Relational Resilience in Practice: A Qualitative Study of Cooperative Capabilities in Egyptian Manufacturing SMEs During Pandemic Disruptions

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Abstract

In recent years, global supply chains have faced substantial challenges due to natural disasters and health crises. These disruptions have impacted the production, distribution, and marketing of goods and services, exposing vulnerabilities throughout the supply chain. Scholars argue that companies need a deeper understanding of such crises and should prepare responses that go beyond traditional strategies. This includes reassessing pre-existing risks and engaging in collaborative learning to craft new pathways toward resilience, especially in the face of pandemics. Recent studies, including those by Ozdemir et al. (2022), focus on intelligence-driven approaches that facilitate early detection and response to disruptions. While collaboration is recognized as a key factor in building resilience, there is limited clarity on the specific practices' firms use during

disruptions. Without a clear understanding of these practices, efforts to strengthen resilience remain incomplete.

Consequently, the aim of this study is to examine the presence, and extent of cross-organizational collaboration in response to disruptions. The research specifically seeks to construct a framework of collaborative practices for enhancing supply chain resilience by answering two primary questions: What forms of collaboration do firms engage in during a pandemic? And how do firms perceive the impact of these practices on their resilience?

Key terms: Supply Chain Resilience, Collaboration, Disruption, Risk Mitigation, Information Sharing, Joint Planning, Emerging Markets, Qualitative Research, Egypt, Pandemic Response

الملخص

في السنوات الأخيرة، واجهت سلاسل التوريد العالمية تحديات كبيرة نتيجة الكوارث الطبيعية والأزمات الصحية، مما أثّر على الإنتاج والتوزيع وتسويق السلع والخدمات، وكشف عن مواطن ضعف متعددة ضمن سلسلة التوريد. يرى الباحثون أن الشركات بحاجة إلى فهم أعمق لمثل هذه الأزمات، وأنها يجب أن تستعد باستجابات تتجاوز الاستراتيجيات التقليدية، بما يشمل إعادة تقييم المخاطر الحالية والمشاركة في التعلم التعاوني لصياغة مسارات جديدة نحو المرونة، خاصةً في ظل الجوائح. وتركز دراسات حديثة، من بينها دراسة أوزدمير وآخرين (٢٠٢٢)، على مناهج قائمة على الذكاء تسهم في الكشف المبكر والاستجابة للاضطرابات. ورغم الاعتراف بالتعاون

مع الممارسات المحددة التي تعتمدها الشركات أثناء الاضطرابات. ومن دون فهم واضح لهذه الممارسات، تظل الجهود الرامية إلى تعزيز المرونة غير مكتملة.
وعليه، تهدف هذه الدراسة إلى فحص مدى وجود التعاون بين المؤسسات المختلفة كرد فعل على الاضطرابات، وتسعى بشكل خاص إلى بناء إطار للممارسات التعاونية لتعزيز مرونة سلسلة التوريد، وذلك من خلال الإجابة على سؤالين رئيسيين: ما أشكال التعاون التي تنخرط فيها الشركات خلال الجائحة؟ وكيف تُقيّم الشركات أثر هذه الممارسات على قدرتها على الصمود؟
الكلمات المفتاحية: مرونة سلسلة التوريد ,التعاون ,الاضطرابات ,تخفيف المخاطر , تبادل المعلومات ,التخطيط المشترك, الأسواق الناشئة ,البحث النوعي ,مصر , الاستجابة للجائحة

1. Introduction

Unlike traditional risks such as natural disasters or geopolitical tensions, health-related disruptions are complex and far-reaching, often impacting multiple tiers of the supply chain simultaneously and over extended periods (Golan et al., 2020). The rise in frequency and severity of global health emergencies — including pandemics like SARS, H1N1, Ebola, and COVID-19 — has underscored the need for more adaptive, resilient supply chain systems. These crises have not only challenged the operational continuity of firms but also reshaped how organizations approach risk management, strategic sourcing, and supplier relationships (Choi et al., 2021). As traditional risk mitigation strategies proved inadequate, firms were forced to reevaluate their dependency on global suppliers and implement new frameworks

centered on flexibility, digitalization, and collaboration (Pettit et al., 2019).

The COVID-19 pandemic, in particular, served as a turning point, revealing that health crises are not isolated events but systemic threats capable of halting production lines, disrupting global trade, and undermining consumer access to essential goods (Macdonald & Corsi, 2021). As such, there is a growing emphasis in supply chain research and practice on developing resilience-oriented strategies that account for the unpredictable nature of global health disruptions.

Small and medium-sized enterprises (SMEs) form the backbone of many emerging economies, contributing significantly to employment, innovation, and local economic development. However, their limited resources, restricted access to capital, and often informal organizational structures make them particularly vulnerable to external shocks, including global health crises (Doern et al., 2019). The COVID-19 pandemic sharply exposed these vulnerabilities, with many SMEs experiencing severe operational disruptions due to supply shortages, demand fluctuations, and mobility restrictions (Juergensen, Guimón, & Narula, 2020).

In emerging markets, these challenges are exacerbated by underdeveloped infrastructure, institutional fragility, and weaker integration into global value chains (Narula, 2020). SMEs in these contexts often lack the financial buffers, digital tools, and

strategic partnerships necessary to absorb disruptions or pivot operations effectively (Lu et al., 2021). Moreover, many operate without formal risk management systems, making them less prepared to anticipate or respond to prolonged crises.

While larger firms may leverage diversified supply networks or digital transformation to maintain resilience, SMEs typically operate with narrower margins and limited strategic flexibility. This structural vulnerability underscores the need for targeted policy interventions, capacity-building programs, and inclusive resilience frameworks that consider the unique constraints faced by SMEs in emerging markets.

Egypt's manufacturing sector plays a pivotal role in the national economy, contributing approximately 16% to the country's GDP and serving as a major source of employment and export earnings (World Bank, 2022). As one of the largest manufacturing hubs in North Africa, Egypt hosts a diverse industrial base, including food processing, textiles, chemicals, pharmaceuticals, and automotive assembly. The sector is also integral to the government's broader economic development strategy, particularly under the Egypt Vision 2030 initiative, which aims to enhance industrial output, increase global competitiveness, and attract foreign direct investment (FDI) (Ministry of Planning and Economic Development, 2020).

Manufacturing firms in Egypt, however, face structural challenges, including infrastructural gaps, regulatory complexity,

and exposure to global supply chain disruptions. These vulnerabilities were significantly magnified during the COVID-19 pandemic, which caused raw material shortages, transportation delays, and labor constraints across the sector. Given its economic importance and exposure to global market dynamics, the resilience of Egypt's manufacturing sector is critical not only for national stability but also for regional industrial supply chains in the Middle East and North Africa (MENA) region.

- Problem statement

Despite the acknowledged importance of resilient supply chains, many organizations found themselves unprepared for the scale and severity of the disruptions caused by the pandemic. The pandemic has underscored the critical need for effective cooperation among supply chain partners to enhance resilience. Many organizations struggled to maintain continuity, revealing gaps in their preparedness and response strategies. This raises a critical question: how can supply chains strengthen their resilience through improved cooperation among partners? Understanding the dynamics of cooperation among suppliers, manufacturers, distributors, and retailers is crucial for developing robust frameworks that can withstand future disruptions.

Identifying gaps in existing supply chain resilience frameworks, particularly concerning cooperation, is essential for enhancing overall effectiveness in crisis management and operational

continuity. Some of the key gaps found through literature (Medel, K. et.al. 2020):

- Fragmented Cooperation: frameworks emphasize organizational resilience rather than fostering collaborative networks that enhance resilience across the supply chain.
- Supplier Relationships: Insufficient attention is given to building strong, cooperative relationships with suppliers and partners, which are critical during disruptions.
- Diverse Approaches: Different organizations may adopt varying strategies for cooperation, leading to misalignment in goals.
- Data Silos: Existing frameworks may not adequately facilitate information sharing between partners, leading to data silos that hinder effective decision-making during crises.
- Change Management: The human aspect of cooperation, including training and change management, is often overlooked in resilience planning.
- Digital Collaboration Tools: There is a gap in leveraging digital technologies that facilitate real-time collaboration, communication, and visibility across the supply chain.
- Integration of Systems: Many frameworks do not address the integration of technological systems that enable seamless cooperation among partners.

