

Study Examines Role of Collaboration-Enhancing Factors in Supply Chain

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ABSTRACT

In a dynamic business landscape, competition is increasingly shifting from individual entities to the competitive strength of the entire supply chain. Therefore, it is imperative to ensure and enhance supply chain competitiveness. Accordingly, our study explores the crucial role of collaboration-enhancing elements within supply chains, focusing on how trust, collaboration, and affective commitment—integral aspects of supply chain management—affect logistics performance, a key performance indicator in this domain. The study introduces two distinct dimensions of trust as precursors to fostering collaboration and enhancing affective commitment. Additionally, it scrutinizes the intricate interplay between supply chain collaboration, affective commitment, and logistics performance. For empirical evidence, we surveyed employees in supply chain-related departments in Korean manufacturing companies, analyzing 281 questionnaires. A structural equation model was employed to rigorously test hypotheses. Within regard to trust, cognitive trust has been identified as a significant catalyst for promoting supply chain collaboration, while both affective and cognitive trust contribute positively to cultivating affective commitment. Conversely, affective commitment is considered a pertinent precursor to fostering supply chain collaboration. Significantly, both supply chain collaboration and affective commitment exhibit a substantial and positive influence on enhancing logistics performance. These findings underscore the pivotal roles of supply chain collaboration and affective commitment in establishing enduring partnerships within supply chains, with trust, in its multifaceted form, emerging as the keystone facilitating these crucial relationships.

Keywords: *affective commitment, affective trust, cognitive trust, logistics performance, supply chain collaboration*

1. INTRODUCTION

In an intensely-competitive business landscape, companies are compelled to strategically construct and adeptly manage their supply chains. This paradigm shift considers supply chain management as a competition among supply chains themselves, transcending the traditional competition between individual companies. This is because the corporate market is completely open, and they can only survive by collaborating with each other. For these reasons, many companies are now realizing the

importance of supply networks (Srivastava *et al.*, 2022). Historically, long-term partnerships and established practices within supply chains thrived. However, uncertainties such as the COVID-19 pandemic and trade disputes disrupted supply chains, necessitating companies to invest heavily on rebuilding efficient supply chain networks (Lee & Whang, 2000; Farrell & Newman, 2019). Then, what factors are needed between companies to build a supply chain? Mutual trust is necessary to facilitate smooth collaboration and commitment between firms. An ongoing relationship between firms can be maintained only if it is based on this trust relationship (Myhr, 2000). In a similar context, Hobbs (2020) argued that when a trust relationship between buyers and suppliers in the supply chain is secured, the firms can respond quickly to uncertainties such as unexpected demand fluctuations and supply chain disruptions. Ballou *et al.* (2000) also said that trust is an essential factor to enhance collaboration among different firms, and firms that have established trust in the early stages of inter-firm collaboration can achieve higher levels of performance.

Trust has emerged as a paramount element for navigating the rapidly-changing market terrain. Essentially, trust forms the basis for seamless collaboration among supply chain partners, enabling companies to mitigate risks and cultivate an enduring and stable relationships with their associates (Kumar *et al.*, 2016). Conversely, research indicates that the absence of trust erodes competitiveness among supply chain partners, resulting in deficient inter-firm management and oversight (Chow & Chan, 2008). Furthermore, Ballou *et al.* (2000) identify trust as a pivotal factor that can facilitate inter-firm collaboration, asserting its significance, particularly in the early stages of collaboration with counterparties. Cumulatively, these studies underscore the pivotal role of trust in nurturing enduring bonds with counterparties.

Mutual commitment constitutes another vital element for establishing enduring relationships. Myhr (2002) asserts that trust is a prerequisite for maintaining lasting relationships. Similarly, Kwon and Suh (2004) conducted an empirical analysis affirming the positive impact of trust on inter-firm commitment. Supply chain collaboration entails the joint efforts of two or more parties working in tandem to achieve shared objectives (Anderson & Narus,

1990). Specifically, it encompasses the planning and execution of supply chain operations by multiple companies with aligned goals (Cao & Zhang, 2011). It can also be conceptualized as an efficiently-functioning business process designed to serve mutually-beneficial objectives (Min *et al.*, 2005). Numerous studies on supply chain and relationship management have consistently emphasized the role of trust as a precursor to effective collaboration (Kwon & Suh, 2005; Morgan & Hunt, 1994). These cumulative findings underscore the essential nature of trust as the basis of engagement and collaboration for achieving common goals.

