanisms to regulate such behavior.

Based on this reasoning, the following hypothesis can be proposed:

**H3:** Network embeddedness moderates the effect of environmental variability on the opportunistic behavior of exchange partners.

Strong ties facilitate the exchange of detailed information and tacit knowledge between partners (Granovetter, 1985). As these relationships strengthen, inter-firm partners develop a deeper understanding of each other's organizational processes, fostering interdependence and relational trust, as seen in Gulati's (1995) study on strategic alliances. Through these established ties, a focal firm perceives its exchange partner as having positive intentions and a commitment to mutual benefit, even in the absence of explicit contractual agreements (Ring & Van de Ven, 1994). For example, when managing market variability in procurement decisions, a focal firm prioritizes suppliers who exhibit reliability and goodwill—those who consistently perform well and demonstrate a vested interest in the long-term success of their partners (McEvily et al., 2003).

In this context, a focal firm's engagement in strong ties allows it to identify suppliers who demonstrate goodwill and reliability through the exchange of detailed information and a history of interactions (Gulati, 1995; Ring & Van de Ven, 1994). Consequently, the presence of strong ties moderates the relationship between environmental variability and perceived trust.

Granovetter (1973) suggests that weak ties serve as channels for accessing novel information by connecting an actor to diverse regions within a network. While weak ties provide valuable access to new insights, they lack the trust, mutual benefit, reciprocity, and long-term orientation that characterize strong ties and serve as informal governance mechanisms (McEvily et al., 2003). Due to their loosely connected structure, networks built on weak ties do not offer sufficient control mechanisms to deter opportunistic behavior when firms face market variability.

Based on this reasoning, the following hypothesis is proposed:

**H4:** Network embeddedness moderates the effect of environmental variability on the trust of exchange partners.

## 4. Research Methods and Materials

### 4.1. Research Setting and Data Collection

The study examined the impact of environmental variability on opportunism and trust, focusing on the moderating role of network embeddedness. It aimed to test hypotheses on how environmental variability affect first-tier suppliers' perceptions of buyer trust and opportunistic behavior.

Given that manufacturers heavily rely on supplier performance, substantial interactions occur to strengthen cooperation and facilitate information exchange. The research sample was selected based on the premise that major suppliers engage in the most intensive interactions with the manufacturer and exhibit the highest level of dependence, making them central to understanding the dynamics of trust and opportunism under environmental

variability. The study selected major first-tier suppliers using systematic random sampling from a mailing list provided by a leading engineering firm. This firm offered consulting and technical services to clients, with finished products sourced from first-tier suppliers. To confirm the critical role of first-tier suppliers in procurement activities, the study conducted in-depth interviews with industry experts and managers. Surveys were administered to procurement managers of first-tier suppliers, as they were well-positioned to provide insights into their firms and transaction partners. These managers not only maintained relationships with second-tier suppliers and business partners but also engaged in extensive interactions with the engineering firm, influencing supplier performance. By analyzing first-tier suppliers with diverse transaction relationships—including buyers, second-tier suppliers, and other business partners—the study explored the impact of environmental variability on opportunism and trust within the context of network embeddedness.

**Table 1:** Scale Items and Construct Evaluation

Constructs	Items	Standardized $\lambda^*$	C.R	Construct Reliability	AVE
Environmental Variability ( $\alpha=.87$ )	The availability of parts for key products in the market fluctuates significantly.	0.53	-	0.74	0.60
	Predicting technological advancements for our main products is highly challenging..	0.89	7.64		
	Estimating market demand for our major products is extremely difficult.	0.93	8.12		
Network Embeddedness ( $\alpha=.86$ )	Our company fostered highly collaborative relationships with our exchange partners.	0.89	-	0.91	0.88
	Our company maintained friendly and harmonious relationships with our exchange partners.	0.99	14.92		
	Our company engaged in sufficient relational interactions with our exchange partners.	0.91	11.67		
Opportunism ( $\alpha=.87$ )	Our primary supplier occasionally made commitments that it was unable to fulfill later.	0.89	-	0.91	0.87
	Our primary supplier occasionally manipulated information to achieve its goals.	0.99	15.49		
	Our primary supplier occasionally misled us to serve its own interests.	0.91	19.21		
Trust ( $\alpha=.87$ )	Our primary supplier viewed our success as equally important as its own.	0.91	18.22	0.90	0.58
	Our primary supplier took our company's interests into account when making key decisions.	0.89	-		
	Our primary supplier prioritized our company's growth when making business decisions.	0.99	15.49		