- Long-term Impact Assessment: There is a need for frameworks that evaluate the long-term benefits of cooperation on supply chain resilience beyond immediate crisis response.

Addressing these gaps in supply chain resilience frameworks can enhance cooperation among stakeholders, leading to more adaptive supply chains. Developing comprehensive strategies that be critical in preparing for future disruptions.

Highlighting the importance and criticality of cooperation in achieving resilient supply chain and since this research is mainly focusing on Egyptian manufacturing SMEs; the main scope of this research will be on the ability of those manufacturing organization to operate effectively and efficiently through their application of collaboration strategy to achieve a resilient supply chain during the pandemic.

Research objectives

This research aims to explore the role of cooperation in building supply chain resilience during times of crisis. The study seeks to achieve the following objectives

1. Examine the impact of pandemics on performance of resilience strategies to identify key vulnerabilities that emerged.
2. Explore the Role of Cooperation through assessing the impact of collaborative practices on supply chain resilience performance and recovery during pandemic

3. Propose a Framework for effective supply chain resilience cooperation.

Research Questions

To guide this study, the following research questions were explored:

RQ1: How do relational capabilities influence the adoption and quality of cooperative practices between firms?

RQ2: What is the impact of cooperative practices on organizational resilience outcomes?

RQ3: In what ways might cooperative practices mediate the relationship between relational capabilities and resilience outcomes?

This research explores the role of collaborative efforts among supply chain partners in fostering resilience amid periods of disruption. Using a qualitative methodology, it examines how elements such as information sharing, joint planning, and risk-sharing practices help maintain operations and facilitate recovery. This study adds to the body of supply chain resilience research by focusing on the relational aspects of risk mitigation, particularly within emerging markets.

These sensitizing concepts provided a flexible framework for exploring how Egyptian manufacturing SMEs engaged in inter-organizational cooperation during the pandemic and how such cooperation contributed to resilience. They were not tested

statistically but instead helped uncover themes through participant accounts and interpretative analysis.

To provide a coherent and structured exploration of the proposed research, the paper is organized into several key sections. The introduction presents the background, problem statement, and research objectives, culminating in the formulation of the research questions. This is followed by a comprehensive literature review that critically examines the constructs of relational capabilities, cooperative practices, and organizational resilience, and integrates insights from Contingency Theory and the Relational View of the Firm. The conceptual framework section then outlines the theoretical model, detailing the expected relationships among interpretive categories. The methodology section describes the research design, sampling strategy, measurement instruments, and data analysis techniques. The results section presents the empirical findings, then the discussion interprets these findings in relation to existing theory and practice, highlighting theoretical contributions and managerial implications. Finally, the paper concludes by summarizing the main insights, acknowledging limitations, and suggesting directions for future research.

2. Pandemic Disruption & Supply Chains: Contextual Background

Pandemic disruption refers to the widespread and significant interruption of normal societal, economic, and healthcare functions caused by the rapid spread of a highly infectious disease across countries or continents. This disruption can affect nearly every aspect of life, including:

Key Aspects of Pandemic Disruption:

1) Healthcare System Overload

- Hospitals and clinics may become overwhelmed with patients, leading to shortages of medical supplies, personnel, and resources. For example, during COVID-19, ICU beds and ventilators were in short supply in many regions (Ranney, Griffeth, & Jha, 2020).

2) Economic Impact

- Businesses may shut down, supply chains may be disrupted, and unemployment can rise sharply. During Ebola outbreaks, local economies suffered due to travel restrictions and labor shortages (World Bank, 2014). COVID-19 triggered global recessions and altered job markets (International Monetary Fund [IMF], 2020).

3) Social and Educational Disruption

- Schools may close, public gatherings may be restricted, and travel can be halted. The SARS outbreak in 2003 led to widespread school closures in parts of Asia (World Health

Organization [WHO], 2006). COVID-19 caused a dramatic shift to remote learning worldwide (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020).

4) Public Health and Behavioral Changes

- Governments may enforce quarantine, isolation, mask mandates, and vaccination campaigns. Populations often change their behavior significantly, as seen during COVID-19 with social distancing and remote work (Centers for Disease Control and Prevention [CDC], 2021).

5) Psychological and Cultural Effects

- Fear, uncertainty, and misinformation can contribute to mental health challenges, social tension, and stigmatization of affected groups (Pfefferbaum & North, 2020).

6) Global Interconnectivity Consequences

- The highly connected nature of today's world accelerates the spread and consequences of pandemics. Future threats could emerge from zoonotic diseases, antibiotic-resistant bacteria, or engineered pathogens (Jones et al., 2008).

The typology of disruptions provides a structured framework for categorizing the various types of events that can affect supply chains, enabling a clearer understanding of their origins, and consequences. Disruptions may arise from diverse sources, including natural disasters, pandemics, geopolitical conflicts, and

market fluctuations. By classifying these disruptions researchers and practitioners can better assess potential impacts, typological perspective is crucial for designing targeted resilience strategies, allocating resources efficiently, and enhancing the adaptability of supply chain networks in the face of uncertainty.

Table 1: *Typology of Disruptions and Their Supply Chain Impact*

Disruption Type	Source/Nature	Scope	Duration	Impact	Examples	Recovery Complexity
Pandemic	Health-related (e.g., virus outbreak)	Global	Medium to Long	Workforce shortages due to illness or lockdowns- Transportation bottlenecks- Demand spikes or drops	COVID-19 (2020), SARS (2003)	High
Natural	Environmental (earthquakes, floods, hurricanes, etc.)	Regional/Local	Short to Medium	Physical damage to facilities/infrastructure- Interruptions in logistics- Localized material delays	Hurricane Milton in US in 2024, the wildfires in US & Canada 2024.	Medium
Financial	Economic/market-driven (e.g., crashes, inflation)	Global/Sectoral	Medium to Long	Reduced capital availability- Supplier insolvency- Shifts in demand and cost volatility	2008 Financial Crisis, 2022 Inflation	Medium to High

Health crises, such as pandemics or widespread disease outbreaks, have significant impacts on global and local supply chains. These impacts manifest in several ways, including demand volatility, shutdowns, and disruptions to material flow.

- Demand Volatility

During health crises, consumer behavior changes rapidly. For example, the COVID-19 pandemic caused a spike in demand for medical supplies, personal protective equipment (PPE), and household essentials, while demand for non-essential goods dropped sharply. This unpredictability puts pressure on forecasting systems and inventory management. "The pandemic led to both demand surges and collapses across different product categories, making it difficult for firms to predict and respond to market needs" (Ivanov, 2020).

- Factory and Transportation Shutdowns

Mandatory lockdowns and social distancing measures often result in the closure of manufacturing facilities, warehouses, and transportation services. These shutdowns reduce production capacity and delay delivery schedules. "Lockdowns and quarantine policies led to the temporary or permanent shutdown of production sites, especially in regions heavily impacted by the virus" (Choi, Rogers, & Vakil, 2020).

- Disruptions to Material Flow

Global supply chains are interconnected. A disruption in one region—especially one that serves as a hub for manufacturing or raw materials—can ripple throughout the network. Border restrictions, port congestion, and labor shortages contribute to supply bottlenecks. "The disruption in the flow of materials, components, and finished goods due to border closures and

reduced logistics capacity severely affected supply chain continuity" (Queiroz et al., 2020).

Manufacturing SMEs in Egypt

Small and medium-sized enterprises (SMEs) form a substantial part of Egypt's industrial sector, especially in manufacturing, contributing significantly to employment and GDP. SMEs constitute over 90% of businesses in Egypt, with many operating in light manufacturing (e.g., textiles, food processing, chemicals, and furniture).

These enterprises are often characterized by limited access to finance, low technological adoption, and informal practices, making them especially vulnerable during crises like pandemics (OECD, 2020). "Egyptian manufacturing SMEs are largely informal and under-capitalized, with weak linkages to global value chains, leaving them more exposed to external shocks such as health crises" (OECD, 2020).