As mentioned earlier, trust plays a critical role in fostering effective collaboration with other parties within the supply chain. In the absence of trust, there exists a persistent apprehension of potential opportunistic behavior by the other party (Mayer *et al.*, 1995). Against this backdrop, this study examines the factors that strengthen collaboration to improve logistics performance in the relationship between firms in the supply chain for South Korean manufacturing firms. In South Korea, the proportion of manufacturing industry is very high, but supply chains are insufficiently established due to the lack of technology, capital, and capabilities. Therefore, this study is considered to have academic and practical significance as it suggests a way to build a robust supply chain. In the present study, we distinguish between two dimensions of trust and scrutinize their respective impacts on supply chain collaboration and affective commitment. Therefore, the primary objectives of this study encompass: 1) elucidating the effects of trust on supply chain collaboration, affective commitment, and logistics performance; 2) reasserting the significance of trust within the supply chain; and 3) discerning the influence of supply chain collaboration and affective commitment on logistics performance by utilizing collaboration-enhancing elements.

The study is structured as follows: Chapter 2 introduces the definitions, characteristics, and prior research about each variable, while Chapter 3 outlines the process of deducing causal relationships between these variables. Chapter 4 encompasses the empirical analysis of the research model, and finally, Chapter 5 consolidates the research findings, offering insights and addressing limitations.

2. THEORETICAL BACKGROUND

This study is motivated by the necessity of establishing effective inter-firm relationships within the supply chain context. It explores two facets of trust, supply chain collaboration and affective commitment, considered as catalysts for fostering collaboration. Additionally, the study investigates logistics performance, a quintessential indicator of supply chain effectiveness. Accordingly, we synthesize pertinent literature on these concepts, elucidating their definitions, measurements, and significance within the field.

2.1 Trust

Trust has emerged as a key variable for establishing and nurturing enduring relationships between companies and their customers. While its exploration spans multiple disciplines, including marketing, economics, and

psychology, it holds a special place in management literature, extending its reach beyond individual relationships, encompassing the firm as a whole. This shift arises from the recognition of trust as a key element in constructing sustainable supply chains, primarily through interactions between supply chain partners (Crutchfield, 2008). Morgan and Hunt (1994) posit that firms entrenched in trusting relationships are less inclined to engage in opportunistic behavior, fortifying their interactions. Rousseau *et al.* (1998) define trust as a psychological state characterized by a willingness to embrace vulnerability, grounded in positive expectations regarding the behavior and intentions of others. Meanwhile, Wilson and Vlosky (1998) contend that trust is indispensable when forging partnerships.

Companies that have cultivated trusting relationships are often found to be less inclined to engage in opportunistic behaviors with each other, exhibiting a readiness to follow the lead of the other firm (Morgan & Hunt, 1994). Trust is characterized as a psychological state wherein individuals willingly embrace vulnerability, grounded in optimistic expectations regarding the conduct and intentions of others (Rousseau *et al.*, 1998). Within the domain of supply chain research, trust has been emphasized as a vital ingredient for establishing partnerships with counterparties (Wilson & Vlosky, 1998). Moreover, trust is recognized as a key aspect for fostering collaboration, especially during the formative stages of collaboration (Ballou *et al.*, 2000).

A multidimensional perspective is crucial when examining trust, as its perception and interpretation vary depending on the measuring entity and its perspective. Scholars have deconstructed trust into different facets, shedding light on its multifaceted nature. For instance, Ganesan (1994) categorized trust into belief in the counterparty's behavior, trust, and favor. Meanwhile, Yeung *et al.* (2009) explored trust in terms of competence, honesty, and benevolence, whereas Doney and Cannon (1997) linked it to honesty, competence, and know-how possessed by the counterparty. Ha *et al.* (2011) proposed evaluating trust based on the counterparty's competence, expertise, and skills. In line with this multidimensional approach, Lewis and Weigert (2012) segmented single-dimensional trust into multidimensional trust, a framework commonly recognized in social psychology. Within this framework, trust can be categorized into cognitive and affective. Drawing upon this established framework, our study categorizes trust into affective and cognitive trust, thereby providing a nuanced perspective on trust within the context of our research.

2.1.1 Affective and Cognitive Trust

Affective trust, primarily grounded in emotions, reflects the depth of warmth, empathy, and confidence one places in the other party (Johnson & Grayson, 2005). Johnston *et al.* (2004) define it as the belief in one's willingness to exert their capabilities for the benefit of the other party within a transactional relationship. Rempel *et al.* (1985) argue that affective trust originates from care and genuine concern for the well-being of the other party. In such a relationship, individuals are inclined to act in the best interests of the other party even in the absence of explicit policies (Johnston *et al.*, 2004). Conversely,

cognitive trust centers on the capabilities and competencies of the other party, rather than emotions. Mayer *et al.* (1995) characterize cognitive trust as being linked to the provider's abilities and skills. It relies on rational knowledge, encompassing factors like predictability of behavior, potential, consistency, and expertise. Cognitive trust necessitates a thorough understanding of and confidence in the other party's expertise or proficiency (Lewis & Weigert, 2012). Nyaga *et al.* (2010) further assert that cognitive trust involves believing that the other party will perform effectively based on fair assessment, expertise, ability, and other rational considerations. In addition, Dowell *et al.* (2015) contend that cognitive trust has greater significance than affective trust in relationships with counterparts. Consequently, affective trust can be perceived as the belief in a partner's willingness to act in the partner's best interests, marked by qualities such as bonding, honesty, and consideration, even in the absence of explicit constraints. Meanwhile, cognitive trust involves a reasoned decision whether to place trust in the other party, based on objective and rational knowledge, such as the other party's ability, potential, and expertise. These dimensions of trust provide a nuanced understanding of how trust operates within the context of relationships and interactions.

