

How Relational Capital and Disruption Orientation Shape Supply Chain Resilience and Market Performance: A Multi-Group Analysis of SMEs and MNEs

Charles Arthur Robb

Linton Global School, Hannam University, South Korea

Email: robbcharles@gmail.com

Aaron Rae Stephens

Business Administration, Hartwick College, United States of America

Email: stephensa@hartwick.edu

Minhyo Kang

Distribution and Logistics Department, Dong-eui University, South Korea

Email: minhyo74@gmail.com (*Corresponding author*)

ABSTRACT

Supply chain disruptions have intensified in frequency and severity, compelling firms to develop adaptive capabilities to sustain competitive performance. This study examines how relational capital and supply chain disruption orientation contribute to supply chain resilience and market performance, and whether these relationships differ between small and medium-sized enterprises and multinational enterprises. Drawing on the relational view and dynamic capability theory, a framework is proposed in which relational capital and disruption orientation enhance resilience, which in turn drives market performance. Using survey data from 191 firms, the study finds that relational capital significantly strengthens both disruption orientation and resilience across firm sizes. Resilience emerges as the strongest predictor of market performance in the pooled sample. However, multi-group results reveal a significant asymmetry: the resilience–performance relationship is stronger for SMEs than for MNEs, while disruption orientation directly enhances performance only in large firms. These findings demonstrate that the performance returns of supply chain capabilities are contingent upon firm size. The study contributes to supply chain management literature by integrating relational and dynamic capability perspectives and highlighting structural context as a boundary condition in resilience research. Managerially, the results highlight the pivotal role of resilience for smaller firms operating under resource constraints.

Keywords: *supply chain resilience, supply chain disruption orientation, relational capital, SME, MNE*

1. INTRODUCTION

Supply chain disruptions have become a persistent and structural feature of the global business environment (Ho *et al.*, 2015; Stumpf *et al.*, 2023). Events such as pandemics, geopolitical tensions, natural disasters, and supplier failures increasingly expose firms to operational interruptions that threaten stability and performance. As a result, supply chain resilience has emerged as a central concept in supply chain management research (Gölgeci and Ponomarov, 2013; Siems *et al.*, 2023). Resilience is commonly defined as a firm's ability to anticipate, absorb, adapt to, and recover from disruptions while maintaining operational continuity. Firms capable of sustaining operations under turbulence are more likely to preserve customer relationships, protect market position, and achieve superior performance outcomes.

Although prior research has demonstrated positive links between resilience and firm performance (Prashantham and Birkinshaw, 2020), important gaps remain. First, less attention has been paid to understanding the antecedent mechanisms underlying resilience development. Dynamic capability theory suggests that resilience does not emerge spontaneously but is built upon organizational processes, learning mechanisms, and relational resources (Siems *et al.*, 2023). In parallel, the relational view emphasizes that inter-organizational relationships characterized by trust, reciprocity, and collaboration can serve as strategic resources that enhance adaptive capacity (Singh, 2024). However, empirical research that simultaneously integrates relational capital, organizational disruption orientation, and resilience within a unified framework remains limited. Second, existing studies often implicitly assume that the effects of supply chain capabilities are uniform across firms. However, organizations differ substantially in structural characteristics such as size, resource endowment, and governance complexity. Small and medium-sized enterprises (SMEs) typically operate with constrained financial slack and limited

redundancy, making them particularly vulnerable to disruptions. In contrast, multinational enterprises (MNEs) often possess diversified operations, formalized coordination mechanisms, and greater information-processing capacity, which may buffer against the impacts of disruption. Recent calls in the literature emphasize the importance of incorporating contingency factors and organizational heterogeneity into resilience research (Wang and Xiao, 2024). Nevertheless, limited empirical work has systematically examined whether resilience performance returns differ across firm sizes (Liu and Wei, 2022).

To address these gaps, this study develops and tests a capability-building framework that integrates relational capital, supply chain disruption orientation, and supply chain resilience to explain market performance outcomes. Relational capital is conceptualized as a network-based resource that facilitates information sharing and coordinated responses during disruptions (Carey *et al.*, 2011; Dyer and Singh, 1998). Supply chain disruption orientation reflects an organizational mindset that is attentive to potential disruptions and committed to preparedness. Building on dynamic capability theory, this research argues that these antecedents contribute to the development of resilience, which subsequently enhances market performance.

Crucially, the researchers extend prior research by explicitly examining firm size as a contingency condition. Drawing on arguments about structural differences and vulnerability exposure, it is proposed that the resilience–performance relationship is stronger for SMEs than for MNEs. In contrast, disruption orientation may translate more directly into performance benefits for larger firms. Using survey data from 191 firms and partial least squares structural equation modeling (PLS-SEM), including multi-group analysis with established measurement invariance procedures (Hair *et al.*, 2019), the research empirically tests both the pooled structural relationships and firm-size differences.

Accordingly, the study contributes to supply chain management literature in several ways. First, it integrates the relational view and dynamic capability theory to clarify how inter-firm relational assets translate into adaptive capabilities and performance outcomes. Second, it identifies disruption orientation as a cultural microfoundation of resilience, enriching the understanding of how preparedness is operationalized. Third, by demonstrating that the resilience–performance relationship varies across firm sizes, the study introduces organizational structure as a critical boundary condition in resilience research. In doing so, it responds to recent calls for greater attention to contingency factors in supply chain capability studies (Siems *et al.*, 2023). Finally, the study provides actionable implications for managers, particularly SMEs operating under resource constraints, by highlighting resilience as a pivotal determinant of sustained market performance.

The remainder of the paper proceeds as follows. Section II develops the theoretical framework and hypotheses. Section III outlines the research design and methodology. Section IV presents the empirical results. Section V discusses theoretical and managerial implications. Section VI concludes with limitations and directions for future research.

2. LITERATURE REVIEW

2.1 Theoretical Underpinning

The relational view of the firm posits that interfirm relationships can serve as an important source of competitive advantage (Kano, 2018). Rather than viewing firms as isolated entities, the relational perspective emphasizes that valuable resources and capabilities may extend beyond organizational boundaries and reside within inter-organizational routines, processes, and collaborative assets (Dyer and Singh, 1998; Singh, 2024). In this context, relational capital represents the cumulative value embedded in a firm's relationships with external partners, encompassing elements such as trust, reciprocity, and close interaction that facilitate knowledge exchange and cooperative problem-solving (Liu and Wei, 2022). High levels of relational capital enable firms to access valuable resources through their partners, including information, technological knowledge, and social support, thereby transforming collaborative relationships into tangible strategic benefits (Stumpf *et al.*, 2023).

Within supply chains, strong relational capital is often reflected in open communication, mutual trust, and a shared willingness to collaborate during disruptions. Such relational conditions enable supply chain partners to coordinate responses, share critical information, and develop innovative solutions during periods of crisis (Schepis and Kingshott, 2024). Consequently, the relational view suggests that firms embedded in high-quality relational networks are better positioned to learn from disruptions and adapt their operations amid environmental turbulence.

Complementing this perspective, dynamic capability theory focuses on a firm's capacity to renew and reconfigure its resource base in response to rapidly changing environments. Dynamic capabilities are commonly defined as the firm's ability to integrate, build, and reconfigure internal and external competencies in order to address environmental change (Prashantham and Birkinshaw, 2020). In supply chain contexts, resilience is frequently conceptualized as a critical dynamic capability because it reflects organizations' ability to absorb shocks, adapt to disturbances, and recover operations after disruptions (Altay *et al.*, 2018). These adaptive capabilities are not static; rather, they emerge through ongoing organizational learning, the accumulation of experience, and investments in coordination mechanisms and resources.