Supply Chain Architecture in Egypt

Egypt's supply chain structure is centralized, with major industrial hubs in cities like Cairo, Alexandria, and 10th of Ramadan City. The architecture is typically characterized by:

- High dependence on imported raw materials and intermediate goods.
- A fragmented logistics system, with inefficient transport infrastructure and underdeveloped digital supply chain tools.

- Reliance on micro and small logistics firms, limiting resilience during disruptions like port closures or workforce shortages.

"Egyptian supply chains, especially in the SME sector, tend to be fragile due to high import dependency, limited local sourcing capabilities, and fragmented logistics infrastructure" (Ghoneim et al., 2021).

During health crises like COVID-19, these characteristics translated into:

- Severe input shortages due to import restrictions and supplier shutdowns.
- Delivery delays and bottlenecks in transportation and logistics.
- Production halts due to labor absenteeism and lack of safety protocols.

3. Literature Review

3.1. Supply Chain Resilience (SCR)

Supply Chain Resilience (SCR) is a critical concept in understanding how supply chains can withstand, adapt to, and recover from disruptions such as health crises, natural disasters, or geopolitical shocks. Several theories and dimensions underpin SCR, helping firms build stronger, more adaptive networks.

- Theories Underpinning Supply Chain Resilience
  - Resource-Based View (RBV): Emphasizes the role of internal resources and capabilities in creating competitive

advantage and resilience. In SCR, capabilities like knowledge management, supplier relationships, and flexible manufacturing systems are key. "A resilient supply chain is seen as one possessing strategic resources that allow for adaptability and continuity during disruptions" (Ponomarov & Holcomb, 2009).

- Dynamic Capabilities Theory: Focuses on a firm's ability to integrate, build, and reconfigure resources to respond to changing environments. In supply chains, this translates to rapid adjustment of sourcing, logistics, and operations. "Dynamic capabilities enable supply chains to sense threats, seize opportunities, and transform operations accordingly" (Tukamuhabwa et al., 2015).
- Complex Adaptive Systems (CAS): Views supply chains as interconnected systems that must adapt to shocks through decentralized decision-making and learning. Encourages diversity, redundancy, and feedback loops. "Supply chains behave as complex adaptive systems, requiring decentralized responses to shocks and continuous learning" (Christopher & Peck, 2004).

➢ Key Dimensions of Supply Chain Resilience

- Flexibility: The ability to adapt operations, reroute logistics, or switch suppliers in response to disruption. Includes process flexibility and structural flexibility (e.g., multi-sourcing, reconfigurable production lines). "Flexibility allows firms to

adjust their operations and maintain continuity during sudden disturbances" (Sheffi & Rice, 2005).

- Redundancy: Having backup resources or excess capacity (e.g., buffer stocks, multiple suppliers). Increases cost but improves the ability to withstand shocks. "Redundancy ensures supply chain continuity by maintaining slack resources in the system" (Tang, 2006).
- Responsiveness: The speed and effectiveness of reacting to a disruption. Tied to real-time monitoring, information sharing, and rapid decision-making. "Responsive supply chains are characterized by fast detection, fast response, and rapid recovery" (Pettit et al., 2010).

3.2. Relational Capabilities

Relational capabilities refer to the interpersonal and inter-organizational capacities that firms develop to manage and sustain collaborative supply chain relationships. These capabilities are critical for achieving resilience, agility, and innovation, especially during disruptions such as health crises.

- Trust: Trust is the belief that a partner will act in a reliable, fair, and non-opportunistic manner. It reduces uncertainty, facilitates information sharing, and supports collaborative risk management. Trust improves coordination and reduces the need for costly monitoring or contractual enforcement. "Trust enhances supply chain performance by encouraging

open communication and reducing transaction costs" (Zaheer, McEvily, & Perrone, 1998).

- Commitment: Commitment refers to the willingness of partners to maintain a long-term relationship, even under pressure or adversity. It reflects shared goals, mutual investments, and a desire to work through challenges collaboratively. High commitment often leads to greater loyalty, innovation, and supply chain continuity.
- Reflexivity: Reflexivity is the ability to reflect, learn, and adapt relationship practices in response to internal or external change. In supply chains, reflexivity helps partners identify what's working, what's not, and how to improve collaboration. Especially valuable in dynamic environments requiring continuous adjustment. "Reflexive practices enable partners to reconfigure their interactions and improve adaptability under uncertainty" (Brattström, Faems, & Mähring, 2019).
- Governance Mechanisms: Governance refers to the formal and informal structures that regulate behavior between partners. Formal: contracts, performance metrics, legal agreements. Informal: norms, mutual expectations, social capital. Effective governance balances control with flexibility, ensuring compliance while promoting cooperation. "Relational and contractual governance are

complementary in managing inter-firm relationships under uncertainty" (Cao & Lumineau, 2015).

- Knowledge Exchange: The ability to share, absorb, and utilize information and know-how among supply chain partners. Drives joint problem-solving, innovation, and continuous improvement. Crucial for building shared understanding and responding collectively to crises. "Knowledge exchange is central to dynamic capabilities and inter-organizational learning in resilient supply chains" (Nonaka & Toyama, 2003).

3.3. Collaboration in Health Crisis Contexts

Collaboration in health crisis contexts—such as pandemics—becomes a critical enabler of supply chain resilience. Effective collaboration helps partners respond quickly to supply disruptions, demand shocks, and operational constraints. This collaboration often involves a mix of informal and formal mechanisms, risk-sharing arrangements, and adaptive coordination strategies.

- Informal and Formal Collaboration Mechanisms: Informal mechanisms include trust-based relationships, shared norms, and social capital. These enable rapid, flexible, and empathetic decision-making during emergencies. Formal mechanisms involve structured contracts, digital platforms for coordination, and official contingency plans. “During crises, informal trust-based relationships can complement

formal governance, enabling agility and mutual support in volatile environments" (Scholten & Schilder, 2015). "Formal mechanisms such as contracts and joint planning are essential for managing long-term collaboration and ensuring accountability" (Wieland & Wallenburg, 2013).

- Risk-Sharing: Health crises increase operational and financial risks across the supply chain. Collaborative risk-sharing—such as shared inventory buffers, joint investment in capacity, or flexible payment terms—can help mitigate individual partner vulnerabilities. This fosters interdependence, encourages continuity, and reduces opportunistic behavior. "Risk-sharing mechanisms during disruptions enhance supply chain resilience by distributing the burden of shocks and enabling coordinated recovery" (Ivanov & Dolgui, 2020).
- Adaptive Coordination: Adaptive coordination refers to the real-time, flexible alignment of activities across supply chain partners in response to changing conditions. It includes agile information exchange, scenario-based decision-making, and decentralized control when central systems are overwhelmed. "Supply chains that embrace adaptive coordination are better equipped to reconfigure resources and adjust strategies during unpredictable health crises" (Sarkis, Cohen, Dewick, & Schröder, 2020).

3.4. Literature Gaps

Relational strategies during pandemic disruptions—such as collaboration, trust-building, joint decision-making, and information sharing—proved to be crucial for navigating uncertainty and maintaining supply chain performance. While traditional resilience strategies often focus on inventory or redundancy, relational strategies provide the social and behavioral infrastructure necessary to adapt quickly to unprecedented shocks like COVID-19.

Trusted partners were more willing to share critical information, adjust contracts, and collaborate on emergency sourcing. Transparency helped reduce opportunistic behavior and fostered faster responses. Companies engaged in joint scenario planning, flexible scheduling, and shared capacity utilization to deal with fluctuating demand and labor shortages. Partnerships shifted from transactional to relational modes of engagement. “During the pandemic, many organizations moved toward deeper collaboration, shifting from adversarial to cooperative behaviors to secure supply continuity” (Hohenstein, 2022)

Despite the recognized importance of relational strategies—such as trust, collaboration, and adaptive coordination—for supply chain resilience, there is minimal empirical evidence from African and Egyptian SMEs, particularly in the context of pandemic-induced disruptions. Most existing studies are conceptual or focus on larger firms, leaving a significant research

gap regarding how smaller firms in these regions build and leverage relational capabilities during crises (El-Said, Al-Said, & Zaki, 2021; Hassen, El Bilali, & Allahyari, 2022).