2.2 Supply Chain Collaboration

Collaboration is a concept that may assume different nuances depending on scholars' research objectives. However, in broad terms, it can be defined as a concerted effort where all companies within a supply chain actively engage with one another toward a shared objective (Mentzer *et al.*, 2000). This collaborative endeavor should be underpinned by a process grounded in trust, mutual respect, and joint decision-making (Ellinger *et al.*, 2000). As discussed earlier, supply chain collaboration can be conceptualized as a process where two or more independent companies collaboratively plan and execute supply chain operations, striving toward a common, mutually-beneficial goal. This form of collaboration fundamentally hinges on the relationships established among these companies. This relationship is akin to the sharing of resources, information, and risks among all parties involved in a trading partnership. It grants them access to complementary resources, mitigates transaction costs, and enhances overall productivity. Moreover, effectively addressing and mitigating the bullwhip effect not only resolves supply chain disruptions but also enhances profitability, ultimately providing a significant competitive advantage. In essence, for an effective supply chain management, there must exist a mutually-advantageous relationship among companies within the supply chain. This necessitates a relationship that is rooted in trust and shared responsibility for decisions and their consequences (Stank *et al.*, 2001). In particular, Nguyen *et al.* (2022) argued that manufacturing firms can optimize operations, maximize production capacity, and reduce costs through collaboration among companies in the supply chain.

However, while collaboration among firms within a supply chain can yield benefits such as reduced lead times, high-quality standards, and minimized inventory levels (McLaren *et al.*, 2002; Richey *et al.*, 2010), some companies may be reluctant to engage in such

collaboration, amid concerns of information leakage, potential risks, and possibility of information misuse. Accordingly, they may provide minimal information or even share incorrect information, which could have adverse repercussions throughout the entire supply chain. If this pattern persists, it can lead to the "bullwhip effect," a recognized issue within supply chain management (Azadegan *et al.*, 2008; Ouyang & Li, 2010). Furthermore, Lee and Kim (2023) stated that mutual information sharing is important to improve the bullwhip effect, and if information is not shared smoothly among companies in the supply chain, mutual collaboration will be difficult, which in turn will lead to the loss of the overall competitiveness of the supply chain. Therefore, it becomes evident that when supply chain collaboration encounters obstacles in the relationships between companies within the supply chain, the entire supply chain could face the risk of disruption.

2.3 Affective Commitment

Commitment within the context of relationships entails a desire to sustain a valuable and enduring partnership with a counterpart over the long term (Tellefsen & Thomas, 2005). It represents an implicit or explicit belief shared between the parties involved (Dwyer *et al.*, 1987). In transactional relationships, a high level of commitment yields positive effects on the buyer-supplier relationship, subsequently enhancing competitive advantage (Samiee & Walters, 2006). Essentially, Ghijssen *et al.* (2010) pointed out commitment as a factor that develops and strengthens relationships and performance with a counterpart in the supply chain. Commitment is key to the successful development of supply chains, reflecting the nature of commitment itself. Allen and Meyer (1990) define commitment as the act of identifying with the other party without expecting any immediate reciprocation. Consequently, commitment serves as the cornerstone for nurturing buyer-supplier relationships within the supply chain (Anderson & Narus, 1990). It can also help deter opportunistic behavior by the other party and reduce costs typically associated with establishing new relationships (Mercurio, 2015).

Researchers have explored commitment from a multidimensional perspective rather than a unidimensional one. This multidimensional view encompasses affective commitment, calculative commitment, and normative commitment as distinct dimensions (Gounaris, 2005; Gruen *et al.*, 2000). However, in this study, we focus solely on affective commitment, primarily because of its substantial correlation with normative commitment and the overlapping conceptual definitions (Allen & Meyer, 1990). Additionally, calculative commitment is somewhat tangential to the objectives of this study as it pertains more to the financial aspects of the buyer-supplier relationship.