Integrating the relational view with dynamic capability theory provides a useful framework for understanding how firms develop supply chain resilience. Relational capital can facilitate the development of dynamic capabilities by enabling firms to access external knowledge, share disruption-related information, and coordinate responses across organizational boundaries (Yu *et al.*, 2019). Through these relational interactions, firms become more aware of potential supply chain disturbances and develop a disruption-oriented mindset that emphasizes preparedness and proactive risk management (Matas *et al.*, 2024). In addition, collaborative relationships may provide access to complementary resources, alternative supply arrangements, and joint problem-solving opportunities that strengthen a firm's ability to withstand and recover from disruptions (Matas *et al.*, 2024).

From this perspective, relational capital represents an important antecedent of both supply chain disruption orientation and supply chain resilience. Firms that cultivate strong relational networks are better positioned to anticipate disruptions, mobilize partner resources, and maintain operational continuity during turbulent periods. These adaptive capabilities are expected to translate into improved market performance, as firms that sustain operations and maintain customer service during crises are more likely to preserve market share, customer loyalty, and growth compared to less resilient competitors (Wang and Xiao, 2024).

Building on these theoretical foundations, the following sections develop hypotheses regarding the relationships among relational capital, disruption orientation, supply chain resilience, and market performance, as well as potential differences between SMEs and MNEs.

2.2 Hypothesis Development

2.2.1 Relational Capability

Firms with rich relational capital are deeply connected with their supply chain partners through trust and frequent communication. Such firms are likely to exchange information on potential risks and past disruptions, developing a shared vigilance for warning signs in the environment. Prior research suggests that relational capital enables firms to scan and interpret environmental changes by leveraging their partners' information and expertise (Kano, 2018). Sanchez-Famoso *et al.* (2025) found that relational capital played a key role in developing international competitive advantages for family-run wineries and oil mills in Spain by strengthening collaborative networks and knowledge exchange. Accordingly, SMEs may benefit from relational capital by strengthening connections with external partners, facilitating access to global markets, and improving firm performance. Xu and Lin (2024) established that supply chain relational capital was critical to the success of new product development and R&D investment in larger corporations. The innovation process often spans the supply chain network; as firms invest together, they become increasingly interdependent and benefit from shared success. Ultimately, network relationships developed through relational capital can shape a firm's orientation toward supply chain disruption (Nibbrig *et al.*, 2025). Thus, as firms invest more in strong inter-firm relationships, they should exhibit a higher orientation toward supply chain disruption. That is, they will be more alert to potential disruptions, routinely learn from supply chain failures, and proactively plan for disruption scenarios through collaboration with partners. Formally:

H1: Relational capital is positively related to a firm's supply chain disruption orientation.

Relational capital is also proposed to serve as an important antecedent of supply chain resilience. Robb *et al.* (2022) found that relational capital helped US firms to bolster supply chain resilience during the COVID-19 pandemic. The collaborative routines and goodwill inherent in relational capital can facilitate joint problem-solving and resource sharing during disruptions (Stumpf *et al.*, 2023). For example, a firm with high relational capital may more easily find alternative supply routes or obtain critical support from partners when a disruption strikes, thereby recovering faster. Strong external relationships have been found to

directly enhance organizational resilience in SMEs (Wang and Xiao, 2024). By enabling firms to access a network of high-quality resources and information, relational capital builds the capacity to absorb and adapt to shocks (Asadollah *et al.*, 2024). Al-Omoush *et al.* (2022) found that interrelationships among suppliers were critical for building resilience in Jordanian food firms, with knowledge sharing strengthening resilience capabilities. Yu *et al.* (2025) emphasized the importance of shared digitalization and supply chain mapping as mechanisms through which US MNEs operating in China strengthened supply chain resilience. Sègbotangni *et al.* (2025) found that supply chain integration and transparency improved resilience among French manufacturing SMEs facing environmental disruptions. Ultimately, relational capital provides an important mechanism through which both MNEs and SMEs develop supply chain resilience. Therefore:

H2: Relational capital is positively related to a firm's supply chain resilience.

2.2.2 Relational Supply Chain Disruption Orientation

A disruption-oriented organizational culture is expected to foster greater supply chain resilience (Kang *et al.*, 2022). A firm with a supply chain disruption orientation (SCDO) systematically learns from past disruptions, conducts scenario planning for potential events, and ingrains a readiness mindset into its processes (Schepis and Kingshott, 2024). Such a firm is not caught off guard by disturbances; instead, it has playbooks and adaptive strategies in place. Thus, disruption orientation should translate into tangible resilience capabilities within the supply chain. Prior studies indeed posit that a strong disruption orientation leads to greater supply chain resilience (Ho *et al.*, 2015). Yu *et al.* (2019) found that disruption orientation significantly strengthened supply chain resilience among Chinese manufacturers. By treating disruptions as likely and preparing accordingly, both SMEs and MNEs can build resilience through mechanisms such as backup systems and flexible sourcing. As a result, resilience can emerge as a natural extension of a disruption-oriented mindset. Therefore, the following is hypothesized:

H3: A supply chain disruption orientation is positively related to supply chain resilience.

Being disruption-oriented may also yield direct benefits for market performance. A firm that is constantly vigilant and prepared for disruptions could avoid or mitigate the operational breakdowns that harm customer service and sales. For instance, if a company anticipates a potential supply issue and secures alternative suppliers in advance, it can continue delivering products when a disruption occurs, thereby outperforming rivals who are unprepared. Prior research suggests that supply chain disruption orientation can directly improve performance outcomes (Schepis and Kingshott, 2024). However, it is also plausible that disruption orientation affects performance primarily through resilience, whereby a disruption-oriented mindset strengthens resilience capabilities, which subsequently drive performance outcomes (Stumpf *et al.*, 2023). Yu *et al.* (2019) linked disruption orientation to improved financial performance among Chinese manufacturers. Kang *et al.* (2022) found that South Korean firms adopted a supply chain disruption orientation to strengthen resilience capabilities through investments in digitalization and adaptive supply chain practices. Together, these arguments suggest that

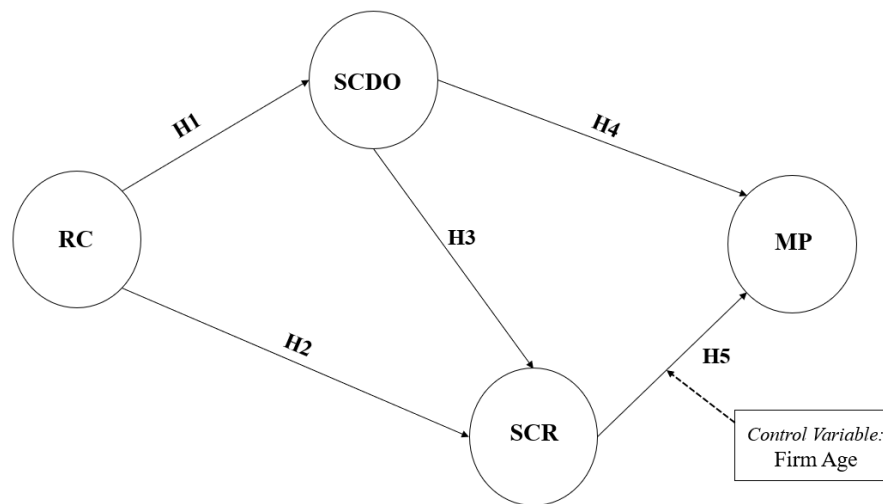


Figure 1 Conceptual Framework

disruption orientation functions as an important organizational precursor to resilience and, potentially, improved performance outcomes. Therefore, a positive direct relationship is hypothesized, while acknowledging that this effect may be weaker than the indirect pathway through resilience.