Relational Strategies in Egyptian SMEs During COVID-19:

- Supplier Diversification and Relationship Building

Egyptian food and beverage SMEs recognized the importance of diversifying suppliers and strengthening relationships with various stakeholders to mitigate supply chain vulnerabilities exposed by the pandemic. Building strong relational capital was seen as essential for enhancing resilience.

- Embracing Digital Platforms and Innovation

Egyptian SMEs adapted to pandemic challenges by utilizing digital platforms for customer engagement and internal coordination. The shift to virtual meetings and online consultations facilitated continuous operations and encouraged innovative problem-solving approaches.

Table 2: *Summary of Key Literature on Resilience, Collaboration, and SMEs*

Author(s)	Focus Area	Context	Key Findings
Ivanov & Dolgui (2020)	Supply chain resilience	Global, COVID-19	Introduces "viability" as a resilience concept; highlights intertwined networks.
Scholten & Schilder (2015)	Collaboration in resilience	General SCM	Trust and joint decision-making enhance supply chain adaptability and recovery.
Wieland & Wallenburg (2013)	Relational capabilities	European firms	Flexibility and commitment improve resilience under supply chain disruption.
Van Hoek (2020)	Practical supply chain responses	Global, post-COVID	Trust-based collaboration enabled faster crisis response; calls for agile SCM.
Hassen et al. (2022)	Relational capital and SME resilience	Egyptian F&B SMEs	Relational capital and environmental scanning improve SME resilience.
El-Said et al. (2021)	SME response to COVID-19	Egyptian SMEs	Limited digital and relational readiness; reactive rather than proactive measures.

Author(s)	Focus Area	Context	Key Findings
Akinlolu et al. (2022)	Digital collaboration for resilience	Nigerian SMEs	Emerging digital tools enabled flexible responses and knowledge exchange.
Brattström et al. (2019)	Reflexivity in interfirm relationships	Project-based organizations	Reflexivity improves adaptive capacity in conflictual and dynamic environments.
Choi, Rogers & Vakil (2020)	Supply chain disruptions	Global (HBR article)	Relational and digital strategies are essential to manage pandemic risks.

Conceptual Framework Overview:

This study adopts a conceptual lens that emphasizes the interplay between relational capabilities, cooperative practices, and resilience outcomes within supply chain contexts—particularly under crisis conditions such as pandemics. Rather than proposing testable hypotheses, the framework serves as an interpretive guide to understand how these elements interact to influence supply chain performance.

- Relational capabilities refer to the underlying skills, norms, and qualities that enable effective and trust-based relationships among supply chain stakeholders. These include trust, open communication, interpersonal competence, and alignment around shared goals. In this study, relational capabilities are viewed as foundational conditions that shape how actors engage and collaborate.
- Cooperative practices encompass the behaviors, routines, and strategic actions through which supply chain partners work together. This includes joint problem-solving, information and resource sharing, mutual adjustment, and partnership-building. The presence of strong relational capabilities is

expected to create an environment conducive to such cooperative behavior.

- Resilience outcomes are understood as the observed capacity of the supply chain to adapt, recover, and sustain operations during disruptions. Key markers of resilience include adaptability, performance continuity, and the ability to sustain collaboration under pressure. Rather than attributing resilience to any single factor, the analysis explores how relational and cooperative dimensions contribute to this emergent capacity.

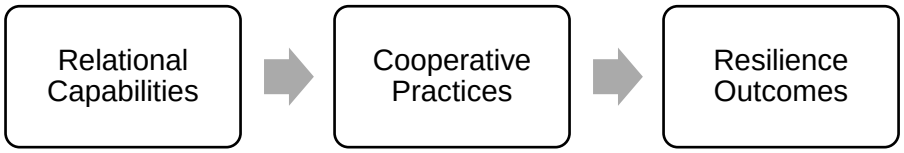

Figure 1 - *Conceptual Framework*

3. Theoretical Framework

This study draws upon two complementary theoretical perspectives to analyze the dynamics of organizational strategy

and inter-firm collaboration: Contingency Theory and the Relational View of the Firm. These frameworks provide a robust lens for understanding how organizational effectiveness is influenced by contextual fit and how competitive advantage can arise from inter-organizational relationships.

Contingency Theory

Contingency Theory posits that there is no universally optimal way to organize or manage a firm; rather, the most effective course of action is contingent upon internal and external contextual factors (Donaldson, 2001). This theory suggests that organizational structures, strategies, and processes must align with situational variables—such as environmental uncertainty, technological complexity, and firm size—to achieve optimal performance.

Within this framework, organizations are seen as open systems that must adapt to environmental conditions to remain viable and competitive. A central tenet is the "fit hypothesis," which asserts that higher performance results from alignment (or fit) between organizational responses and situational demands (Lawrence & Lorsch, 1967; Galbraith, 1973). For example, in rapidly changing environments, firms may benefit from more decentralized structures and collaborative strategies that allow for flexibility and responsiveness.

Relational View of the Firm

The Relational View of the Firm, developed by Dyer and Singh (1998), extends the resource-based view by arguing that inter-organizational relationships can serve as sources of sustained competitive advantage. According to this perspective, firms can generate relational rents—superior profits that accrue from unique, difficult-to-imitate relationships with other firms. These rents arise through mechanisms such as:

- Relationship-specific investments (e.g., co-specialized assets)
- Inter-firm knowledge-sharing routines
- Complementary resource endowments
- Effective governance mechanisms that promote trust and mitigate opportunism

The Relational View shifts the unit of analysis from the individual firm to the dyadic or network level, emphasizing the importance of cooperative strategies, mutual dependence, and shared capabilities in creating long-term value.

Integration of Theories

Combining Contingency Theory with the Relational View provides a nuanced framework for understanding how firms can adapt their inter-organizational strategies in response to contextual variables. Specifically, the fit between environmental contingencies and relational capabilities determines the effectiveness of collaborative arrangements. For instance, in volatile markets, firms may benefit more from flexible alliances

characterized by trust, knowledge sharing, and joint problem-solving.

This integrated theoretical lens suggests that not all relational strategies are equally effective in all contexts; their success depends on the degree of alignment with external demands and internal competencies. Therefore, organizations that can strategically align their relational capabilities with contextual needs are more likely to realize performance benefits.

Building upon the theoretical foundations of Contingency Theory and the Relational View of the Firm, this study introduces a conceptual model linking Relational Capabilities, Cooperative Practices, and Resilience Outcomes. The model posits that firms operating in dynamic or uncertain environments must develop and deploy relational capabilities that enable cooperative practices, which in turn enhance organizational resilience.

Relational Capabilities

Relational capabilities refer to a firm's ability to initiate, develop, and manage inter-organizational relationships that are strategic and mutually beneficial. These capabilities encompass trust-building mechanisms, effective communication routines, partner-specific investments, and the ability to align goals and expectations across organizational boundaries (Dyer & Singh, 1998; Kale & Singh, 2007). They serve as the foundation for cooperative engagement and are critical enablers in fostering long-term partnerships and value co-creation.

From a contingency perspective, relational capabilities are especially important in volatile or complex environments, where traditional, hierarchical control mechanisms may be insufficient. Thus, these capabilities provide the adaptive flexibility needed to align with contextual demands (Donaldson, 2001).

Cooperative Practices

Cooperative practices are the observable, processual manifestations of relational capabilities in action. These include joint problem-solving, knowledge sharing, mutual adjustment, and collaborative planning (Simatupang & Sridharan, 2005). While relational capabilities represent latent potential, cooperative practices are the actual behaviors and routines through which that potential is realized.

The model positions cooperative practices as a mediating mechanism—a conduit through which relational capabilities influence outcomes. Strong relational capabilities enable the establishment of cooperative routines, which help firms coordinate effectively and respond to disruptions collectively and efficiently.