2.4 Logistics Performance

Logistics, which involves the management of the end-to-end process from raw materials to the final consumer, constitutes a critical component of the broader supply chain framework. Efficient logistics processes are vital for enabling supply chain companies to identify and meet the evolving demands of end consumers (Stank *et al.*, 2005). Given that the supply chain comprises independent entities,

overall performance is often evaluated by considering the efficiency metrics of individual companies (Ha *et al.*, 2011). In a similar vein, Keebler and Plank (2009) defined logistics performance in terms of assessing the company's outcome against various goals related to the logistics function. Among them, logistics performance is conspicuous and can be assessed using various indicators. Researchers have employed diverse criteria to measure logistics performance. Harrison and New (2002) and Beamon (1999), for instance, gauged logistics performance using indicators such as supply chain inflows and outflows, inventory levels, logistics-related costs, time-related metrics, and overall efficiency. Stank *et al.* evaluated logistics performance through dimensions such as cost (selling, purchasing, and logistics costs), time (delivery and cycle time), and efficiency (order fulfillment rates and logistics flexibility). Furthermore, Wang and Yeo (2018) assessed logistics performance using parameters like order fill rates, inventory turnover, and lead time. Additionally, Iacovou *et al.* (1995) categorized logistics performance into operational and strategic dimensions. These studies illustrate the wide array of indicators available for measuring logistics performance, and the choice of indicators should align with the specific objectives of the study. This study explores logistics performance from the perspective of total logistics cost, lead time, order completion rate, inventory turnover rate, and improvements in logistics quality.

3. HYPOTHESIS ESTABLISHMENT AND RESEARCH MODEL

3.1 Trust and Supply Chain Collaboration

Trust catalyzes the fostering of collaboration with counterparties by serving as a deterrent against potentially-opportunistic behavior and reducing transaction costs (Das & Teng, 2001). Moreover, trust and collaboration are intricately intertwined. The decision to engage in collaboration is typically voluntary and, as such, is contingent upon the presence of trust (Mattessich & Monsey, 1992). Similarly, Kwon and Suh (2004) empirically established the indispensable role of trust in facilitating successful performance and commitment within supply chain management. Myhr (2002) also determined that trust exerts a positive influence on collaboration within supply chains, while Tschannen-Moran (2001) argued that trust is pivotal for enabling collaboration grounded in unbiased decisions, especially in the volatile landscape of business uncertainties. Additionally, Ballou *et al.* (2000) conducted a study highlighting that firms fostering trust in the early stages of collaboration within supply chains can achieve a high degree of seamless collaboration. Consequently, trust can be regarded as the belief that the other party will not act in a self-serving manner, and plays a pivotal role in determining the extent of mutual collaboration. Based on these premises, this study formulates the following hypotheses:

Hypothesis 1-1: *Affective trust has a significantly positive impact on supply chain collaboration.*

Hypothesis 1-2: *Cognitive trust has a significantly positive effect on supply chain collaboration.*

3.2 Trust and Affective Commitment

Research in relationship management underscores the inherent connection between trust and commitment. Trust, often referred to as belief and goodwill, is critical for reducing uncertainty within a relationship. Firms that have established trust are better positioned to achieve positive outcomes because they harbor expectations or beliefs that their counterparts will act favorably (Anderson & Narus, 1990). Kwon and Suh (2004) empirically demonstrated the positive impact of trust on commitment within relationships involving supply chain partners, emphasizing that serious business dealings are challenging without trust. Myhr (2002) argued that trust is indispensable for the maintenance of long-term relationships, while McDonald (1981) contended that a lack of trust leads to distrust, subsequently eroding commitment. In a similar context, an empirical analysis conducted in a study by Lee and Kim (2023) for three major new industries in South Korea showed that companies with a trust relationship have a high level of mutual commitment. In light of these findings, it becomes evident that trust functions as a mitigating factor against opportunistic behavior and the exploitation of relationships, thereby nurturing the desire for continuity and commitment (Morgan & Hunt, 1994). Consequently, we posit that trust is an essential element for establishing enduring transactional relationships, and formulate the following hypotheses.

Hypothesis 2-1: *Affective trust has a significantly positive effect on affective commitment.*

Hypothesis 2-2: *Cognitive trust has a significantly positive effect on affective commitment.*

3.3 Affective Commitment and Supply Chain Collaboration

The success of supply chains hinges on mutual commitment. Moberg *et al.* (2002) contend that commitment is a prerequisite for the reciprocal exchange of information in inter-firm transactions, as it serves as a deterrent against opportunistic behavior (Morgan & Hunt, 1994). Establishing seamless communication channels with supply chain partners is paramount for constructing an efficient supply chain. In scenarios fraught with information leakage and potential risks, firms are increasingly inclined to share information when engaged in a long-term relationship with cooperative counterparts (Moberg *et al.*, 2002). Katrina's (2003) study reveals that it is only through a high level of commitment that firms can embrace processes like planning and operations to share a vision and collaborate effectively. Welty and Becerra-Fernandez (2001) argue that a psychological attachment to the working relationship with a counterpart is essential for sustaining commitment and collaboration. Based on these premises, we formulate the following hypothesis:

Hypothesis 3: *Affective commitment has a significantly positive impact on supply chain collaboration.*

3.4 Supply Chain Collaboration and Logistics Performance

Firms with well-established collaborative relationships tend to outperform firms that engage in individual competition (Frohlich & Westbrook, 2001). This underscores the contemporary business landscape, which is characterized by competition among supply chains rather than individual entities. Consequently, collaboration between buyers and suppliers is indispensable for cultivating a competitive edge. Cooperative relationships necessitate accurate information exchange and trust, which can lead to cost reduction, enhanced customer satisfaction, and sustained growth (Mentzer *et al.*, 2000). Stank *et al.* (2001) empirically demonstrated that a high degree of collaboration within the supply chain translates into enhanced production flexibility and increased profitability. Moreover, Ha *et al.* (2011) identified that collaborative relationships exert a positive influence on logistics efficiency, information sharing, and more. Drawing from these findings, this study formulates the following hypothesis:

Hypothesis 4: Supply chain collaboration has a significantly positive impact on logistics performance.