H4: A supply chain disruption orientation is positively related to market performance.

2.2.3 Supply Chain Resilience

Supply chain resilience refers to an organization's ability to absorb disruptions, adapt to unexpected shocks, and recover quickly from adverse events. In turbulent environments, resilience is widely recognized as a key driver of market performance because it allows firms to maintain operational continuity and sustain customer service levels despite disruptions. Resilient firms are better positioned to stabilize supply flows, protect customer relationships, and, in some cases, even capitalize on disruptions by adapting faster than competitors. Stephens *et al.* (2022), for example, found that supply chain resilience significantly improved performance outcomes among Korean and U.S. firms operating in volatile markets.

Prior studies also highlight how resilience can be strengthened through collaborative supply chain relationships and technological capabilities. Yu *et al.* (2025) showed that relational capital enabled U.S. multinational enterprises operating in China to recover from disruptions and improve their supply chain resilience and market position. Similarly, Kang *et al.* (2022) demonstrated that South Korean manufacturers leveraged digital innovation to enhance supply chain resilience, thereby improving market performance. These findings suggest that resilience enables firms to respond quickly during disruptions by reallocating resources, maintaining supply continuity, and serving customers when competing firms are unable to do so. Additionally, Korean manufacturers were found to build market performance when supply chain resilience was improved (Kang *et al.*, 2024).

As a result, firms with higher levels of supply chain resilience are expected to achieve stronger market outcomes, including higher customer satisfaction, greater market share

growth, and improved competitive positioning. Thus, the following hypothesis is proposed:

H5: Supply chain resilience is positively related to market performance.

2.2.4 Firm Size

Firm size represents a fundamental organizational characteristic that shapes resource availability, structural complexity, and information-processing capacity. Larger firms typically possess more diversified supply networks, greater financial slack, and more formalized governance structures, which may buffer the impact of supply chain disruptions. In contrast, smaller firms often operate with fewer redundant resources and thinner margins, making them more vulnerable to operational shocks and environmental turbulence (Prashantham and Birkinshaw, 2020).

From a dynamic capabilities perspective, the effectiveness of adaptive capabilities depends on the organizational context in which they are deployed (Asadollah *et al.*, 2024). While relational capital and disruption orientation may facilitate the development of resilience across firms, the performance returns of resilience investments may vary depending on structural conditions associated with firm size (Rodríguez-Gulías, 2024). Larger firms often benefit from formal risk management systems and established coordination mechanisms that translate preparedness into performance outcomes. Smaller firms, although potentially more flexible, may lack the institutionalized processes to convert disruption awareness into immediate competitive gains systematically.

From an information-processing and structural-contingency perspective, firm size fundamentally shapes how capabilities translate into performance outcomes. Larger firms typically possess more developed information-processing systems, formalized coordination mechanisms, and resource buffers, which enable disruption-related signals to be systematically interpreted and acted upon (Bode *et al.*, 2011). As a result, a disruption-oriented mindset in large firms is more likely to translate directly into performance outcomes through early detection and coordinated response mechanisms. In contrast, SMEs often face constraints in information-processing capacity and formal coordination

Table 1 Demographics of the Sample (N=191)

Demographic Characteristic	Interval	Industry Type	Count (%)
Number of Employees	Less than 250		123 (64%)
	251 or more		68 (36%)
Number of Years in Operation	1-5 years		51 (26%)
	6-10 years		62 (32%)
	11-25 years		55 (28%)
	26 years or more		23 (14%)
Annual Sales	\$5 million or less		80 (42%)
	\$5–10 million		26 (14%)
	\$10–20 million		10 (5%)
	\$20–50 million		8 (4%)
	\$51 million or more		67 (35%)
Industry		Machinery, automobiles	13 (7%)
		Building materials	15 (8%)
		Chemical and petrochemical	14 (7%)
		Electronics and electrical	20 (10%)
		Others	129 (68%)

systems. While they may exhibit high levels of disruption awareness, their ability to convert such awareness into immediate performance gains is more limited. Instead, SMEs rely more heavily on operational capabilities such as flexibility, redundancy, and recovery speed, that is, supply chain resilience, to maintain performance under disruption. Consequently, resilience is expected to play a more central role in driving performance outcomes for SMEs. Based on these arguments, firm size is expected to moderate the structural relationships within the proposed model, particularly the pathways linking disruption orientation and resilience to market performance.

2.2.5 Firm age (Control Variable)

Firm age has been associated with organizational learning, accumulated experience, and the institutionalization of routines that may influence capability development and performance outcomes. Older firms often benefit from established supplier relationships and prior exposure to disruptions, which can contribute to resilience-building processes (Gölgeci and Ponomarov, 2013). Over time, firms may refine coordination mechanisms and strengthen relational capital, thereby enhancing their adaptive capacity. However, increased firm age may also be associated with structural inertia and reduced organizational flexibility, potentially constraining rapid adaptation to environmental turbulence. As firms mature, established routines and bureaucratic processes may limit their responsiveness to unexpected supply chain disruptions. Given these competing theoretical arguments, firm age is included as a control variable in the model to account for potential maturity-related effects on market performance and on the development of supply chain capabilities. A summary of the conceptual framework is available in Figure 1.

3. METHODOLOGY

3.1 Sample

Empirical data were collected via a survey of manufacturing firms to test the proposed model. The final sample consisted of 191 firms. According to the European Commission classification, firms with fewer than 250 employees were classified as SMEs, while those with 250 or more employees were classified as large enterprises. For brevity, and consistent with prior comparative supply chain

studies, the latter group is referred to as “MNEs” in this study. However, it should be noted that this classification reflects firm size rather than strict multinational status. By this criterion, the sample included 123 SMEs (64%) and 68 MNEs (36%). The respondents were supply chain or operations managers knowledgeable about their firm’s disruption management practices. Table 1 summarizes the sample demographics. The firms represented a range of company ages (about 58% had over 10 years of operation) and a variety of industries, including machinery, building materials, chemicals, electronics, and others. Annual sales levels also varied widely, indicating a mix of smaller and larger revenue companies. This diversity of backgrounds increases the generalizability of the results. Surveys were administered via email and an online questionnaire. Respondents were assured confidentiality. To reduce common method bias, the survey was divided into sections and kept anonymous. Harman’s single-factor test post hoc was also conducted, which did not indicate a single factor accounting for the majority of the variance (no single factor > 50%), suggesting common method bias is not a serious concern.

3.2 Research Instrument

All constructs were operationalized using multi-item scales adapted from established studies to ensure content validity and theoretical consistency. Minor wording adjustments were made to fit the supply chain context of manufacturing firms while preserving the original conceptual meaning. All items were measured on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). All constructs were modeled as reflective, consistent with prior research. A summary of the variables with items and construct definitions is presented in Table 2.

