

Resilient interorganizational culture in multi-tier supply networks: the 'what' and 'how'

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Abstract

Purpose: Highlighted in multiple calls, research on interorganizational culture remains limited in the supply chain resilience (SCRES) literature, particularly at the supply network-level. Drawing from an in-depth case study of a US chemical multinational and 21 multi-tier suppliers facing the COVID-19 disruption, this paper explores interorganizational culture's role in SCRES in a multi-tier supply network. Based on the case data, this work proposes an exploratory definition of resilient interorganizational culture, conceptualizing it as a network-wide cultural alignment framework that can strengthen SCRES through cultural propagation and transitivity mechanisms.

Design/methodology/approach: The case consists of 83 in-depth interviews over nine months, collecting data from a buyer and 21 suppliers in the chemical industry. Using balance theory, the analysis examines what and how inter-organizational culture elements influence the SCRES elements of collaboration, flexibility, visibility, and velocity in a disrupted multi-tier supply network.

Findings: The case study sheds light on the various cultural elements and supply network mechanisms between organizations that form a resilient interorganizational culture during a significant global disruption. These cultural elements encompass shared goals, expectations, understanding, processes, and values. The findings of this study indicate that these cultural elements, along with the mechanisms of network-level cultural propagation and cultural transitivity in balanced and unbalanced triadic cultural relationships, affect different aspects of SCRES uniquely. The study underscores the significance of evaluating the interorganizational cultural alignments existing in supply networks to achieve SCRES.

Originality: This paper maps aligned and misaligned cultural elements and explores how they characterize a resilient interorganizational culture in a multi-tier supply network, drawing on the concepts of network-level cultural propagation and transitivity in balanced and unbalanced triadic relationships. It extends balance theory by introducing cultural transitivity as a mechanism linking triadic cultural structures to resilience outcomes. It complements balance theory by conceptualizing cultural propagation as the

diffusion of cultural alignments and misalignments beyond triads, influencing resilience at the network-level. It contributes to network theory by articulating how cultural alignments and misalignments flow both directionally and transitively across interconnected supply chain actors. Grounded in a single case study, the work advances SCRES theory by offering exploratory insights into how cultural transitivity and propagation enable the SCRES elements of collaboration, flexibility, visibility, and velocity.

Keywords: supply chain resilience, supply network, balance theory, interorganizational relationships, interorganizational culture, buyer-supplier relationships.

Article classification: Research paper, case study.

1. Introduction

In today's interconnected and complex supply chain networks, the importance of culture is amplified. It is not only a foundation for ethical and moral habits that nurture trust and partnership commitment (Fukuyama, 1995; Sambasivan and Yen, 2010) but also a critical factor in avoiding misalignment that can lead to business disruptions, impairing decision-making and information-processing capabilities (Ali et al., 2023; Cadden et al., 2013; Wong et al., 2023). Culture impacts strategy (Green, 1988) and shapes core supply chain dynamics such as trust, collaboration, risk tolerance, and information sharing (Cao et al., 2015; Kumar et al., 2018). Interorganizational culture represents shared goals and objectives, business philosophies or management styles (Sáenz et al., 2014), assumptions (Chowdhury et al., 2019), norms, beliefs, and values (Hult et al., 2007) that help achieve strategic alignment between partners (Sáenz et al., 2014). Scholars have connected the idea of interorganizational culture to cultural compatibility (e.g., Sáenz et al., 2014). While interorganizational culture is what partners culturally share, cultural compatibility, also known as cultural alignment or fit (Cartwright and Cooper, 1993), identifies the degree to which two partners share a set of norms, beliefs, or values (Hult et al., 2007). The sharing of norms between partners enables the transition of intra- to interorganizational rules and vice versa (Sáenz et al., 2014). Existing studies have demonstrated that interorganizational culture significantly shapes supply chain performance in the buyer-supplier context (Cao et al., 2015), notably by influencing collaborative synergies, shared understanding, and cognitive efforts to mitigate supply risks, thereby enabling supply chain resilience (SCRES) (Chowdhury et al., 2019). Misaligned cultures can disrupt collaboration and hinder SCRES (Ali et al., 2017; Christopher and Peck, 2004). Scholars have further revealed that compatible or aligned interorganizational cultures can help avoid business failure, strife, and suspicion (Rajaguru and Matanda, 2019). Indeed, shared cultural foundations have been shown to facilitate mutual understanding and learning across firms, contributing to more resilient responses (Razak et al., 2024). Recent empirical studies have demonstrated that various forms of culture, such as learning culture, digital organizational culture, and humanitarian values, play a critical role in enabling key SCRES capabilities, including collaboration, flexibility, and risk response (Acar et al., 2022; Michel et al., 2023; Rodríguez-González et al., 2023). While research on interorganizational culture has traditionally focused on mergers, acquisitions, and joint ventures (Teerikangas and Very, 2006), studies in the supply chain domain have largely concentrated on material and information flows between actors. This highlights a growing need to explore how interorganizational culture shapes performance and resilience in increasingly complex environments (Altay et al., 2018; Sáenz et al., 2014).