Resilience Outcomes

Resilience outcomes refer to a firm's ability to anticipate, absorb, adapt to, and recover from disruptions or adverse events (Ponomarov & Holcomb, 2009; Duchek, 2020). In this model, resilience is viewed not merely as a reactive capability but as a

dynamic, relationally embedded outcome enabled by cooperative efforts.

Firms that engage in strong cooperative practices are better positioned to access shared resources, coordinate contingency responses, and rapidly reconfigure operations when facing disruptions. Thus, resilience is framed as an emergent property of well-managed inter-firm relationships, supported by underlying relational capabilities and sustained through cooperative behavior.

This model implies that:

- Firms must develop relational capabilities as a strategic asset.
- These capabilities must be operationalized through cooperative practices to be effective.
- Resilience outcomes are enhanced when relational capabilities and cooperative practices are well-aligned with environmental contingencies.

This model also allows for contextual moderation, consistent with Contingency Theory, whereby the effectiveness of relational strategies may vary based on environmental uncertainty, supply chain complexity, or institutional pressures.

Conceptual Model Mapping

1. Independent Variable: Relational Capabilities: The firm's ability to build, manage, and leverage strategic inter-organizational relationships. Key Dimensions:

a. Trust-building mechanisms

b. Partner-specific investments
c. Inter-firm communication routines
d. Relational governance structures
e. Learning and absorptive capacity

2. Mediator: Cooperative Practices: The day-to-day behaviors and processes through which collaboration occurs. Key Dimensions:

a. Joint decision-making
b. Information and knowledge sharing
c. Collaborative planning and forecasting
d. Joint problem-solving
e. Mutual adjustment and alignment

3. Dependent Variable: Resilience Outcomes: The firm's ability to withstand, adapt to, and recover from disruptions. Key Dimensions:

a. Anticipation capacity (forecasting potential shocks)
b. Absorptive capacity (withstanding impacts)
c. Adaptive capacity (adjusting structures/processes)
d. Recovery speed (returning to normal operations)

Logical Relationships

- Relational Capabilities → Cooperative Practices: Firms with greater relational capability engage more effectively in cooperative behaviors.

- Cooperative Practices → Resilience Outcomes: Collaborative routines (e.g., joint planning, shared buffers) improve disruption response and adaptation.
- Relational Capabilities → Resilience Outcomes (indirectly via cooperative practices) Relational capabilities alone do not guarantee resilience—they must be enacted through cooperative practices.

5. Methodology

5.1. Research Design

Qualitative Research Methods

- Interview Design
  - Interview format: The interview will be semi-structured, allowing for both guided questions and open-ended responses. This framework has been chosen to capture an in-depth qualitative analysis of the strategic decisions built during the pandemic and the lessons business leaders learned. Interviews will explore areas such as problem-solving strategies related to suppliers' diversification and information sharing technologies, and the application of innovations in technology in which has facilitated adaptation to the challenges of the pandemic.

Qualitative Content Analysis

- Qualitative content analysis will be used to systematically analyze interview transcripts and other qualitative data collected from field experts and supply chain managers. This

approach will help identify themes and challenges faced during the pandemic. Content analysis will involve documenting content to identify recurring themes, challenges, and lessons learned. This approach will provide deeper insights into the quality aspects of resilient supply chain management, highlighting the rationale behind certain strategies and the contextual factors that affect success or failure during pandemics.

5.2. Sampling

The selection of key sector as manufacturing is based on the direct impact and magnitude of pandemic on this sectors' supply chain. The global manufacturing supply chain has faced challenges, affecting production and distribution. These areas were chosen to examine how the crisis affected critical services and resources and provide insights into coping mechanisms and their effectiveness under stress.

The interview structure consisted of 12 questions conducted with 21 supply chain professionals with various demographics and backgrounds. The respondents' profile, shown in table 3, can be summarized as follows:

- Gender Distribution: Majority of the interviewees were males representing 76.2% of the total sample while females accounted for 23.8%. This distribution encounters for the predominant representation of males in manufacturing professionals.

- Age Distribution: respondents were primary within the age range of 35-50 years representing 61.9% from the total sample, followed by age group of 50-60 years (23.8%). The minimum portion from age group 30-40 years representing 14.3% from the sample. This indicates that the concentration of professionals is in their mid-career stages.
- Professional: Main respondents were from the level of supply chain directors, decision makers in their field representing 47.6% from the total sample, dominating the overall sample. This is followed up with 28.6% for operation managers, also sharing the same criticality and authority of decision-making during times of pandemics. Remaining sample was distributed between 14.3% for Financial managers, and 9.5% for CEO level.
- Years of experience: 52.4% from the interviewees were representing 15-20 years of experience, and 23.8% representing the following layer of 10-15 years of experience. The remaining sample were represented by 14.3% from 20-25 years and 9.5% from 5-10 years of experience.

5.3. Data Collection

Semi-structured interviews (Table 3): involve discussing a particular subject directly with a targeted group of individuals. Typically, interviews are conducted on a one-on-one basis; researchers can use them to collect qualitative data.

One drawback of interviews and focus groups is that they can require significant time and financial resources.

5.4. Thematic Analysis

Braun and Clarke's 6-Phase Model of Thematic Analysis is one of the most widely used frameworks for analyzing qualitative data. It provides a systematic approach to identifying, analyzing, and reporting themes within data. NVivo is a powerful qualitative data analysis (QDA) software designed to help researchers organize, code, and analyze unstructured or semi-structured data such as interview transcripts, focus group discussions, and field notes.

Coding guidelines are built to ensure consistent categorization of text. Codes are developed based on thematic analysis and predefined categories. Codes help in organizing and grouping similar pieces of information to identify patterns and themes. NVivo software is used to assist in the coding process, text is reviewed and tagged according to the coding guidelines. This process assists in quantifying and categorizing the information. Word frequency table, and word cloud features are used to visualize and analyze the data. These tools help in identifying key themes and concepts

The coded data is analyzed to identify trends, correlations, and patterns. Figuring out insights based on the frequency of terms, themes, and their relevance to the research questions. Analysis

includes discussing different interpretations and understanding the implications of the findings.

Table 3: ***Participant Profile*** **— sector, position, years of experience**

	Frequency	Percent	Total
Gender			
Male	**16**	**76.2%**	**21**
Female	**5**	**23.8%**	
Age group			
25-35	**3**	**14.3%**	**21**
35-50	**13**	**61.9%**	
50-60	**5**	**23.8%**	
Professionality			
Supply Chain Director	**10**	**47.6%**	**21**
Operation Manager	**6**	**28.6%**	
Finance Manger	**3**	**14.3%**	
CEO	**2**	**9.5%**	
Years of Experience			
5-10	**2**	**9.5%**	**21**
10-15	**5**	**23.8%**	
15-20	**11**	**52.4%**	
20-25	**3**	**14.3%**	

6. Findings:

The qualitative analysis yielded four dominant and interrelated themes that shaped how SMEs experienced and responded to disruption through collaboration: (1) Barriers to Collaboration, (2) Enablers of Cooperative Practices, (3) Relational Capabilities in Action, and (4) Strategic Adjustments for Resilience. These themes reflect both the constraints and enablers within inter-organizational relationships, particularly in the context of uncertainty and limited resources.

To enhance the credibility of these findings, the analysis followed the principle of thematic saturation—the point at which no new themes or significant insights emerged from additional data. Saturation was assessed iteratively during the coding process, with consistent patterns and recurrent concepts

appearing across multiple interviews. By the final stages of analysis, all major themes were well-supported by data from a diverse set of participants, suggesting that the thematic structure adequately captured the core dimensions of SMEs' cooperative responses to disruption. This saturation strengthens the validity and trustworthiness of the findings and supports their relevance across comparable contexts.