SCDO was measured using four items adapted from Bode *et al.* (2011). This construct captures the extent to which a firm systematically anticipates, analyzes, and learns from supply chain disruptions. The items reflect an organizational mindset oriented toward awareness of disruption and preparedness, aligning with the sensing and learning dimensions of dynamic capability theory. A sample item is: “At my company, we are alert for possible supply chain disruptions at all times.” Relational capital was measured using four items adapted from Carey *et al.* (2011)

Table 2 Operationalization of the Research Instrument

Variable	Operational Definition	Measurement Items	Prior Research
Supply Chain Disruption Orientation	The degree to which an organization learns from and prepares for SC disruptions.	(SCDO1) We are alert for possible supply chain disruptions at all times. (SCDO2) We expect supply chain disruptions always to be looming. (SCDO3) We think about how supply chain disruptions could have been avoided. (SCDO4) After a supply chain disruption has occurred, it is analyzed thoroughly.	Bode <i>et al.</i> (2011)
Relational Capital	The degree to which an organization develops and maintains good relations with its partners.	(RC1) Close interactions with partners. (RC2) High levels of reciprocity with partners. (RC3) Mutual trust between our partners and us. (RC4) Mutual respect between our partners and us.	Dyer and Singh (1998)
Supply Chain Resilience	The degree to which a firm can anticipate, absorb, adapt to, and recover from supply chain disruptions while maintaining operational continuity.	(SCR1) We can quickly respond to unexpected supply chain disruptions. (SCR2) We can maintain operations even amid significant supply chain disruptions. (SCR3) We can recover rapidly from supply chain disruptions. (SCR4) Our firm's supply chain has the knowledge to recover from disruptions and unexpected events. (SCR5) Our firm's supply chain is well-prepared to address the financial impacts of disruptions. (SCR6) Our firm's supply chain can transition to a new, more desirable state after a disruption.	Gölgeci and Ponomarov (2013)
Market Performance	The degree to which this firm can perform well within the market.	(MP1) Our firm has higher/greater customer loyalty. (MP2) Our firm has higher/greater customer satisfaction. (MP3) Our firm has a higher/greater company image. (MP4) Our firm has higher/greater growth in market penetration. (MP5) Our firm has higher/greater growth in industry competitiveness.	Carey <i>et al.</i> (2011)

and grounded in the relational view (Dyer and Singh, 1998). The scale captures the quality of inter-organizational relationships characterized by trust, reciprocity, close interaction, and mutual respect. These relational attributes represent inter-firm resources that enable information sharing and collaborative problem-solving during disruptions. Supply chain resilience was measured using six items adapted from Gölgeci and Ponomarov (2013) and related resilience research. The construct captures a firm's capability to respond to, adapt to, and recover from supply chain disruptions while maintaining operational continuity. The scale reflects resilience as an adaptive dynamic capability rather than mere operational efficiency. Sample items include the firm's ability to respond quickly to disruptions and to maintain supply chain functioning during disturbances. Firm age was included as a control variable in the structural model to account for potential maturity-related effects on market performance.

Market performance was measured using five comparative items adapted from Carey *et al.* (2011). Respondents evaluated their firm's performance relative to major competitors across dimensions such as customer loyalty, satisfaction, company image, and market growth. Perceptual performance measures are widely used in supply chain research and have been shown to correlate with objective performance indicators.

To reduce common method bias, survey items were psychologically separated across sections, and respondents were assured anonymity. Additionally, Harman's single-factor test indicated that no single factor accounted for the majority of variance.

4. ANALYSIS AND RESULTS

4.1 PLS-SEM Procedure and Invariance Testing

A Partial least squares structural equation modeling (PLS-SEM) was employed using SmartPLS 4 to estimate both the measurement and structural models. PLS-SEM was selected for its suitability for prediction-oriented research, robustness with moderate sample sizes, and appropriateness for multi-group comparisons (Hair *et al.*, 2022). The analysis followed a two-step approach: first assessing the measurement model for reliability and validity, and then evaluating the structural model for explanatory and predictive power. The consistent PLS algorithm was used for parameter estimation, and bootstrapping with 5,000 resamples was conducted to obtain t-statistics and p-values for hypothesis testing. All hypotheses were theoretically grounded and directional; therefore, one-tailed tests were applied, consistent with established PLS-SEM practices in confirmatory research contexts.

Table 3 Outer Model Assessment

Factors	Standard Load		VIF	AVE (AVE > 0.5)		Construct Reliability (C.R > 0.7)		Cronbach's Alpha ($\alpha > 0.5$)	
	SMEs	MNEs		SMEs	MNEs.	SMEs	MNEs.	SMEs	MNEs
SCDO1	0.793	0.834	1.765						
SCDO2	0.700	0.779	1.622						
SCDO3	0.879	0.879	2.264	0.636	0.700	0.835	0.869	0.810	0.857
SCDO4	0.807	0.851	1.746						
RC1	0.667	0.886	1.541						
RC2	0.703	0.942	1.957						
RC3	0.732	0.961	2.004	0.526	0.827	0.716	0.948	0.701	0.930
RC4	0.792	0.844	1.721						
SCR1	0.724	0.771	1.621						
SCR2	0.708	0.867	1.967						
SCR3	0.698	0.859	1.936						
SCR4	0.784	0.822	1.765	0.512	0.608	0.816	0.888	0.809	0.869
SCR5	0.690	0.683	1.507						
SCR6	0.684	0.648	1.746						
MP1	0.780	0.720	1.780						
MP2	0.774	0.762	1.892						
MP3	0.716	0.808	1.654	0.568	0.613	0.821	0.860	0.809	0.844
MP4	0.669	0.786	1.763						
MP5	0.821	0.834	1.991						

To compare SMEs ($n = 123$) and MNEs ($n = 68$), measurement invariance was assessed using the MICOM procedure (Henseler & Sarstedt, 2013). Configural invariance was established by ensuring that the indicators, data treatment procedures, and algorithm settings were identical across groups. Compositional invariance was then evaluated using permutation tests (5,000 permutations). The correlations of composite scores between groups were close to 1 (e.g., SCDO = 0.999; SCR = 0.996), with confidence intervals that included 0.99 or 1, confirming compositional invariance across all constructs. Partial measurement invariance was established across all constructs, which is sufficient for multi-group comparison (Hair *et al.*, 2022). Although some constructs also satisfied the criteria for full measurement invariance, partial invariance is considered adequate for comparing structural path coefficients across groups. Equality of means and variances was also assessed. While latent means differed significantly by disruption orientation (SMEs reported slightly higher levels), most variance was equivalent across groups. Since full invariance is not required for multi-group path comparison, the analysis proceeded using partial invariance.

After establishing measurement invariance, multi-group analysis (PLS-MGA) was conducted using both Henseler's MGA and permutation tests to assess differences in path coefficients between SMEs and MNEs. Differences were considered significant if $p < 0.05$ in either test. Although PLS-SEM is primarily prediction-oriented, the study reported the standardized root mean square residual (SRMR) as an approximate indicator of model fit (Hair *et al.*, 2019; Hair *et al.*, 2022). The SRMR for the overall model was 0.074, below the recommended threshold of 0.08, indicating an acceptable approximate fit. Given the smaller size of the MNE subgroup, a post-hoc statistical power analysis was conducted. Following the inverse-square-root method (Kock and Hadaya, 2018), the minimum required sample size for detecting a path coefficient of 0.30 at $\alpha = 0.05$

is 53 observations. With 68 MNE observations, the subgroup exceeds this threshold, suggesting adequate power for detecting medium-sized effects. Nevertheless, MNE-specific findings are interpreted cautiously.

4.2 Measurement Model Assessment

The measurement model was evaluated for internal consistency reliability, convergent validity, and discriminant validity. As reported in Table 3, all constructs exceeded recommended reliability thresholds. Composite reliability (CR) values were above 0.70 across groups, and Cronbach's alpha values ranged between 0.70 and 0.94, indicating satisfactory internal consistency. Average variance extracted (AVE) values exceeded 0.50 for all constructs, supporting convergent validity. In addition, variance inflation factor (VIF) values for all indicators were below the conservative threshold of 3.3, indicating that multicollinearity is not a concern in the measurement model (Hair *et al.*, 2019). These results suggest that the indicators contribute uniquely to their respective constructs and that the measurement model demonstrates adequate reliability and validity across both SME and MNE subsamples.