Over the past few decades, the literature has increasingly adopted a relational view, recognizing that firm performance and resilience are heavily influenced by external relationships, specifically who organizations choose to work with (Mesquita et al, 2008; Wang and Rajagopalan, 2015). In the context of supply chains, this shift highlights the need to move beyond examining isolated firm attributes and instead zoom in on the relational dynamics between organizations, including the alignment and misalignment of their cultural elements. The existing supply chain literature has largely focused on cultural aspects at the organizational and buyer-supplier levels (Chowdhury et al., 2019; Rajaguru and Matanda, 2019). However, culture transcends the walls of one firm or buyer-supplier relationships, since social interactions among groups of people occur without any clear boundaries (Lee et al., 2015). This underscores the importance of studying interorganizational culture at the network-level. Indeed, supply chains go beyond the confines of buyer-supplier dyads (Kim et al., 2011), as these dyads can influence each other and be influenced by different connections within the broader supply networks. This is particularly evident in the context of large-scale disruptions, where resilience depends on multilevel coordination mechanisms and collaboration across interconnected supply chain tiers (Aman and Seuring, 2023; Lusiantoro and Pradiptyo, 2022). A firm's failure to address supply disruptions often stems from a limited understanding of the supply network in which it is embedded (Kim et al. 2015). Consequently, SCRES strategies must be network-wide (Christopher and Peck, 2004). Indeed, the performance of a supplier relies on the effectiveness of its extended supply network. Therefore, buyers need to reduce supply risks by selecting and assessing suppliers not in isolation but rather in consideration of their embeddedness within larger supplier networks (Kim et al., 2011). A relevant example is Toyota, whose North American truck production stopped over a component disruption in a Japanese plant (Kim et al. 2015). As such, a network lens is necessary to develop resilience and understand how global supply chains work comprehensively. Given the increasing number of supply chain players struck by disruptions, a few studies have recently shifted their attention from dyads to broader supply networks to unveil complex and inconspicuous supply network patterns and how disruptions proliferate insidiously in multi-tier supply networks.

This study introduces and explores the phenomenon of resilient interorganizational culture at the supply network-level. Unlike firm-level organizational culture, resilient interorganizational culture is presented here as a supply network-wide cultural phenomenon characterized by cultural alignments that may strengthen a supply network's ability to foster the key SCRES capabilities of collaboration, flexibility, visibility, and velocity. Grounded in a single in-depth case study, this work adopts a network view (Kim et al., 2011) that draws on balance theory (Choi and Wu, 2009) to examine cultural balance/unbalance in triads, while also leveraging network theory to understand how cultural alignments may propagate across

interconnected actors, thereby enabling resilience beyond dyadic or triadic boundaries. Investigated in triads, balance theory stipulates that relationship balance is possible when all partners share similar views or when two relationships in the triad are adversarial (Hummon and Doreian, 2003). SCRES enables companies to persist, adapt, or transform when dealing with disruptions (Wieland and Durach, 2021) through organizational and interorganizational resources and capabilities (Kamalahmadi and Parast, 2016). This study seeks to identify precisely what and explain how interorganizational culture elements impact the four most common SCRES capability elements (i.e., collaboration, flexibility, visibility, and velocity) (Ali et al., 2017; Johnson et al., 2013; Jüttner and Maklan, 2011) in a disrupted multi-tier supply network. These SCRES capabilities will be fully defined in the following literature review section. The research questions guiding this work are as follows:

- (1) What interorganizational cultural elements impact SCRES elements at a supply network-level?
- (2) How do these interorganizational cultural elements impact SCRES at the supply network-level?