Theme 1: Barriers to Collaboration

Despite a shared interest in continuity, several participants identified significant barriers that hindered effective collaboration during periods of disruption. These included technical incompatibility, communication breakdowns, and misaligned priorities. One SME respondent noted, "We tried integrating our systems, but it just didn't work. Our ERP couldn't read their files, and we ended up sending updates manually, which slowed everything down." The lack of technological interoperability not only introduced inefficiencies but also eroded trust between partners. Another participant highlighted diverging strategic focuses: "During the early phase of the crisis, some of our partners were focused on survival, while others were more concerned with stockpiling. We weren't aligned, and that created tension." Furthermore, the absence of clear communication protocols contributed to operational silos. "There were days we didn't hear back from key partners. No updates, no transparency—we had to make decisions blind," shared a

logistics coordinator. These examples underscore how structural and behavioral misalignments can undermine coordination at critical moments.

Theme 2: Enablers of Cooperative Practices

In contrast, many firms were able to overcome initial challenges by leveraging enablers that supported cooperative behavior, even in turbulent conditions. Strong leadership emerged as a central facilitator. One respondent shared, "Our managing director called each of our top five suppliers personally to keep communication open. That set the tone—we weren't just protecting our own interest; we wanted a collective strategy." Another key enabler was the presence of pre-existing relationships, which laid the groundwork for trust-based engagement. "We had worked with that supplier for over a decade. That history helped us move fast—there was no need to renegotiate terms or second-guess intentions," explained one operations manager. Digital tools also played a key enabling role, especially for visibility and real-time coordination. "We created a shared online dashboard using basic tools like Google Sheets and WhatsApp," noted another participant. These examples illustrate how leadership, social capital, and pragmatic digital solutions together fostered cooperative resilience.

Theme 3: Relational Capabilities in Action

The data also revealed how relational capabilities—such as trust, flexibility, and knowledge sharing—were activated and deepened through the crisis. Several participants described scenarios in which trust replaced formal contracts. “Agreements were often informal, relying on mutual trust rather than formal contracts,” said one business owner. This was especially evident when suppliers prioritized deliveries based on relationship quality, not contractual obligation. “One of our suppliers had a backlog, but they moved us to the top of the list because of how we’ve supported them previously,” explained a procurement lead. Flexibility was another critical capability that allowed firms to adapt in real time. “We had to reschedule orders, change delivery points, and reallocate stock—all done informally, just based on mutual understanding,” said a participant. Knowledge sharing also emerged as an important dynamic. “We shared what we learned about hygiene protocols and local restrictions—it wasn’t only about orders, it was about helping each other survive,” recounted another. These accounts demonstrate that relational resilience is rooted in social and behavioral mechanisms that are often more agile and effective than formal systems.

Theme 4: Strategic Adjustments for Resilience

Finally, participants described a variety of strategic adjustments that were enabled by relational and cooperative practices. These included joint contingency planning, informal fallback systems,

and alternative sourcing strategies. One SME leader explained, "We sat down—virtually—with our main partners and developed a three-tier risk response plan. We planned for worst-case scenarios together." Others emphasized informal coordination: "We didn't have official backups, but through our networks, we identified substitute suppliers who could jump in if needed." In some cases, these strategies were not written or contractually bound but were based on shared understanding and continuous communication. "Every Friday we had a quick call with all partners—not just to talk about problems, but to anticipate what might come next. It helped us stay ahead," said another. These strategic behaviors reveal how firms not only responded to disruptions reactively but also proactively shaped resilience capacity through relational and cooperative alignment.

Together, these themes highlight a shift from transactional approaches toward embedded, relationship-centered resilience strategies. While technical barriers and coordination challenges were evident, firms that invested in relational capabilities and collaborative practices were able to navigate disruptions more effectively. The data supports the view that in high-uncertainty environments—such as those shaped by pandemic conditions—resilience is co-created, not merely designed, and relational factors often serve as critical enablers when formal systems fall short.

Table 5: Final Thematic Map (Themes → Subthemes → Codes → Sample Quotes)

Theme	Subtheme	Code	Sample Quote
1. Barriers to Collaboration	**Communication Challenges**	**Delayed responses**	***"There were days we didn't hear from key partners. No updates, no transparency—we had to guess."***
	Misalignment of Priorities	**Hoarding vs. cooperation**	***"Some partners were hoarding inventory; we were trying to keep the supply chain flowing."***
	System Incompatibility	**ERP/software mismatch**	***"Our systems didn't integrate. We had to revert to emails and spreadsheets—very inefficient."***
2. Enablers of Cooperative Practices	**Leadership Commitment**	**Direct outreach**	***"Our CEO called key partners to ensure alignment and trust."***
	Strong Relationship History	**Social capital**	***"We've worked together for over 10 years. That made it easy to collaborate quickly."***
	Use of Digital Tools	**Shared dashboards**	***"We used Google Sheets and WhatsApp to keep everyone informed in real time."***
3. Relational Capabilities in Action	**Trust and Reliability**	**Verbal agreements**	***"Agreements were often informal, relying on mutual trust rather than formal contracts."***
	Flexibility and Adaptation	**Rescheduling, substitutions**	***"We had to reroute and change orders—partners were flexible because of our relationship."***
	Knowledge Sharing	**Regulatory updates**	***"We shared what we learned about health rules and lockdowns—everyone benefited."***
4. Strategic Adjustments for Resilience	**Joint Planning**	**Scenario discussions**	***"We developed a three-tier plan with partners—best, moderate, and worst-case scenarios."***
	Informal Fallback Systems	**Backup sourcing**	***"We used our network to find alternate suppliers without formal contracts—just mutual support."***
	Coordination Routines	**Weekly check-ins**	***"Every Friday, we had informal calls with partners to stay aligned and troubleshoot proactively."***

Table 6: Theme Frequency Across Respondents (N = 21)

Theme	Number of Respondents	% of Respondents	Commentary
1. Barriers to Collaboration	**18 out of 21**	**86%**	**Most respondents experienced miscommunication, incompatible systems, or priority misalignment.**
2. Enablers of Cooperative Practices	**20 out of 21**	**95%**	**Widely reported use of digital platforms, pre-existing relationships, and leadership commitment.**
3. Relational Capabilities in Action	**19 out of 21**	**90%**	**Trust-building, flexibility, and knowledge sharing were critical to response efforts.**
4. Strategic Adjustments for Resilience	**17 out of 21**	**81%**	**Many firms engaged in joint planning and informal fallback strategies.**

Based on the above frequency table (Table 6), Enablers of Cooperative Practices had the highest frequency, indicating that collaborative strengths were a key source of resilience. Relational Capabilities were widely recognized, supporting the theoretical framing around relational resilience. Even Barriers were nearly universal, reinforcing the practical complexity of SME coordination during crises. This distribution supports the context–response alignment proposed in contingency and relational views of the firm.

7. Discussion

The emergent themes from the study—Relational Capabilities, Cooperative Practices, and Resilience Outcomes—reflect the complex, embedded nature of collaboration in the face of disruption. These themes do not suggest causal mechanisms but

rather illustrate interpretive patterns that help explain how SMEs in the study experienced, understood, and navigated supply chain disruption.

These patterns can be meaningfully interpreted through two conceptual perspectives: Contingency Theory and the Relational View of the Firm. Contingency Theory helps illuminate how SMEs adjusted their cooperative responses in alignment with contextual challenges. Rather than following a fixed or universal model, firms appeared to adapt their strategies according to environmental pressures, relational dynamics, and resource limitations. This reinforces the idea that effectiveness is contingent on the "fit" between internal relational capabilities and the external environment—especially during times of uncertainty.

Complementing this, the Relational View of the Firm (Dyer & Singh, 1998) sheds light on how resilience outcomes appear to be co-constructed through inter-firm relationships. Interviewees described how trust, joint decision-making, and mutual dependence helped overcome constraints and enabled continuity. From this perspective, resilience was not framed as a standalone capability but as a collective, emergent property of collaborative networks.

Taken together, these frameworks support a relational and contextual interpretation of resilience. Rather than isolating single variables, the findings underscore the interplay between

organizational choices, interpersonal dynamics, and institutional environments. Table 7 below summarizes how participants perceived key barriers and enablers across multiple dimensions of cooperation and resilience.