3.5 Affective Commitment and Logistics Performance

Commitment to building and maintaining a long-term relationship with a counterparty is a shared belief (Dwyer *et al.*, 1987). Grounded in this commitment, supply chain firms can gain a competitive advantage and ultimately enhance their performance (Samiee & Walter, 2006). A study by Krause *et al.* (2007) corroborated that commitment to long-term relationships in supply chain management fosters improved supply chain performance. For instance, in long-term relationships as opposed to short-term ones, counterparties are less inclined to engage in opportunistic behavior and are more likely to reduce transaction costs, thereby enhancing their performance with suppliers. In addition to these perspectives, Spekman (1988) identified commitment as a factor that can nurture relationships with counterparts, and Paul *et al.* (2010) ranked commitment as the top factor that amplifies collaboration. Building upon these studies, Morgan and Hunt (1994) asserted that commitment is key to enhancing organizational performance. Consequently, this study formulates the following hypothesis.

Hypothesis 5: Affective commitment has a significantly positive impact on logistics performance.

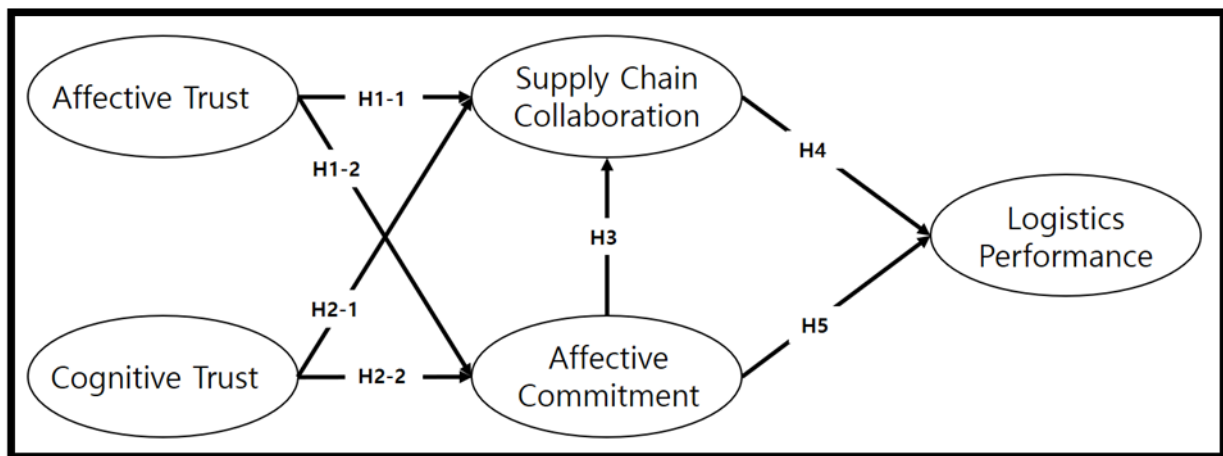


Figure 1 Research model

4. RESEARCH METHOD

4.1 Data Collection and Sample Characteristics

The sample comprises employees working in supply chain-related departments within Korean manufacturing companies. To ensure the questionnaire's validity, a pre-test was conducted over two months, starting from June 2020, involving professors, doctoral students in business administration, and relevant employees. Following the selection of the final survey questions, a total of 2,126 questionnaires were distributed through a survey agency. After excluding ineligible questionnaires, which were treated as non-responses, 281 questionnaires were used for statistical analysis. Recently, structural equation models have been used not only in the study of business administration, but also in various social science fields. These structural equations facilitate analysis, including

latent variables that cannot be measured directly, and provide many alternative methods for measuring discontinuous data (Bowen & Guo, 2011). Various statistical programs such as AMOS, EQS, and LISREL are used to measure these structural equations (Hsu *et al.*, 2006), and in this study, we used SPSS 23.0 and AMOS 23.0 to verify them.

Regarding the sample characteristics, 53.7% of the respondents were male and 46.3% were female. The respondents were in their 20s (7.8%), 30s (35.9%), 40s (29.5%), and 50s and above (26.7%), with those in their 30s accounting for the highest proportion. In terms of job, 29.2% of the respondents held managerial positions. Lastly, distribution by supply chain position was as follows: second-tier suppliers (16.8%), first-tier suppliers (24.2%), and prime contractors (25.9%). **Table 1** below provides an overview of the sample's general characteristics.