Culture is an intricate concept, lending itself to qualitative methods seeking data depth to understand unclear underlying assumptions and meanings (Cadden et al., 2013). Hence, a qualitative approach based on an in-depth case study of the industrial lubricant supply network of a chemical multinational in the US was used to collect data from 83 interviews from 22 organizations (i.e., 21 suppliers and one lead buyer). This work makes three theoretical contributions. First, it extends balance theory by analyzing how cultural transitivity influences SCRES across connected triadic actors, offering a novel application of the theory to cultural alignment in supply networks. It also complements balance theory by introducing cultural propagation as a mechanism through which interorganizational alignments spread beyond triads to shape resilience at the network-level. Second, it contributes to network theory by revealing how cultural alignment flows directionally (i.e., backward and forward) and transitively across interconnected tiers, clarifying underexplored alignment dynamics. Third, it advances SCRES theory by framing interorganizational culture as a dynamic, multi-tier enabler of collaboration, flexibility, visibility, and velocity. These mechanisms are grounded in a case study and formalized through propositions that capture network-level cultural dynamics. Practically, the paper advances the professional field of supply chain management by providing actionable insights for organizations aiming to foster resilience amid heightened global disruptions.

2. Theoretical background

2.1 SCRES

In the supply chain literature, scholars have mainly adopted an engineering view of resilience, highlighting the system's ability to bounce back to an equilibrium state (Sheffi and Rice, 2005; Ponomarov and Holcomb, 2009; Ali et al., 2017). However, some supply chain researchers have recently started to challenge the equilibrium state and consider disruptions as opportunities to metamorphose, adapt, evolve, and transform (Wieland and Durach, 2021). Recent empirical findings emphasize that disruptions such as the COVID-19 pandemic have accelerated firms' need to shift from traditional resilience strategies to more adaptive, real-time responses (Ivanov, 2021; van Hoek, 2020). Drawing on complex adaptive systems from the study of ecosystems, social systems, and the panarchy framework, scholars have introduced the notion of growth (Day, 2014), adaptation, transformability (Wieland and Durach, 2021), and antifragility, embracing turbulence rather than avoiding it (Nikookar et al., 2021). In the same vein, recent theorizations have adopted the dynamic capability lens to study transformation and growth in SCRES (Nikookar and Yandori, 2022). This lens investigates the SCRES capabilities to (1) sense/recognize threats and opportunities (i.e., proactive capability to prepare and learn), (2) seize/respond to threats and opportunities (i.e., reactive capability to respond), and (3) transform/improve the firm's capabilities (i.e., reactive capability to recover and learn) (Nikookar and Yandori, 2022). Accordingly, this study considers SCRES as an adaptive capability to maintain operational continuity against disruptions at the desired level of connectedness and control over structure and function (Ponomarov and Holcomb, 2009). This adaptive capability consists of preparing for, responding to, recovering from (Ponomarov and Holcomb, 2009), and learning from disruptions (Day, 2014). Building on this foundation, Ivanov (2025) frames SCRES as a dynamic, bioinspired capability, emphasizing the interdependence of adaptation and viability as strategic imperatives. Recent contributions also emphasize a systemic view of SCRES quality and the interplay between supply network structures and resilience capabilities (Gruchmann et al., 2024; Wang et al., 2025).

SCRES capabilities of preparation, response, recovery, and learning are enabled by elements (Ali et al., 2017; Christopher and Peck, 2004). The most common SCRES elements discussed in the literature are collaboration, flexibility, visibility, and velocity (Ali et al., 2017; Jüttner and Maklan, 2011; Johnson et al., 2013; Sá et al., 2019; Scholten and Schilder, 2015). Collaboration between members represents the level of tactical, operational, and strategic shared decision-making and joint efforts (Jüttner and Maklan, 2011). Flexibility is the aptitude of a supply chain to change the number and heterogeneity of possible solutions to respond to a market event while maintaining performance (Stevenson and Spring, 2007). This could