Discriminant validity was assessed using both the Fornell–Larcker criterion and the heterotrait–monotrait (HTMT) ratio. As shown in Table 4, the square root of the average variance extracted (AVE) for each construct exceeded its correlations with other constructs within both the SME and MNE samples, satisfying the Fornell–Larcker criterion and indicating that each construct shares more variance with its own indicators than with other constructs. Additionally, HTMT ratios (Table 5) were below the conservative threshold of 0.85, providing further evidence that the constructs are empirically distinct and not capturing overlapping conceptual domains (Hair *et al.*, 2019). Together, these results confirm adequate discriminant validity across all constructs in the model. Overall, the measurement model demonstrates satisfactory reliability and validity across both firm-size groups.

Table 4 Fornell-Larcker Criterion

	MP	RC	SCDO	SCR
MP	SME: 0.754 MNE: 0.783 COM: 0.760			
RC	SME: 0.651 MNE: 0.678 COM: 0.622	SME: 0.725 MNE: 0.909 COM = 0.812		
SCDO	SME: 0.487 MNE: 0.498 COM: 0.456	SME: 0.292 MNE: 0.453 COM: 0.349	SME: 0.798 MNE: 0.836 COM: 0.812	
SCR	SME: 0.680 MNE: 0.519 COM: 0.653	SME: 0.587 MNE: 0.569 COM: 0.543	SME: 0.599 MNE: 0.590 COM: 0.597	SME: 0.716 MNE: 0.779 COM: 0.737

Notes: SME = Small and Medium Enterprise; MNE = Multinational Enterprise; COM = Complete Fornell-Larcker Criterion

Table 5 HTMT Matrix (Complete)

	MP	RC	SCDO	SCR
MP	-			
RC	0.761	-		
SCDO	0.544	0.411	-	
SCR	0.783	0.652	0.698	-

Table 6 Structural Model Assessment

Endogenous Variables	R ²		Q ²	
	SMEs	MNEs	SMEs	MNEs
SC Disruption	0.085	0.205	0.058	0.171
SC Resilience	0.545	0.463	0.323	0.276
Market Performance	0.608	0.326	0.376	0.300

Table 7 Comparison of Cohen's f-Square Effect Sizes

Pathway	Cohen's f-Square of SME	Cohen's f-Square of MNE	Comparison (= SME – MNE)
RC → SCDO	0.093	0.258	- 0.165
RC → SCR	0.409	0.214	+ 0.195
SCDO → MP	0.002	0.084	- 0.082
SCDO → SCR	0.441	0.259	+ 0.182
SCR → MP	0.946	0.115	+ 0.831

Table 8 Pathway Assessment (Complete)

Hypotheses	Pathways	Pathway Coefficient	t-Stats	p-Value	Results
H1	Relational Capital → SC Disruption Orientation	0.357	4.390	0.000	Accepted
H2	Relational Capital → SC Resilience	0.403	5.446	0.000	Accepted
H3	SC Disruption Orientation → SC Resilience	0.457	6.500	0.000	Accepted
H4	SC Disruption Orientation → Market Performance	0.119	1.360	0.087	Rejected
H5	SC Resilience → Market Performance	0.591	6.097	0.000	Accepted
Control Variable					
	Firm Age → Market performance	0.103	1.949	0.026	-

Notes: β = Standardized path coefficient. Bootstrapping with 5,000 resamples.

4.3 Structural Model Assessment

The study first evaluated the structural model using the full sample (N = 191). Model explanatory power was assessed using R² values, predictive relevance using Stone–Geisser's Q² values, and effect sizes using Cohen's f² (Tables 6 and 7). The model explains a substantial portion of the variance in key endogenous constructs. For the pooled sample, R² values were 0.157 for SCDO, 0.521 for SCR, and 0.502 for market performance, indicating moderate-to-substantial explanatory power. Predictive relevance was supported by positive Q² values for all endogenous constructs, confirming the model's predictive capability.

In addition to the pooled model results, effect sizes (Cohen's f²) are reported separately for SMEs and MNEs in Table 7 to provide a more nuanced comparison of the relative strength of structural relationships across firm sizes.

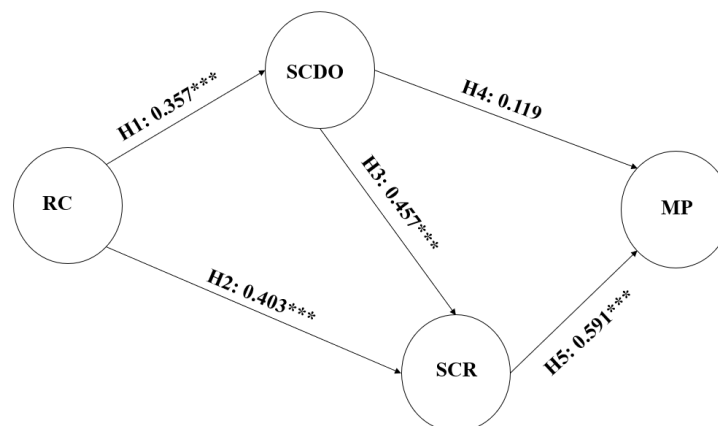
Hypothesis testing results for the pooled sample are reported in Table 8. Relational capital significantly influenced disruption orientation (H1: $\beta = 0.357$, $p < 0.001$) and resilience (H2: $\beta = 0.403$, $p < 0.001$). Disruption orientation significantly enhanced resilience (H3: $\beta = 0.457$, $p < 0.001$). Supply chain resilience had a strong positive effect on market performance (H5: $\beta = 0.591$, $p < 0.001$), representing the largest effect in the model.

Table 9 Pathway Assessment (SMEs)

Hypotheses	Pathways	Pathway Coefficient	t-Stats	p-Value	Results
H1a	Relational Capital → SC Disruption Orientation	0.292	3.411	0.000	Accepted
H2a	Relational Capital → SC Resilience	0.451	5.759	0.000	Accepted
H3a	SC Disruption Orientation → SC Resilience	0.468	5.549	0.000	Accepted
H4a	SC Disruption Orientation → Market Performance	0.031	0.388	0.349	Rejected
H5a	SC Resilience → Market Performance	0.761	5.473	0.000	Accepted
Control Variable					
	Firm Age → Market performance	0.076	1.282	0.100	-

Table 10 Pathway Assessment (MNEs)

Hypotheses	Pathways	Pathway Coefficient	t-Stats	p-Value	Results
H1b	Relational Capital → SC Disruption Orientation	0.453	3.507	0.000	Accepted
H2b	Relational Capital → SC Resilience	0.380	2.560	0.005	Accepted
H3b	SC Disruption Orientation → SC Resilience	0.418	3.136	0.001	Accepted
H4b	SC Disruption Orientation → Market performance	0.295	1.849	0.032	Accepted
H5b	SC Resilience → Market performance	0.345	1.678	0.047	Accepted
Control Variable					
	Firm Age → Market performance	0.049	0.450	0.326	-



: $p < 0.05$, *: $p < 0.001$

Figure 2 Results

However, the direct path from disruption orientation to market performance (H4) was not statistically significant in the pooled sample ($\beta = 0.119$, $p = 0.087$), suggesting that the performance impact of disruption orientation may operate primarily through resilience rather than directly. These results support the core relational–capability–performance chain proposed in the conceptual framework. Firm age accounted for potential maturity-related differences across firms. The results indicate that firm age exhibits a modest relationship with market performance, although its effect size is relatively small compared with the primary structural relationships in the model.

4.4 Multi-Group Analysis (SMEs vs. MNEs)

To examine whether the structural relationships differ by firm size, separate models were estimated for SMEs and MNEs (Tables 9 and 10), followed by formal difference testing using PLS-MGA and permutation tests (Table 11). Results are further illustrated in Figure 2.