Note: (48) = 67.11 ( $p = .01$ ), goodness-of-fit index = .92; adjusted goodness-of-fit index = .88; comparative factor index = .99; root mean square error of approximation = .05. SFL = standardized factor loading, AVE=average variance extracted.

The study initially reached out to the procurement manager of each firm via telephone and subsequently sent them a questionnaire by mail. As procurement managers were responsible for sourcing parts and materials from sub-suppliers, they were expected to maintain close relationships with these suppliers and possess specialized knowledge of procurement items. Additionally, their role allowed them to provide insights into interactions with buyers based on procurement requirements. Following follow-up phone calls

and a second round of mailings, the study successfully gathered 148 responses from the 520 questionnaires distributed, resulting in an approximate response rate of 28%.

### 4.2 Nonresponse Bias

The study assessed non-response bias using two approaches. First, it compared early respondents with late

respondents, following the method suggested by Armstrong and Overton (1977). Additionally, the study analyzed the mean values of key variables, including environmental variability, network embeddedness, opportunism, and trust. The results showed no significant differences between the groups, indicating that non-response bias was not a major concern.

**4.3. Measure Development**

The study first gathered established measures of key variables from previous research. To assess their relevance, in-depth interviews were conducted with three purchasing managers. Based on insights from these interviews, certain items were reworded for clarity. All items were assessed using a 7-point Likert-type scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Since the original items were in English, a Korean version of the questionnaire was developed to fit the research context. To ensure equivalence between the English and Korean versions, a bilingual speaker back-translated the Korean version into English. Any discrepancies identified were discussed and resolved by the translators.

To measure first-tier suppliers’ perceptions of environmental variability, the study employed constructs from previous research (Chen & Paulraj, 2004; Petersen et al., 2003). Higher levels of technological uncertainty indicate greater difficulty in accurately predicting the technical requirements of a product. The measurement items for technological uncertainty were adapted from Heide and John (1990) and refined to align with the study’s context.

Environmental variability was primarily assessed based on the focal firm's perceived unpredictability regarding the availability of essential components, fluctuations in market demand, and technological advancements impacting major products (Thompson, 1967; Lawrence & Lorsch, 1967). Opportunism was measured using items adapted from Williamson (2007). Trust was evaluated through measurement items derived from Morgan and Hunt (1994). Network embeddedness was captured by analyzing the frequency, intensity, and stability of interactions between exchange partners, as these dimensions are widely recognized in the literature (Coleman, 1990; Powell, 2003; Gulati, 1998; Burt, 1992).

**4.4. Measure Reliability and Validity**

Cronbach’s alpha was employed in reliability analyses to confirm that each measure met acceptable reliability standards, with every item construct yielding a coefficient alpha above the widely accepted threshold of 0.82.

The study assessed the validity of the constructs—environmental variability (EV), network embeddedness

(NE), structural opportunism (O), and trust (T). The study conducted an item-total correlation test to eliminate ill-fitting items.

**Table 2: Means, Standard Deviations and Correlations**

	1	2	3	4
1. Environmental Variability (EV)	1.00			
2. Opportunism (O)	.399	1.00		
3. Trust (T)	-.222	-.397	1.00	
4. Network Embeddedness (NE)	-.078	-.342	.584	1.00
M	4.32	5.75	2.08	2.35
SD	1.50	1.38	0.99	1.13

Note: sample size = 148

The study then subjected the remaining items to a confirmatory factor analysis using AMOS. Based on this procedure, the study identified a measurement model that exhibited acceptable fit indices,  $\chi^2(48)=67.11$  ( $p=.01$ ), GFI=.92, AGFI=.88, CFI=.99, and RMSEA=.05. All factor loadings were statistically significant ( $p<.05$ ), which supports adequate convergent validity and confirms the unidimensionality of the measures (Anderson & Gerbing, 1988). The study also evaluated the discriminant validity of all four latent variables through AVE values (Fornell & Larcker, 1981), calculating these values to ensure they exceeded the squared correlation coefficients between variables. The findings indicated that discriminant validity was established, with AVE values ranging from 0.58 to 0.88.