Table 7. Barriers vs. Enablers Matrix

Dimension	Barriers	Enablers
Relational Capabilities	Lack of trust; high partner turnover; limited relational history	Long-term partnerships; mutual trust; prior collaboration experience
Cooperative Practices	Poor communication; siloed decisions; competitive mindset	Joint planning; information sharing; shared goals and KPIs
Digital Readiness	Low digital adoption; technical skill gaps; financial limitations	Cloud-based SCM platforms; upskilling initiatives; accessible tech
Contingency Planning	No continuity plans; reactive approaches; lack of shared protocols	Co-developed strategies; scenario planning; shared risk frameworks
Institutional Support	Weak regulations; limited SME outreach; fragmented policy environment	Cluster collaboration; public digitization initiatives
Cultural/Organizational	Resistance to change; transparency fears; limited resilience mindset	Adaptive culture; leadership commitment; learning orientation

Contextual Influences: SMEs in Emerging Markets

The findings must be understood in relation to the distinctive features of SMEs in emerging markets. Unlike large firms or those in highly institutionalized economies, these SMEs often operate with limited formal support systems, facing regulatory unpredictability, constrained access to finance, and infrastructure gaps. In this context, participants emphasized the reliance on informal, trust-based networks and relational governance mechanisms as key to navigating disruptions.

These firms displayed a tendency to engage in flexible, improvisational strategies, shaped by frugality, embeddedness in local ecosystems, and responsiveness to informal coordination norms. While such characteristics posed challenges—such as limited digital readiness—they also created opportunities for agile, relationship-based resilience. The findings suggest that social capital and localized partnerships often substitute for formal risk-management structures, supporting continuity through relational means.

❖ Relational Resilience as a Strategic Priority

Rather than emphasizing technical redundancy (e.g., buffer stock, dual sourcing), participants repeatedly stressed the importance of what may be termed relational resilience—the ability to draw on strong, adaptive partnerships to collectively navigate uncertainty. In resource-constrained environments, building redundant systems may be financially or operationally infeasible. Instead, firms relied on trust, transparency, and joint responsiveness to ensure continuity.

This perspective reflects a shift from static risk mitigation tools to dynamic relational processes. As one participant noted, “We cannot afford to hold safety stock—but we can call our partners anytime, and they will help.” Such accounts highlight how relational capabilities function as resilience enablers, allowing firms to reallocate resources, coordinate responses, and share burdens in real-time. Relational resilience thus emerges not as a

technical feature, but as an ongoing inter-organizational process, shaped by everyday interactions, shared norms, and mutual adaptation. For SMEs in volatile contexts, this type of resilience is not only strategic—but essential.

❖ Extending Pandemic Literature through a Relational Lens

The themes identified in this study echo and extend previous pandemic-related research while offering a more generalized and interpretive framing of resilience. Early studies during the COVID-19 crisis (e.g., Ivanov & Dolgui, 2020; Sharma et al., 2020) documented widespread supply chain fragility and proposed solutions centered on redundancy, visibility, and digitization.

In contrast, the present findings add nuance by foregrounding relational dynamics as central to organizational continuity. As also noted in studies like Chowdhury et al. (2021), firms with pre-existing relational assets—such as trust and mutual support—were better positioned to respond rapidly and flexibly. This study contributes to that evolving discourse by shifting the lens from reactive, event-specific responses to proactive, embedded strategies that evolve through cooperation.

Importantly, while grounded in a pandemic context, the findings move beyond COVID-specific implications to reflect broader patterns in how SMEs build resilience through relational mechanisms. The evidence suggests that resilience is not a one-

time response, but a continuous process of co-adaptation, deeply shaped by the quality of inter-firm relationships.

Table 8. Relational Capabilities – Definitions, Examples, and Perceived Impact

Relational Capability	Definition	Examples	Perceived Impact on Resilience
Trust	Willingness to be vulnerable based on positive expectations of a partner	Sharing forecasts; maintaining open communication	Facilitates information flow; reduces opportunism; enables joint action
Commitment	Willingness to invest in and sustain a relationship over time	Keeping supply agreements during crisis	Builds long-term cooperation; strengthens continuity
Information Sharing	Open, timely, and accurate data exchange	Sharing stock levels and delays	Enhances visibility and coordinated response
Joint Problem-Solving	Collaborative resolution of disruptions or uncertainties	Co-developing contingency plans	Promotes adaptability; reduces disruption recovery time
Mutual Dependence	Balanced reliance that incentivizes ongoing collaboration	SMEs providing key inputs; buyers offering technical support	Reinforces commitment and reciprocal support
Relational Governance	Use of shared norms, values, and informal mechanisms to guide behaviour	Informal agreements based on mutual understanding	Encourages flexibility and trust-based coordination

These relational capabilities emerged not as abstract concepts but as lived, observed patterns in how SMEs engage with partners under stress. Participants framed these capabilities as pragmatic tools—mechanisms through which they compensated for institutional gaps, mitigated uncertainty, and maintained operations.

Rather than establishing general laws or causal predictions, this study illuminates relational patterns and interpretive insights into how SMEs co-create resilience in resource-constrained, uncertain

environments. The findings suggest that resilience is not an isolated attribute, but an evolving outcome of embedded cooperation, mutual support, and shared adaptation.

By foregrounding relational capabilities and cooperative practices, the study contributes to a growing understanding of resilience as a socially constructed, context-sensitive process. This view encourages scholars and practitioners to invest not only in systems and technologies—but in relationships, trust, and shared learning as foundations for future preparedness.

8. Implications

8.1 Practical and Policy Implications

This section interprets the study's empirical findings through the conceptual model of relational capabilities → cooperative practices → resilience outcomes, integrating theoretical perspectives and participant voices. Each implication is anchored in one of the four core themes identified in Table 6: (1) Barriers to Collaboration, (2) Enablers of Cooperation, (3) Cooperative Practices for Resilience, and (4) Strategic Impacts and Outcomes.

1. Addressing Barriers to Collaboration: Enhancing Relational Capabilities

One of the most consistent challenges reported by SME managers was the presence of communication delays, lack of mutual trust, and conflicting goals, all of which hindered effective collaboration during disruptions. As one participant explained, “We had the intention to collaborate, but every

supplier had their own agenda during the crisis" [Participant 7, Electrical Components].

This finding underscores the necessity of building relational capabilities—trust, commitment, and open communication—as prerequisites for resilience. From a Relational View of the Firm, these capabilities serve as intangible assets that enable joint value creation. Contingency Theory also supports this implication, positing that organizational effectiveness is contingent on the alignment between internal processes and environmental demands.

Practical Recommendation: SME managers are encouraged to proactively invest in relationship-building initiatives, such as:

- Regular dialogue through structured and informal channels;
- Joint performance reviews and shared metrics;
- Trust-building workshops and collaborative forums.

Policy Recommendation: Government agencies and industry associations can facilitate relationship development by:

- Funding inter-firm matchmaking platforms or SME consortia;
- Supporting regional clusters where trust and norms can develop over time;
- Incentivizing cross-sectoral networking events and long-term partnerships.

2. Enabling Conditions: Leveraging Digital Tools and Shared Communication Channels

Several SMEs noted that lack of real-time data and fragmented communication systems severely constrained collaborative efforts during disruptions. A manager from a textiles SME commented, “We didn’t know our supplier had shut down operations until we missed a shipment—it was all reactive.” [Participant 12, Apparel Manufacturing].

Such challenges highlight the value of digital integration in enabling cooperative practices. Relational capabilities like transparency and information sharing become operationalized through digital tools that enhance visibility and responsiveness—key dimensions in resilient supply chains.

Practical Recommendation: SMEs are advised to adopt cost-effective digital platforms that facilitate:

- Real-time inventory and logistics tracking;
- Shared dashboards for supply chain performance;
- Communication hubs for inter-firm coordination.

Policy Recommendation: Policymakers can support digital transformation by:

- Expanding access to digitization grants and training programs (e.g., "Go Digital" schemes);
- Offering free or subsidized digital maturity audits (e.g., ERP, SCM tools);

- Mandating digital readiness as part of public procurement standards for SMEs.