manifest in flexible supply, demand, processes, capacity, and order fulfillment or transportation (Ali et al., 2017). For example, flexibility can emerge through logistics-driven adaptation, especially via digitalization and modular process design (Song et al., 2022). Visibility is the ability of the supply chain to capture timely information about the identification, location, and status of supply chain events or entities (Johnson et al., 2013). Velocity revolves around the adaptation speed by which a supply chain responds to and recovers from a market event (Christopher and Peck, 2004). Enhanced visibility and velocity are increasingly supported by AI and digital tools, strengthening the information-processing dimension of SCRES (Belhadi et al., 2021; Zhang et al., 2024). A growing body of evidence highlights collaboration, flexibility, visibility, and velocity as central mechanisms of resilience, particularly in turbulent and complex environments (Berger et al., 202; El Baz and Ruel, 2024; Ivanov, 2025; Juan et al., 2021; Scala and Lindsay, 2021; Zhao et al., 2024). Scholten et al. (2025) include redundancy as a fifth commonly cited SCRES element, based on a qualitative study of seven organizations that experienced twelve disruptions. Some scholars argue that redundancy may reinforce or overlap with flexibility, depending on how buffering and adaptation are defined (Stevenson and Spring, 2007). This illustrates the ongoing conceptual ambiguity surrounding the boundaries of SCRES capabilities. In addition to these core elements, many others stemming from these can be found in the SCRES literature, such as management support, continuity teams, training, past learning (Chowdhury and Quaddus, 2016), risk awareness, efficiency, knowledge management, but also social capital (Ali et al., 2017) with personal relationships and social interactions (Nikookar and Yandori, 2022).

2.2 SCRES and interorganizational culture

Components of interorganizational culture have been acknowledged within buyer-supplier relationships in the supply chain risk and resilience literature (Ding et al., 2024). Suppliers and buyers use interorganizational culture to facilitate tacit and explicit understanding, but also cognitive effort in supply risk identification (Fan and Stevenson, 2018) and mitigation (Chowdhury et al., 2019). This aligns with recent findings showing that cultural and relational foundations can foster shared interpretation and coordinated action, thereby enhancing resilience across supply networks (Razak et al., 2024). Studying humanitarian supply chains, Altay et al. (2018) show that control and flexibility orientation cultures positively influence SCRES and pre- and post-disaster performance. SCRES and supply chain risk management cultures are specific organizational cultures that enable the concepts of resilience (Christopher and Peck, 2004). Risk management culture is positively associated with firm risk reduction (Ali et al., 2023) and the financial performance of firms through SCRES efforts (Chunsheng et al., 2020).

With the late rise of the digital era, information security culture is another form of culture that mitigates information leakage and fosters effective information sharing (Wong et al., 2023). In addition, digital culture strengthens supplier-buyer absorptive capacity and enhances risk-coping mechanisms across the supply chain (Rodríguez-González et al., 2023).

Buyer-supplier organizational culture compatibility achieves the highest performance outcomes (Cadden et al., 2013). Interorganizational cultural compatibility in philosophies, values, social norms, professionalism, and chemistry positively impacts interorganizational information systems integration and supply chain capabilities (Rajaguru and Matanda, 2019). Cultural similarities in supplier-supplier and supplier-buyer relationships reduce communication costs, foster altruistic behavior, and strengthen mutual trust, ultimately leading to improvements in supplier cost efficiency, investment, and innovation (Ding et al., 2024). While components of interorganizational culture have been explored in dyadic buyer-supplier settings, their role across multi-tier supply networks remains underexplored.

2.3 A supply network view of SCRES

A supply network is a collection of nodes and arcs (Borgatti and Li, 2009). Nodes consist of suppliers, manufacturers, service providers, and customers linked by arcs/ties in the form of physical flows (e.g., materials) or contractual relationships (Kim et al., 2011). The literature discusses disruptions at two levels of analysis: the node/arc-level and network-level. The node/arc-level investigates nodes individually and/or arcs consisting of a dyad with two nodes, while the network-level examines the broader structure and the cascading effects of disruptions as they propagate through the system (Kim et al., 2011; Kim et al., 2015; Christopher and Peck, 2004; Lusiantoro and Pradiptyo, 2022). This study adopts a network view centered on a focal node network, encompassing a focal firm or the lead buyer, and a set of firms or suppliers with direct or indirect ties to the focal firm (Borgatti and Li, 2009). In this study, the focal firm or lead buyer is the destination of the physical flows emanating from other nodes. Acknowledged in a few studies, SCRES at the supply network-level remains underexamined (Kim et al., 2015), particularly in terms of how disruption and cultural alignment may propagate beyond immediate dyads, shaping resilience dynamics across the extended supply network.

This work focuses on node/arc disruptions and how they affect the SCRES elements of collaboration, flexibility, visibility, and velocity within the supply network. Conceptualizing supply networks in the form of material and informational flows, the literature overlooks the role of cultural alignment between two nodes and how it affects supply network resilience. To address this gap, this study draws on balance theory

to examine how cultural alignments within triads, the microstructures of supply networks, contribute to SCRES.