Finally, the study assessed construct reliability and observed that each factor demonstrated an acceptable level of reliability. Overall, these findings suggest that the measures possess adequate reliability and validity. Table 1 presents the factor loadings, reliability estimates for each construct, goodness-of-fit indices, and AVE values, while Table 2 displays the inter-construct correlations.

**5. Analysis and Results**

**5.1. Hypotheses Test**

The study employed structural models to examine the hypotheses. It designated the supplier's environmental variability as the exogenous variable, while opportunism, trust, and network embeddedness were treated as endogenous variables. Environmental variability exhibited a positive effect on opportunism ( $\gamma_{11} = .32$ ,  $t = 4.81$ ), supporting H1, and a negative effect on partner’s trust ( $\gamma_{11} = -.15$ ,  $t = -2.57$ ), thereby supporting H2.

To evaluate the moderating influence of network embeddedness (i.e., H3 and H4), the study conducted a unique multisample analysis using AMOS, following the approach of Jaccard et al. (1996). The sample firms were split at the median into high and low network embeddedness

groups, and each group was subsequently analyzed using a nested structural model where environmental variability was treated as an exogenous variable, while network embeddedness, opportunism, and trust were considered endogenous variables.

**Table 3:** AMOS Results for H1 and H2

Description	Hypothesis		Coefficient	t value
	Hypotheses	Sign		
EV → O	H1	+	.32	4.81***
EV → T	H2	-	-.15	-2.57*

$\chi^2(25) = 55.532$ ,  $p = .001$ . Goodness-of-fit index = .93; adjusted goodness-of-fit index = .88; comparative factor index = .98; root mean square error of approximation = .07.

\*Significance at  $\alpha = .05$ , \*\*Significance at  $\alpha = .01$ , \*\*\* Significance at  $\alpha = .001$

**Table 4:** AMOS Results for H3 and H4

Description	Hypotheses	Strong Tie		Weak Tie	
		Coefficient	t value	Coefficient	t value
EV → O	H3	.25	3.18***	.57	4.14*
EV → T	H4	-.01	-.89	-.37	-2.66*

$\chi^2(52) = 96.708$ ,  $p = .001$ . Goodness-of-fit index = .84; adjusted goodness-of-fit index = .81; comparative factor index = .97; root mean square error of approximation = .073.

\*Significance at  $\alpha = .05$ , \*\*Significance at  $\alpha = .01$ , \*\*\* Significance at  $\alpha = .001$

To evaluate the moderating effect, the study adopted a two-step approach (Jaccard et al., 1996) by developing a structural model using pooled data from the two groups (i.e., the pooled-sample model). Initially, the study estimated the model's fit before moving on to test the multisample structural model. The pooled-sample model demonstrated an acceptable fit to the data ( $\chi^2 = 96.708$ ,  $df = 52$ ), thereby confirming the suitability of the multisample model for hypothesis testing.

The study then estimated a multi-sample model for the strong tie and weak tie groups by constraining the path coefficients across both groups to standardize conditions and limit interaction effects. It was hypothesized that if network embeddedness moderated the relationships, the constrained multi-sample model would show a poorer fit compared to the unconstrained pooled-sample model (Jaccard et al., 1996).

The analysis revealed that the difference in  $\chi^2$  values between the pooled-sample model ( $\chi^2 = 91.34$ ,  $df = 52$ ) and the multi-sample model ( $\chi^2 = 95.71$ ,  $df = 53$ ) supports a moderating effect of strong ties on the relationship between environmental variability and the opportunism ( $\chi^2 = 4.37$ ,  $df = 1$ ,  $p > .05$ ).