The results indicate several similarities across firm types. In both SMEs and MNEs, relational capital positively influences supply chain disruption orientation (H1a, H1b) and supply chain resilience (H2a, H2b). In addition, disruption orientation significantly enhances resilience in both groups (H3a, H3b). These findings suggest that the relational and capability-building mechanisms underlying resilience development operate similarly across firm sizes. However, notable differences emerge in the pathways linking capabilities to market performance. For SMEs, disruption orientation does not significantly influence market performance (H4a), whereas it has a positive and significant effect on market performance for MNEs (H4b: $\beta = 0.295$, $p = 0.032$). In contrast, supply chain resilience exerts a substantially stronger influence on market performance for SMEs (H5a: $\beta = 0.761$, $p < 0.001$) than for MNEs (H5b: $\beta = 0.345$, $p = 0.047$). Formal difference testing

Table 11 Results of Invariance Measurement Testing Using Permutation

Constructs	Configural Invariance (Same Algorithms for Both Groups)	Compositional Invariance (Correlation=1)		Partial Measurement Invariance Established	Equal Mean Assessment			Equal Variance Assessment			Full Measurement Invariance Established
		C = 1	Confidence Invariance		Difference	Confidence Interval	Equal	Difference	Confidence Interval	Equal	
MP	Yes	0.997	0.989; 1.000	Yes	-0.105	-0.294; 0.299	Yes	-0.095	-0.482; 0.518	Yes	Yes
RC	Yes	0.994	0.991; 1.000	Yes	0.066	-0.302; 0.297	Yes	-0.715	-0.464; 0.517	No	No
SCDO	Yes	0.999	0.990; 1.000	Yes	0.328	-0.294; 0.291	No	-0.164	-0.473; 0.554	Yes	No
SCR	Yes	0.996	0.995; 1.000	Yes	0.220	-0.298; 0.290	Yes	-0.209	-0.541; 0.604	Yes	Yes

Table 12 Results of Hypothesis Test

Hypothesis Relationship	Path Coefficients		Path Coefficients Difference	Confidence Interval (95%)	Henseler's MGA	Permutation p-Value	Difference Significant
	SMEs	MNEs					
RC → SCDO	0.292	0.453	-0.161	-0.285; 0.283	0.148	0.188	No
RC → SCR	0.451	0.380	0.071	-0.270; 0.262	0.335	0.318	No
SCDO → MP	0.031	0.295	-0.263	-0.312; 0.300	0.070	0.087	No
SCDO → SCR	0.468	0.418	0.050	-0.238; 0.262	0.389	0.314	No
SCR → MP	0.761	0.345	0.416	-0.333; 0.356	0.017	0.025	Yes

Table 13 Mediation Effects of Bootstrapped Indirect Effects (Complete)

Mediating Pathways	β-Coefficient	t-Value	p-Value
H6a: RC → SCDO → SCR → MP	0.096	3.836	0.000
H6b: RC → SCDO → SCR	0.162	4.553	0.000
H6c: RC → SCR → MP	0.226	3.514	0.000
H6d: RC → SCDO → MP	0.036	1.116	0.132
H6e: SCDO → SCR → MP	0.275	5.639	0.000

Notes: Mediating variables are in bold.

confirms that the resilience–performance relationship is significantly stronger for SMEs than for MNEs (difference = 0.416; $p < 0.05$ across tests). These findings indicate that while relational capital and disruption orientation contribute similarly to resilience development across firm sizes, the performance implications of resilience differ substantially. In particular, resilience yields disproportionately greater performance benefits for SMEs, suggesting that smaller firms rely more heavily on resilience capabilities to sustain market performance under disruption.

Latent mean comparisons further indicate that SMEs report slightly higher levels of disruption orientation than MNEs. However, this heightened orientation does not translate into direct performance gains for SMEs, reinforcing resilience as the primary mechanism by which disruption preparedness influences market outcomes in smaller firms. This finding suggests that SMEs depend more heavily on resilience capabilities to convert disruption preparedness into tangible performance outcomes. The results of both PLS-MGA and permutation tests are presented in Table 12.

4.5 Mediation Analysis

To further examine the indirect mechanisms underlying the proposed relationships, bootstrapped mediation analyses were conducted using 5,000 resamples. The results are reported in Table 13. The findings indicate that relational capital exerts a significant indirect effect on market performance through supply chain resilience. This suggests

that the performance benefits of strong inter-organizational relationships are not primarily direct; rather, they operate by strengthening a firm's resilience capability. In other words, relational capital enhances a firm's ability to withstand and recover from disruptions, thereby improving its competitive performance.

In addition, the authors observed a significant serial mediation effect whereby relational capital influences market performance through disruption orientation and, subsequently, through resilience. This sequential pathway supports the theoretical logic that relational resources contribute to a disruption-aware organizational culture, which then facilitates the development of resilience capability, ultimately translating into superior market performance.

Furthermore, disruption orientation demonstrates a significant indirect effect on market performance via resilience. While disruption orientation does not consistently yield direct performance gains in the pooled model, it strengthens resilience, which in turn drives performance. This reinforces the argument that resilience functions as the central capability mechanism linking preparedness and market outcomes. These findings indicate that resilience serves as a central mediating mechanism by which both relational resources and disruption-oriented capabilities translate into performance outcomes, reinforcing its role as a core dynamic capability in supply chain contexts.

5. DISCUSSION

This study provides empirical evidence on how relational capital and disruption orientation shape supply chain resilience and market performance, and how these relationships differ between SMEs and MNEs. The findings provide robust support for the proposed relational–capability–performance chain, while revealing important asymmetries across firm size. Our most striking finding concerns the asymmetric importance of supply chain resilience for SMEs versus MNEs. While resilience significantly enhances performance in both groups, its impact is substantially stronger for SMEs. This asymmetry is not sufficiently explained by a generic resource-based logic alone. Rather, it becomes clearer when considering structural and organizational characteristics associated with firm size.

From a structural inertia perspective, large organizations tend to operate with formalized routines, layered hierarchies, and institutionalized risk-management systems. Such structural features allow MNEs to embed a disruption-oriented mindset into governance mechanisms, strategic planning systems, and enterprise-wide monitoring processes. Consequently, a disruption-oriented culture in MNEs can directly translate into performance outcomes, as early-warning systems, cross-functional coordination mechanisms, and resource buffers enable rapid execution and loss mitigation. In contrast, SMEs often operate with less formalized structures and fewer dedicated risk-management systems. For these firms, disruption orientation alone does not automatically yield performance benefits unless it is converted into tangible operational capabilities.

Information processing theory further clarifies this distinction. MNEs typically possess greater information-processing capacity due to specialized departments, digital infrastructures, and formal communication channels. Disruption signals can therefore be systematically interpreted, escalated, and acted upon at scale. This enhances the likelihood that a disruption-oriented mindset directly mitigates performance losses. SMEs, while often more flexible and entrepreneurial, face information-processing constraints that limit their ability to translate vigilance into immediate competitive gains. For them, resilience, manifested in redundancy, flexibility, adaptive sourcing, and recovery capability, becomes the operative mechanism that protects performance.

These findings suggest that resilience functions as a survival-level dynamic capability for SMEs, whereas in MNEs it operates more as a stabilizing complement to existing structural advantages. SMEs are typically more vulnerable to operational shocks due to thinner margins, limited supplier diversification, and lower financial slack. Therefore, improvements in resilience disproportionately affect their ability to maintain customer satisfaction, market presence, and continuity during disruptions. In contrast, MNEs may rely on diversified markets, financial reserves, global footprints, and brand capital to absorb short-term shocks, reducing the marginal performance impact of additional resilience investments.