Table 1 General characteristics of the sample

Category	Frequency (Number)	Percentage (%)	
Gender	Male	151	53.7
	Female	130	46.3
	Total	281	100
Age	20s	22	7.8
	30s	101	35.9
	40s	83	29.5
	50s and above	75	26.7
	Total	281	100
Job Position	Staff	77	27.4
	Assistant Manager	70	24.9
	Manager	82	29.2
	Above a manager	52	18.5
	Total	281	100
Supply Chain Position	Second-tier Supplier	47	16.7
	First-tier Supplier	68	24.2
	Prime Contractor	73	26.0
	Others	93	33.1
	Total	281	100

4.2 Measurement of Variables

This study employed 25 variables to measure content validity, drawing from previous research. Precisely, affective trust was assessed using three variables, cognitive trust with four variables, supply chain collaboration with

nine, affective commitment with three, and logistics performance with six variables. Each question employed a 7-point Likert scale, where 1 represented “very bad,” 4 indicated “neutral,” and 7 signified “very good.” **Table 2** below provides the operational definitions of the variables.

Table 2 Definitions and measurement of variables

Latent variable	Operational definition	Reference(s)
Affective Trust	Promote integrity and honesty in work	Ha <i>et al.</i> , 2011; Lee & Kim (2023)
	Demonstrate respect and accept each other's positions and arguments	
	Interpret others' viewpoints positively	
Cognitive Trust	Have confidence in each other's job performance	Ha <i>et al.</i> , 2011; Lee & Kim (2023)
	Express satisfaction with each other's knowledge and expertise	
	Acknowledge and accept each other's opinions regarding knowledge and experience	
	Recognize each other's unique knowledge and skills	
Supply Chain Collaboration	Evaluate the effectiveness of communication	Alzoubi <i>et al.</i> , 2020 Mentzer <i>et al.</i> , 2001; Min <i>et al.</i> , 2005; Cao & Zhang, 2011
	Share knowledge, know-how, and skills collaboratively	
	Take ownership of various communication channels	
	Exchange information regarding demand forecasts and market trends	
	Share production planning information	
	Share information on operating profits and costs	
	Provide mutual risk and loss coverage	
	Facilitate ease of collaboration with suppliers	
Facilitate seamless feedback gathering		
Affective Commitment	Invest efforts in maintaining relationships	Meyer & Allen, 1990; Gruen <i>et al.</i> , 2000; Moussa & El-Arbi, 2020
	Demonstrate a willingness to engage in long-term, ongoing business relationships	
	Strive to maintain relationships through active mutual efforts	

Table 2 Definitions and measurement of variables (Con't)

Latent variable	Operational definition	Reference(s)
Logistics performance	Logistics-related costs, including transportation, storage, and inventory management	Kannan & Tan, 2004
	Time required for order processing and delivery	Harrison & New, 2002
	Ability to deliver ordered goods to a specified location within a designated timeframe and in the desired condition	
	Annual turnover of inventory	Shin <i>et al.</i> , 2000
	Level of satisfaction with logistics quality	Gunasekaran <i>et al.</i> , 2001; Baemon, 1999
	Ability to respond flexibly to order fluctuations	

4.3 Reliability and Validity Tests

Prior to hypothesis testing, the study assessed the reliability and validity of the measured variables. We calculated Cronbach’s alpha using SPSS 23.0 to check the reliability, and in the field of social sciences, it can generally be said that the reliability is secured if it is 0.7 or higher (Hair *et al.*, 2010). The variables in this study yielded the following alpha values: affective trust=0.775, cognitive trust=0.840, supply chain collaboration=0.938, affective commitment=0.837, and logistics performance=0.896, affirming the measurement tool’s precision.

To validate the causal relationship between affective trust, cognitive trust, supply chain collaboration, affective commitment, and logistics performance, we conducted a confirmatory factor analysis using AMOS 23.0. Fit indices for the proposed research model were evaluated, with GFI=0.897, RMR=0.056, AGFI=0.848, TLI=0.943, and CMIN/DF=1.849 meeting the recommended overall criteria, indicating the acceptability of the research model (Hair *et al.*, 2010). The results of convergent validity analysis for the variables utilized in this study are presented in **Table 3**. All variables exhibited an average variance extracted (AVE) exceeding 0.5 and a conceptual reliability (CR) exceeding 0.7. Furthermore, the path coefficients were significant at the $p < 0.001$ level, affirming the acceptance of all factors.