For the association between environmental variability and trust, the difference between the pooled-sample model ( $\chi^2 = 91.34$ ,  $df = 52$ ) and the multi-sample model ( $\chi^2 = 97.09$ ,

$df = 53$ ) indicates a moderating effect of network embeddedness ( $\chi^2 = 3.75$ ,  $df = 1$ ,  $p < .05$ ).

The study examined the multisample model to assess whether variability, opportunism, and trust were significantly correlated within the two groups (Jaccard et al., 1996). Findings revealed that environmental variability exerted a significant positive influence on the opportunism in both the strong and weak tie groups, thereby supporting H3. Moreover, while environmental variability had a significant negative effect on trust among firms with strong tie positions, it showed no significant effect on trust in the weak tie group, providing support for H4.

## 6. Discussion

### 6.1. Theoretical Implication

The analytical findings support the proposed hypotheses and provide two key theoretical contributions. First, this study identifies network embeddedness as a critical contextual factor in managing opportunistic behavior among exchange partners. In discussions on mitigating opportunism, research in organizational economics and strategic management has outlined several approaches to address this challenge. Early studies emphasized the role of monitoring mechanisms and incentive structures in controlling opportunistic behavior. In particular, vertical integration has been justified as a governance strategy that enables firms to regulate opportunism through enhanced oversight and structured incentives (Powell, 2003). More recent research has expanded this perspective, demonstrating that opportunism can also be mitigated through strategic partner selection and relational mechanisms such as trust-building and socialization (Granovetter, 1985).

The primary objective of strategies within the relational governance and strategic management literature for mitigating opportunism is to minimize information asymmetry and limit the incentives for opportunistic behavior (Dyer & Singh, 1998). While traditional governance mechanisms emphasize monitoring and incentive structures, Blois (1990) argues that firms should expand their perspective beyond transaction costs and consider the value generated through inter-organizational relationship networks. Sztompka (1999) critiques transaction cost theory for failing to acknowledge that economic exchanges are embedded within social relationships, which help mitigate opportunism. Firms that are strongly embedded in relational networks with exchange partners are less likely to engage in opportunistic behavior and instead develop collaborative problem-solving mechanisms (Gulati, 1995; Uzzi, 1997).

McEvily et al. (2003) further assert that strong ties foster mutual benefit, encourage reciprocity, and support a long-term orientation, ultimately serving as an informal social control mechanism. Within this framework, the present study introduces and empirically examines network embeddedness as a key contextual factor for managing opportunism, particularly in volatile business environments.

Second, this study seeks to expand the dyadic perspective of social exchange theory (SET) by integrating it with social network theory to better understand how trust among exchange partners can be fostered in uncertain environments. SET posits that interactions between exchange partners are not solely driven by economic transactions but are also shaped by social relationships that involve repeated exchanges, reciprocal commitments, and an expectation of long-term obligation fulfillment (Emerson, 1976). These social dynamics create trust-based relationships that extend beyond immediate financial considerations, reinforcing cooperative behavior within inter-organizational networks.

The primary foundations of trust in exchange relationships are shared values and the duration of engagement, both of which facilitate effective communication and mutual understanding between parties. This study expands the social exchange theory (SET) perspective on trust formation within dyadic relationships by integrating it with social network theory, drawing upon the concept of network embeddedness as proposed by Burt (2003) and Coleman (1990). According to Coleman (1990), economic actions and outcomes, like all social interactions, are shaped by both direct dyadic relationships and the broader structure of network connections. Specifically, strong network ties facilitate the exchange of detailed, high-quality information and tacit knowledge (Gulati, 1998). As strong ties develop, inter-firm partners gain a deeper understanding of each other's operations, increase their mutual dependence, and cultivate trust within the relationship (McEvily et al., 2003).

By incorporating a firm's network embeddedness as a key contextual factor in fostering trust among exchange partners, this study seeks to bridge the gap between SET's dyadic focus and the broader relational structures emphasized in social network theory.