Beyond size-based asymmetry, our findings also reinforce the enabling role of relational capital. Across both groups, relational capital significantly enhances disruption orientation and resilience. This indicates that inter-

organizational relationships serve as foundational mechanisms for building adaptive capacity. Trust, reciprocity, and collaborative communication allow firms to access timely information, coordinate contingency actions, and mobilize shared resources when disruptions occur. Importantly, these relational effects are structurally equivalent across SMEs and MNEs, suggesting that relationship-based resources constitute a universal adaptive asset in supply chains.

Collectively, the results demonstrate that the performance returns of adaptive capabilities are context-dependent. Dynamic capabilities do not operate uniformly across organizational settings; rather, their value depends on structural complexity, information-processing capacity, and exposure to vulnerability. Firm size shapes not only resource availability but also the efficiency with which cultural orientations and relational assets are translated into market outcomes.

5.1 Academic Implications

This study advances supply chain management theory in several important ways. First, it integrates the relational view with dynamic capability theory in a supply chain context. While prior research has treated relational capital primarily as a source of relational rents, our findings demonstrate that relational capital also serves as an enabling mechanism for dynamic capability development. By empirically showing that relational capital strengthens disruption orientation and resilience, the researchers extended the relational view beyond value appropriation toward adaptive buffering under uncertainty. Second, the study clarifies the role of SCDO as a cultural micro foundation of resilience. Rather than treating resilience as a purely structural or operational construct, our findings indicate that organizational mindset and a learning orientation toward disruptions are precursors to the formation of resilient capability. This contributes to dynamic capability research by highlighting how cultural orientations facilitate the sensing and reconfiguring processes necessary for resilience development. Third, and most importantly, the multi-group analysis introduces firm size as a boundary condition in the resilience–performance relationship. While prior research often controls for firm size, our results demonstrate that size fundamentally shapes the performance returns of adaptive capabilities. The significantly stronger resilience–performance effect for SMEs suggests that vulnerability exposure and structural configuration moderate the strategic payoff of resilience investments. This contributes to contingency-based perspectives in supply chain management and addresses calls for greater attention to organizational heterogeneity in resilience research. Finally, the findings contribute to post-disruption scholarship by reinforcing and extending empirical evidence linking disruption orientation and resilience to performance outcomes across contexts. By demonstrating structural equivalence in relational pathways but asymmetry in performance conversion, this study adds nuance to existing models. It strengthens confidence in the robustness of these relationships across firm types.

5.2 Practical Implications

The findings offer differentiated guidance for SME and MNE managers. For SME managers, resilience should be treated as a strategic imperative rather than a secondary

capability. Given the disproportionate performance impact observed, SMEs should prioritize investments that enhance redundancy, flexibility, adaptive sourcing, and recovery speed. Practical initiatives include supplier diversification, flexible production arrangements, employee cross-training, scenario planning, and the establishment of contingency partnerships. Because SMEs often operate under resource constraints, relational capital becomes a critical lever. Strengthening trust-based relationships with suppliers and logistics providers can secure preferential treatment during crises and improve access to shared contingency resources. In this sense, relational capital serves as a multiplier, amplifying the effectiveness of resilience investments.

For MNE managers, the results highlight the strategic importance of cultivating a culture of disruption. Larger firms may already possess structural resilience, but the direct performance effect of disruption orientation suggests that enterprise-wide vigilance and institutionalized learning systems can further mitigate disruption-related losses. Embedding risk-awareness training, formalizing post-disruption learning routines, enhancing cross-functional information flows, and integrating digital monitoring systems can strengthen this cultural orientation. However, given the more modest marginal performance effect of resilience in MNEs, managers should carefully evaluate the cost–benefit trade-offs of excessive redundancy. Balanced investments that combine structural resilience with effective sensing and coordination mechanisms may yield superior outcomes.

Across both firm types, measurement and monitoring are essential. Firms should develop internal indicators for relational capital (e.g., collaboration intensity, trust indices), disruption orientation (e.g., frequency of risk assessments, lessons-learned processes), and resilience (e.g., recovery time objectives). Formalizing these constructs into measurable targets enables continuous improvement and strengthens accountability in disruption management practices.

6. CONCLUSION

6.1 Contribution

In an era marked by increasingly frequent and severe supply chain disruptions, this study provides timely insights into how relational capital and disruption-oriented capabilities shape supply chain resilience and market performance. Using multi-group PLS-SEM to compare SMEs and MNEs, this study examined the interplay among relational capital, supply chain disruption orientation, resilience, and performance outcomes.

The findings affirm that strong inter-organizational relationships and a disruption-oriented culture constitute foundational mechanisms for building resilience. In turn, resilience emerges as a critical driver of market performance amid uncertainty. Importantly, our results demonstrate that these dynamics are not uniform across organizational contexts. Firm size moderates the resilience–performance relationship, with resilience exerting a significantly stronger performance impact in SMEs, while disruption orientation exhibits a direct performance effect primarily in MNEs. The study advances theory in three main respects. First, it bridges the relational view and dynamic capability theory by

empirically demonstrating how relational capital facilitates the development of adaptive capabilities that translate into performance advantages. Second, it highlights disruption orientation as a cultural micro-foundation of resilience, clarifying the role of organizational mindset in shaping capabilities. Third, by introducing firm size as a boundary condition, the study shows that the performance returns of adaptive capabilities are context-dependent, shaped by structural complexity and exposure to vulnerability. This contributes to contingency-based perspectives in supply chain resilience research.

For practitioners, the findings underscore that resilience-building and relational investments are not generic best practices but context-sensitive strategic levers. For SMEs, resilience may represent a survival-critical capability that determines competitive continuity during disruption. For MNEs, embedding disruption orientation into formal structures and information-processing systems can yield direct performance benefits while complementing existing resilience mechanisms.

6.2 Limitations and Directions for Future Research

Notwithstanding its contributions, this study has several limitations that offer opportunities for future research. First, the study relies on cross-sectional survey data and perceptual performance measures. Although procedural and statistical remedies were employed to mitigate common method bias, causal inferences remain limited. Future studies could adopt longitudinal designs or incorporate objective performance indicators to capture better the dynamic evolution of disruption orientation, resilience, and performance outcomes over time. Second, while the sample includes firms from multiple industries, it is geographically concentrated. Institutional, cultural, and regulatory differences may influence supply chain risk management practices across regions. Replication in other national contexts, emerging economies, or highly globalized supply networks would strengthen external validity and help clarify contextual contingencies. Third, firm size was operationalized using a broad SME–MNE distinction. Although appropriate for the present multi-group comparison, this categorization may mask more nuanced structural differences among firms. Future research could employ more granular classifications (e.g., micro, small, medium, and large firms) or examine additional moderating factors such as digital maturity, governance structure, or internationalization intensity. Fourth, although a post hoc statistical power analysis was conducted using the inverse-square-root method, confirming that the MNE subgroup sample size exceeds the minimum threshold required to detect medium-sized effects, this approach primarily reflects the ability to detect individual path relationships. Given the complexity of the full structural model, which includes multiple constructs and indicators, the required sample size for stable parameter estimation may be larger. Therefore, the findings specific to the MNE subgroup should be interpreted with appropriate caution. Future research could employ larger samples to validate subgroup-specific effects further and enhance the robustness of multi-group comparisons. Finally, this study focuses primarily on relational and cultural antecedents of resilience. Future research could

extend the model by incorporating complementary technological capabilities, such as digital supply chain infrastructure, analytics integration, or AI-enabled risk sensing. Such capabilities may interact with relational assets to strengthen adaptive capacity. Further research could also examine potential trade-offs between resilience and efficiency, including the so-called efficiency–resilience paradox, to understand better how firms balance redundancy, flexibility, and cost considerations in resilience investment strategies.