3. Embedding Cooperative Practices: Co-Planning and Joint Risk Management

A recurring theme was the lack of alignment in contingency planning across supply chain partners. One participant remarked, "We had a business continuity plan, but none of our suppliers did. So, when the pandemic hit, we were alone." [Participant 4, Chemical Manufacturing].

This reinforces the study's conceptual premise that cooperative practices, especially joint planning and knowledge sharing, directly influence resilience outcomes. This aligns with both Contingency Theory, which advocates for structural alignment under uncertainty, and the Relational View, which emphasizes co-specialization of capabilities.

Practical Recommendation: SME managers are encouraged to:

- Develop contingency and recovery plans jointly with suppliers and distributors;
- Conduct periodic risk-sharing simulations;
- Clearly define roles, responsibilities, and fallback options across firms.

Policy Recommendation: Governments are advised to:

- Create sector-specific "resilience playbooks" or templates for SMEs;

- Support shared risk analysis workshops within industry clusters;
- Encourage anchor firms to disseminate planning tools and resilience KPIs to smaller partners.

4. Realizing Strategic Impacts: Institutionalizing Resilience through Networked Cooperation

Finally, many SMEs reported that collaboration not only helped them survive disruption but also strengthened their long-term strategic positioning. As one interviewee put it, "Because we worked closely with our suppliers during COVID, we now have priority access and even co-develop new products together." [Participant 19, Plastic Manufacturing].

This reflects a relational upgrading where resilient practices become embedded in ongoing strategic routines, leading to competitive advantages. The Relational View of the Firm asserts that such embeddedness can produce superior performance outcomes over time, especially in uncertain environments.

Practical Recommendation: Managers are encouraged to:

- Treat resilience as a continuous strategic priority, not a one-off response;
- Institutionalize cooperative practices (e.g., joint innovation, data-sharing agreements);
- Establish formal risk-sharing contracts where feasible.

Policy Recommendation: Ecosystem actors are advised to:

- Support public-private crisis coordination platforms at regional levels;
- Incentivize participation in resilience audits and supply chain benchmarking programs;
- Facilitate long-term resilience certification or accreditation schemes for SMEs.

Table 9: Practical & Policy Recommendations Mapped to Findings

Theme	Empirical Finding	Practical Recommendation (SMEs)	Policy Recommendation (Govt/Ecosystem)	Theoretical Lens
Barriers to Collaboration	Misaligned goals, lack of trust, poor communication	Build trust through structured engagement and shared metrics	Fund SME relationship-building and cluster initiatives	Relational View, Contingency Theory
Enablers of Cooperation	Digital tools improved coordination and visibility	Adopt cloud-based and real-time data platforms	Provide digitization grants and SME digital audits	Relational Capabilities Framework
Cooperative Practices	Joint planning led to faster response and recovery	Develop and share contingency plans with partners	Create resilience playbooks and risk training programs	Contingency Theory
Strategic Impacts	Cooperation led to sustained strategic advantage	Institutionalize resilience as an ongoing cooperative strategy	Support regional resilience hubs and accreditation schemes	Relational View of the Firm

This study highlights that building resilient supply chains among Egyptian manufacturing SMEs requires more than technical fixes—it demands the cultivation of relational capabilities and cooperative practices that are embedded within inter-organizational networks. By addressing persistent barriers to collaboration, leveraging enablers such as digital tools, and institutionalizing joint planning routines, SMEs can significantly enhance their capacity to anticipate, absorb, and recover from disruptions. Furthermore, the findings underscore that resilience is not solely an internal organizational feature but a networked

outcome that benefits from coordinated efforts across the supply chain. Policymakers have a vital role to play in shaping an ecosystem conducive to such collaboration, through targeted interventions, capability development, and incentives that promote long-term relational engagement. Ultimately, by aligning practice with theory—particularly through the lenses of Contingency Theory and the Relational View of the Firm—this study offers a roadmap for fostering adaptive, cooperative, and resilient supply chains in volatile contexts.

9. Conclusion

This study reinforces the argument that resilience is not solely a function of structural redundancies or digital sophistication but is fundamentally relational in nature. Trust, commitment, and knowledge exchange—the core components of relational capabilities—emerged not only as facilitators of cooperation but as mechanisms through which resilience itself is enacted. By situating these findings within Contingency Theory and the Relational View, the study underscores the contingent value of relational strategies in uncertain environments, particularly among emerging-market SMEs.

9.1 Summary of Key Findings

The results revealed that relational capabilities, particularly trust, commitment, and open communication, are critical enablers of effective inter-organizational cooperation. These social-relational foundations allowed firms to engage in cooperative practices

such as knowledge sharing, joint scenario planning, and informal fallback arrangements. In many cases, these cooperative behaviors substituted for more formal governance structures, especially in the face of institutional and infrastructural limitations.

Digital tools also emerged as practical enablers that helped SMEs maintain visibility and responsiveness in disrupted environments. Conversely, firms that lacked relational depth or operated in silos struggled to coordinate, revealing the limits of isolated risk management approaches. These findings emphasize that resilience, particularly in SME contexts, is a networked capability that is co-developed and sustained through collaboration.

Theoretical Contributions

his study advances two key theoretical perspectives. First, drawing on the Relational View of the Firm (Dyer & Singh, 1998), the research illustrates that inter-firm collaboration does more than create competitive advantage—it enables relational resilience, where mutual dependence and joint responsiveness help firms navigate disruption. Trust, commitment, and information sharing were not just enabling factors but integral components of a firm's adaptive capacity.

Second, the application of Contingency Theory (Donaldson, 2001) reinforces the idea that organizational effectiveness hinges on alignment between internal capabilities and external

environmental demands. Firms that adapted their cooperative strategies to local constraints—technological, institutional, and cultural—achieved greater continuity and responsiveness. These findings suggest that cooperative resilience strategies must be context-sensitive, particularly in emerging markets where formal structures may be weak.

Practical Implications

At the policy level, the findings point to the need for ecosystem-wide interventions that support collaborative resilience. Governments and development agencies are advised to promote cluster-based cooperation models, provide financial incentives and training for digital adoption, and develop publicly available resilience playbooks tailored to the SME sector. Scholars have emphasized the importance of institutional frameworks that reduce transaction costs and enhance cooperative behavior in crisis contexts (Wieland & Durach, 2021; Chowdhury & Quaddus, 2017).

Such interventions can help SMEs overcome relational and technical barriers, foster mutual preparedness, and embed resilience into supply chain ecosystems. Rather than viewing cooperation as a reactive or supplementary function, managers are advised to treat it as a core strategic pillar that supports long-term continuity, especially in volatile environments.

Policy Implications

At the policy level, the findings point to the need for ecosystem-wide interventions that support collaborative resilience. Governments and development agencies are encouraged to:

- Promote cluster-based cooperation models for SMEs;
- Develop publicly available resilience playbooks;
- Provide financial incentives and training for digital adoption and joint planning.

Such initiatives can help SMEs overcome barriers to cooperation, reduce fragmentation, and build systemic resilience that extends beyond individual firms.

Limitations

While this research offers important insights, it is not without limitations. The focus on Egyptian SMEs limits the generalizability of the findings to other geographic or economic contexts. Informal business norms, varying levels of digital readiness, and the structure of local supply chains may shape resilience strategies in ways that differ from other settings.

In addition, the study relied on qualitative data and interpretive thematic analysis, prioritizing depth and context over generalizability. As such, the insights are analytically transferable rather than statistically representative.

Future Research Directions

To build on the current findings and enhance theoretical and practical understanding, future research is recommended to consider the following:

- Cross-national comparative studies to explore how relational resilience strategies vary across institutional and cultural environments;
- Longitudinal studies to examine how cooperative practices evolve across repeated disruptions and recovery cycles;
- Sector-specific analysis to assess how resilience strategies differ in manufacturing, services, agriculture, or technology sectors;
- Mixed-methods research to validate and refine the relational resilience framework through both qualitative depth and quantitative breadth.

These future directions will support the development of more robust, inclusive, and adaptable models of supply chain resilience, particularly for SMEs in dynamic and uncertain environments.

10. References

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