## 6.2. Practical Implication

This study offers several managerial insights for firms navigating business operations in environments characterized by variability. First, firms operating under such conditions are more susceptible to opportunistic behavior from their exchange partners. However, the extent to which a firm experiences opportunism is influenced by the strength of its network embeddedness with its exchange

partners. For instance, when supply chain disruptions occur due to inventory shortages, suppliers may exploit the situation by raising prices above market levels or reallocating scarce resources to competitors willing to pay a premium. The degree of network embeddedness plays a crucial role in mitigating such risks, as firms with strong ties are less likely to encounter opportunistic behaviors than those with weak or loosely connected relationships (Dyer & Singh, 1998; Gulati & Gargiulo, 1999).

The findings of this study indicate that suppliers embedded in strong-tie networks with their exchange partners are less likely to prioritize short-term gains and more inclined to adopt a long-term strategic perspective (Gulati, 1995). In contrast, suppliers operating within weak-tie networks are more prone to opportunistic behavior due to the absence of effective relational control mechanisms that regulate their actions (Granovetter, 1985; Burt, 1992).

Therefore, firms navigating market variability should carefully assess their level of network embeddedness with exchange partners when developing strategies to mitigate opportunistic behavior. Establishing and maintaining strong ties within a network can serve as an informal governance mechanism, fostering trust and reducing the likelihood of opportunism in uncertain environments (McEvily et al., 2003).

Second, a firm's network embeddedness helps reduce information asymmetry and fosters trust among exchange partners in environments characterized by variability. For instance, when firms anticipate technological advancements in their core products, sharing this information with suppliers becomes essential to ensure that future component production aligns with these innovations.

However, without confidence in the continuity of their supply relationships, suppliers may be reluctant to make capital investments necessary for producing new components that incorporate technological advancements. Strong network ties facilitate trust and commitment, encouraging suppliers to invest in long-term collaborations despite market uncertainty (Dyer & Singh, 1998; Gulati & Gargiulo, 1999).

In this context, firms embedded in strong-tie networks can effectively identify exchange partners who demonstrate goodwill—such as suppliers or buyers who consistently perform reliably, operate efficiently, and prioritize the well-being of their partners (Gulati, 1995; McEvily et al., 2003). This recognition is facilitated through the exchange of detailed information and a history of repeated interactions, which strengthen trust and reinforce cooperative behavior (Coleman, 1990; Uzzi, 1997).

## 6.3. Limitation and Future Research

This study has certain limitations and offers directions

for future research. First, its scope is confined to suppliers within the construction engineering sector, specifically examining first-tier vendors in their interactions with a major construction firm and second-tier suppliers. Consequently, to enhance the generalizability of these findings, further research should validate these results across different industries.

Second, this study primarily focuses on the moderating effect of network embeddedness in mitigating opportunism and fostering trust. In particular, it highlights the advantages of strong ties, such as facilitating detailed information exchange and serving as a social control mechanism in uncertain environments. However, a key limitation of strong ties is the potential redundancy of information. Burt (2003) notes that strong ties tend to form among similar individuals, leading to highly interconnected clusters where access to novel information may be limited. Future research should explore how firms can balance strong and weak ties to optimize information diversity and governance effectiveness in dynamic market conditions. environmental variability and trust.

Therefore, firms operating in variable environments must assess whether controlling opportunism or minimizing information redundancy is more critical to their strategic objectives. For instance, if firms are categorized into traditional manufacturing industries and rapidly evolving IT industries, the moderating impact of network embeddedness may be less pronounced in the IT sector compared to traditional manufacturing. In fast-paced IT industries, where continuous innovation is essential, reducing information redundancy may take precedence over mitigating opportunism, even when facing uncertain market conditions.

For future research, examining the effectiveness of network embeddedness under environmental variability across diverse industries with distinct sector-specific characteristics would provide valuable insights. Investigating how different industries balance the trade-offs between governance mechanisms and information diversity can contribute to a more comprehensive understanding of inter-firm relationship management (Gulati & Gargiulo, 1999).

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