CONFLICTS OF INTEREST

There are no conflicts of interest to report.

DATA AVAILABILITY STATEMENTS

The data is available upon request.

REFERENCES

- Al-Omoush, K. S., Palacios-Marqués, D., and Ulrich, K. (2022). The impact of intellectual capital on supply chain agility and collaborative knowledge creation in responding to unprecedented pandemic crises. *Technological Forecasting & Social Change*, 178, 121603.
- Altay, N., Gunasekaran, A., Dubey, R., and Childe, S. J. (2018). Agility and resilience as antecedents of supply chain performance under moderating effects of organizational culture within the humanitarian setting: a dynamic capability view. *Production Planning & Control*, 29(14), pp. 1158–1174.
- Asadollah, O., Carmy, L. S., Hoque, M. R., and Yilmazkuday, H. (2024). Geopolitical risk, supply chains, and global inflation. *The World Economy*, 47(8), pp. 3450–3486.
- Bode, C., Wagner, S. M., Petersen, K. J. and Ellram, L. M. (2011). Understanding responses to supply chain disruptions: Insights from information processing and resource dependence perspectives. *Academy of Management Journal*, 54(4), pp. 833–856.
- Carey, S., Lawson, B., and Krause, D. R. (2011). Social capital configuration, legal bonds and performance in buyer-supplier relationships. *Journal of Operations Management*, 29(4), pp. 277–288.
- Dyer, J. H., and Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23(4), pp. 660–679.
- Golgeci, I., & Ponomarov, S. Y. (2013). Does firm innovativeness enable effective responses to supply chain disruptions? An empirical study. *Supply Chain Management: An International Journal*, 18(6), 604–617.
- Hair, J., and Alamer, A. (2022). Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics*, 1(3), 100027.
- Hair, J. F., Risher, J. J., Sarstedt, M., and Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24.
- Henseler, J. and Sarstedt, M. (2013). Goodness-of-fit indices for partial least squares path modelling. *Computational Statistics*, 28(2), pp. 565–580.
- Ho, W., Zheng, T., Yildiz, H., and Talluri, S. (2015). Supply chain risk management: a literature review. *International Journal of Production Research*, 53(16), pp. 5031–5069.
- Kang, M., Robb, C., & Stephens, A. (2022). A comparative analysis of South Korean and US firms: Ambidextrous innovation, supply chain resilience, and market performance. *Operations and Supply Chain Management: An International Journal*, 15(4), pp. 565–581. <https://doi.org/10.31387/oscm0510367>
- Kang, M., Robb, C. A., Kim, S., and Stephens, A. R. (2024) Digital Technology Adoption for Building Supply Chain Resilience Amid the COVID-19 Pandemic: Evidence from South Korean Manufacturers. *Operations and Supply Chain Management: An International Journal*, 17(1), pp. 65–76.
- Kano, L. (2018). Global value chain governance: A relational perspective. *Journal of International Business Studies*, 49(6), pp. 684–705.
- Kock, N., and Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. *Information systems journal*, 28(1), pp. 227–261.
- Liu, H., and Wei, S. (2022). Leveraging supply chain disruption orientation for resilience: the roles of supply chain risk management practices and analytics capability. *International Journal of Physical Distribution & Logistics Management*, 52(9/10), pp. 771–790.
- Matas, J., Pérez, N., Ruiz, L., and Riquelme-Medina, M. (2024). Firm disruption orientation and supply chain resilience: understanding mechanisms to mitigate disruption impact. *Journal of Business & Industrial Marketing*, 39(13), pp. 82–95.
- Nibbrig, M. H., Azadeh, S. S., and Maknoon, M. Y. (2025). Adaptive resilience strategies for supply chain networks against disruptions. *Transportation Research Part E: Logistics and Transportation Review*, 200, 104172.
- Prashantham, S., and Birkinshaw, J. (2020). MNE–SME cooperation: An integrative framework. *Journal of International Business Studies*, 51(7), pp. 1161–1175.
- Robb, C. A., Kang, M., and Stephens, A. R. (2022). The effects of dynamism, relational capital, and ambidextrous innovation on the supply chain resilience of U.S. firms amid COVID-19. *Operations and Supply Chain Management: An International Journal*, 15(1), pp. 1–16.
- Rodríguez-Gulías, M. J., Fredenández-López, S., and Rodeiro-Pazos, D. (2024). Foreign knowledge sources and innovation: Differences across large and small and medium-size multinational enterprises (MNEs). *International Review of Economics and Finance*, 92, pp. 741–757.
- Sánchez-Famoso, V., Cano-Rubio, M., and Fuentes-Lombardo, G. (2025). Relational capital's contribution to international success: Evidence from family-owned wineries and olive oil mills in Spain. *Research in International Business and Finance*, 74, 102651.
- Schepis, D., and Kingshott, R. P. (2024). Relational approaches to business network development: new insights and future research directions. *Journal of Business & Industrial Marketing*, 39(7), pp. 1381–1385.
- Sègbotangni, E. A., Laguir, I., and Gupta, S. (2025). Exploring the effect of supply chain integration and supply chain transparency on SME environmental performance under conditions of unpredictability. *Journal of Environmental Management*, 375, 124225.
- Siems, E., Seuring, S., and Schilling, L. (2023). Stakeholder roles in sustainable supply chain management: a literature review. *Journal of Business Economics*, 93(4), pp. 747–775.
- Singh, R. K. (2024). Strengthening resilience in supply chains: the role of multi-layer flexibility, supply chain risks and environmental dynamism. *The International Journal of Logistics Management*, 35(6), pp. 1807–1826.
- Stephens, A. R., Kang, M., and Robb, C. A. (2022). Linking supply chain disruption orientation to supply chain resilience and market performance with the stimulus–organism–response model. *Journal of Risk and Financial Management*, 15(5), pp. 227.

- Stumpf, L., Schöggel, J. P., and Baumgartner, R. J. (2023). Circular plastics packaging–Prioritizing resources and capabilities along the supply chain. *Technological Forecasting and Social Change*, 188, 122261.
- Wang, M., and Xiao, S. (2024). Why do MNE foreign subsidiaries differ in supply chain management capability, and how does it matter? *International Journal of Development Issues*, 23(2), pp. 260–281.
- Xu, W. and Lin, M. (2024). Supply chain relational capital and corporate NPD R&D Investment. *Finance Research Letters*, 61, 105008.
- Yu, J., Fang, Y., Bai, Y., and Chen, F. (2025). Building resilience amidst geopolitical tensions: The case of U.S. MNE subsidiaries in China. *Journal of International Management*, 31(4), 101260.
- Yu, W., Jacobs, M. A., Chavez, R., and Yang, J. (2019). Dynamism, disruption orientation, and resilience in the supply chain and the impacts on financial performance: A dynamic capabilities perspective. *International Journal of Production Economics*, 218, pp. 352–362.

Charles Arthur Robb is an assistant professor of management and the dean of the Linton Global School at Hannam University. He graduated from Pusan National University with a PhD in international trade. His research focuses on organizational resilience and global marketing.

Aaron Rae Stephens is an associate professor of business administration at Hartwick College and the coordinator of their MBA program. He graduated from Pusan National University with PhD in international trade. In 2026 he was the alternate Fulbright Scholar to Malta. In 2023 he was a Fulbright Specialist in South Korea. His research focuses on organizational resilience amid dynamic global disruption stemming from AI, pandemics, war, and more.

Minhyo Kang is an assistant professor of distribution and logistics at Dong-eui University and the head of their MBA program. He graduated from Pusan National University with a PhD in international trade. His research is focused on supply chain management and organizational resilience.