Table 3 Results of convergent validity analysis

Path	Non-Standardized coefficient	Standardized coefficient	S.E.	C.R.	AVE	CR
AT4<-Affective Trust	1	0.679			0.562	0.834
AT2<-Affective Trust	1.171	0.829	0.113	10.383***		
AT1<-Affective Trust	1.065	0.701	0.11	9.671***		
CT4<- Cognitive Trust	1	0.675			0.608	0.86
CT3<- Cognitive Trust	1.196	0.809	0.102	11.761***		
CT2<- Cognitive Trust	1.193	0.826	0.1	11.937***		
CT1<- Cognitive Trust	1.029	0.734	0.095	10.858***		
CO9<- Supply Chain Collaboration	1	0.849			0.626	0.834
CO8<- Supply Chain Collaboration	0.969	0.823	0.056	17.383***		
CO7<- Supply Chain Collaboration	0.917	0.764	0.059	15.638***		
CO6<- Supply Chain Collaboration	0.971	0.748	0.065	14.87***		
CO5<- Supply Chain Collaboration	0.94	0.801	0.057	16.622***		
CO4<- Supply Chain Collaboration	0.904	0.795	0.055	16.435***		

Table 3 Results of convergent validity analysis (Con't)

Path	Non-Standardized coefficient	Standardized coefficient	S.E.	C.R.	AVE	CR
CO3<- Supply Chain Collaboration	0.989	0.828	0.056	17.575***	0.599	0.931
CO2<- Supply Chain Collaboration	0.928	0.761	0.06	15.456***		
CO1<- Supply Chain Collaboration	0.94	0.792	0.058	16.279***		
AC5<- Affective Commitment	1	0.804			0.586	0.894
AC 3<- Affective Commitment	1.044	0.757	0.08	13.035***		
AC 2<- Affective Commitment	1.092	0.821	0.077	14.105***		
LP6<-Logistics Performance	1	0.709			0.586	0.894
LP5<-Logistics Performance	1.056	0.751	0.075	14.135***		
LP4<-Logistics Performance	1.07	0.694	0.099	10.807***		
LP3<-Logistics Performance	1.222	0.864	0.092	13.245***		
LP2<-Logistics Performance	1.165	0.804	0.094	12.454***		
LP1<-Logistics Performance	1.043	0.717	0.093	11.162***		

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

To assess discriminant validity, we calculated the average variance extracted (AVE) for each variable and computed the correlation coefficient between the variables. The criterion for evaluating discriminant validity is that the

squared value of the correlation coefficient between each variable should not exceed the AVE value. The results are presented in **Table 4** below.

Table 4 Results of discriminant validity analysis

	Affective Trust	Cognitive Trust	Affective Commitment	Supply Chain Collaboration	Logistics Performance
Affective Trust	0.562				
Cognitive Trust	0.364	0.608			
Affective Commitment	0.278	0.321	0.626		
Supply Chain Collaboration	0.198	0.352	0.532	0.599	
Logistics Performance	0.179	0.299	0.332	0.418	0.586

4.4. Empirical analysis

To test the hypotheses of this study, we used a structural equation model with maximum likelihood estimation, and we used AMOS 23.0 for this purpose. The results are as follows: GFI=0.853, RMR=0.063, AGFI=0.821, TLI=0.918, CMIN/DF=2.209. These values

generally align with the goodness-of-fit criteria proposed by Hair *et al.* (2010). Consequently, we proceeded to test the hypotheses using the path analysis model, with all hypotheses being accepted except for hypotheses 1-1. The results are detailed in **Table 5**.

Table 5 Results of hypothesis verification

Path	Estimate	S.E.	C.R.	P	Result
H1-1	-0.064	0.09	-0.714	0.475	rejected
H1-2	0.413	0.098	4.208	***	accepted
H2-1	0.359	0.104	3.456	***	accepted
H2-2	0.451	0.107	4.21	***	accepted
H3	0.638	0.082	7.768	***	accepted

Table 5 Results of hypothesis verification (Con't)

Path	Estimate	S.E.	C.R.	P	Result
H4	0.589	0.063	9.406	***	accepted
H5	0.22	0.087	2.535	0.011*	accepted

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

5. CONCLUSIONS

5.1 Study Results

This study examined the factors enhancing collaboration among firms within the supply chain to improve logistics performance. Specifically, it examined two dimensions of trust as antecedents to supply chain collaboration and affective commitment, ultimately assessing their influence on logistics performance—a crucial indicator of supply chain effectiveness. The key findings of the study are as follows:

First, affective trust does not exert a significant positive impact on supply chain collaboration, in a shift from earlier studies that established a positive relationship between these factors. Traditionally, trust has been considered a critical element in fostering an enduring, mutually-beneficial relationships in inter-firm interactions. However, this study's results present a paradox. According to Azadegan *et al.* (2008), achieving smooth communication and information sharing in the context of supply chain collaboration with emotional trust alone is challenging amid concerns of information leakage, misuse, and potential risks. Consequently, the significant positive effect of cognitive trust on supply chain collaboration suggests that trust grounded in the counterparty's knowledge, expertise, and domain-specific knowledge plays a pivotal role in fostering collaboration. Second, both dimensions of trust—cognitive and affective—display a significant positive effect on affective commitment. This finding underscores the importance of trust in cultivating enduring, committed relationships. To maintain a long-term relationship with a supply chain partner, it is essential to have faith in their capabilities while also fostering emotional trust. Third, the study reveals that affective commitment exerts a significant positive effect on supply chain collaboration, underscoring the importance of mutual commitment in fostering successful supply chain collaboration. Specifically, it highlights the significant role of affective commitment in establishing enduring and long-term relationships with supply chain partners, even in the face of uncertainty. Finally, supply chain collaboration and affective commitment both have a significant positive impact on logistics performance. These results align with numerous prior studies, demonstrating that firms engaged in collaborative relationships outperform those that do not (Frohlich & Westbrook, 2001). Additionally, supply chain collaboration enables firms to lower costs and enhance production flexibility, thereby positively affecting performance. Furthermore, commitment to the counterparty can confer a competitive advantage and ultimately enhance performance (Samiee & Walter, 2006). Krause *et al.* (2007) contend that commitment to long-term relationships serves as a catalyst for improving supply chain performance. The findings suggest that supply chain collaboration and affective commitment play pivotal roles in enhancing logistics performance.

5.2 Implications and Limitations

The study offers several theoretical implications. First, it focuses on trust among firms in the supply chain within an uncertain business environment. Trust has been extensively explored in various fields, including marketing, economics and psychology, and plays a crucial role in establishing long-term and sustainable supply chains (Crutchfield, 2008). Moreover, it has been demonstrated that in uncertain situations such as the COVID-19 pandemic and the Russia–Ukraine conflict, companies with trusted relationships are less likely to engage in opportunistic behavior (Morgan & Hunt, 1994). Therefore, trust holds significant importance across diverse domains. Notably, while prior research predominantly examined trust within the context of supply chain management as a single-dimensional construct, this study breaks new ground by dissecting trust into multiple dimensions, specifically affective and cognitive trust, drawing upon the framework established by Lewis and Weigert (2012). The multidimensional aspects of trust underscore its essential role in facilitating supply chain collaboration (Ballou *et al.*, 2000). These findings reaffirm that trust is not only necessary but also pivotal for fostering more engaged relationships with partners within the supply chain (Kwon & Suh, 2004).

Secondly, we examined the impact of the two dimensions of trust within the supply chain on supply chain collaboration, affective commitment, and logistics performance. Research by Das and Teng (2001) suggested that firms establishing mutual trust in an uncertain business environment could effectively mitigate potential opportunistic behavior and foster collaboration with their counterparts. Similarly, Kwon and Suh (2004) argued that trust plays a pivotal role in commitment within supply chain relationships, and McDonald (1981) emphasized trust as a crucial element in sustaining commitment in ongoing relationships. However, contrary to previous studies, our research revealed that affective trust does not yield a positive effect on supply chain collaboration. This observation is noteworthy as it empirically demonstrates that cognitive trust, encompassing factors such as the ability, knowledge, and know-how of the other party, holds greater importance in the context of uncertain and increasingly competitive supply-chain relationships.

The study offers several practical implications. Firstly, companies invest significant efforts in establishing efficient supply chains to enhance their competitive edge. In times of uncertainty and crises, businesses must respond with increased efficiency. This necessitates that key stakeholders within the supply chain focus on cultivating cognitive trust, which is rooted in the skills and capabilities of their partners, rather than relying solely on emotional trust based on feelings. Consequently, amid uncertain circumstances, supply chain companies must persistently work toward

fostering cognitive trust, the second dimension of trust, to gain a competitive advantage.

Secondly, our findings underscore the significance of supply chain collaboration and affective commitment for firms striving to attain sustainable competitive advantages and enhance performance within an uncertain environment. Notably, many companies establish supply chains because individual firms often struggle to thrive in a fiercely-competitive business landscape. This reinforces previous research emphasizing that companies with well-nurtured collaborative relationships outperform those operating individually. The results further reaffirm that long-term relationships and active engagement with partners yield positive impacts on performance. This suggests that manufacturing companies can enhance their logistics performance by prioritizing supply chain collaboration and dedicating efforts to maintaining relationships, including transparent information sharing and effective communication with partners, alongside long-term and unwavering commitments to these relationships.

Despite these implications, this study has several limitations. Firstly, it centers on trust and investigates its impact on supply chain collaboration, affective commitment, and logistics performance. Recent literature on supply chains has shifted its focus toward fairness-related factors as contributors to trust enhancement. Future research could delve deeper into variables associated with procedural, distributive, and interactional fairness to gain a more comprehensive understanding of the significance and role of these two dimensions of trust.

Secondly, the sample used in this study exclusively consisted of Korean manufacturing firms. For greater generalizability of the research model presented here, it would be beneficial for future researchers to include participants from diverse countries and regions.

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