Balance theory is a theoretical framework, first developed in behavioral psychology, to study triadic interpersonal and group relationships, where a (+) sign typically represents a cooperative relationship between two firms, while a (-) sign indicates an uncooperative relationship between two firms (Choi and Wu, 2009). Applied to the supply chain context, balance theory provides a lens to understand cooperative and adversarial interorganizational cultural dynamics. It helps identify and understand balanced and unbalanced cultural relationships in triads. According to the literature on balance theory (Hummon and Doreian, 2003), a balanced triadic relationship always has three (+) signs or two (-) signs and one (+) sign, and an unbalanced triadic relationship always has two (+) signs and one (-) sign or three (-) signs. Balance theory describes interorganizational relationships similarly to the buyer-supplier relationship literature, with positive/cooperative relationships or negative/adversarial relationships between two nodes.

Balance theory is the only theory from the broad academic literature that addresses triads (Choi and Wu, 2009). Triads constitute the smallest supply networks. Therefore, using balance theory has sound applicability to interorganizational cultural relationships in triads, and its insights may inform broader reflections on cultural dynamics in larger supply networks. Although initially, this theory focused on the individual level, management researchers have used it to understand organizations. Despite its relevance, balance theory remains underutilized in the supply chain resilience literature, particularly in relation to cultural alignments and misalignments across networked relationships. This paper explores how cultural elements and their alignments contribute to SCRES by applying balance theory in triads and examining cultural propagation mechanisms across larger supply networks, thereby offering deeper insight into culture-driven resilience in supply networks. This work characterizes cultural alignments between two actors with a (+) and cultural misalignments between two actors with a (-).

3. Method

Understudied in the literature, network-level interorganizational culture and resilient interorganizational culture are complex real-life phenomena that can be amply explored through a single case study (Siggelkow, 2007) seeking meaning and context over causality and positivist generalization (Eisenhardt, 1989). As such, despite its limited generalizability, applications and risk of subjectivity, a case study method was selected to focus on detailed descriptions, data analysis, and exploration of contextual factors (Yin, 2018). This approach serves as a first exploratory step to examine the role of interorganizational culture in

SCRES at the supply network-level. The research focuses on a single supply network in the US to enable an in-depth exploration of network-level mechanisms and eliminate cross-network and geographical dispersion differences. The case study analyzes the supply network of the US-based industrial lubricant division of a chemical multinational, consisting of a lead buyer referred to as LEAD_BUYER in this paper and 21 other organizations operating in its extended upstream supply chain (Figure 1). While the lead buyer plays a central role in shaping interorganizational culture and resilience, the 21 suppliers are also interconnected. A buyer's supplier is often also a buyer of another supplier within the network, creating a dynamic multi-tier structure where resilience is shaped by multiple interconnected relationships.

Figure 1. Examination of LEAD_BUYER's supply network

LEAD_BUYER was the focal buyer and purchased products and services directly from 21 suppliers. LEAD_BUYER had a FREIGHT_FORWARDER that managed ocean and land carriers for products overseas. LEAD_BUYER subcontracted the production of some special blends to BLENDER_1, BLENDER_2, BLENDER_3, and BLENDER_4 which produced oil blends shipped to LEAD_BUYER's third-party WAREHOUSE_1, WAREHOUSE_2, and WAREHOUSING_4PL or end-customers. In the production process, LEAD_BUYER and blenders used suppliers: BASE_OIL_1, BASE_OIL_2, ADDITIVE_1, ADDITIVE_2, PACKAGER_1, PACKAGER_2, PACKAGER_3, DISTRIBUTOR_1, and DISTRIBUTOR_2. In the delivery process, blenders used LEAD_BUYER's transportation 4PL, TRANSPORT_4PL, to organize transport with LTL_CARRIER (i.e., LTL: Less-Than-Truckload), BULK_CARRIER_1, and BULK_CARRIER_2 shipping to LEAD_BUYER's third-party warehouses and customers. The warehouses worked with all LEAD_BUYER's suppliers, except the base oil suppliers, to schedule deliveries of materials that LEAD_BUYER needed. LTL and bulk carriers were exclusively managed by LEAD_BUYER's transportation 4PL. Distributors purchased products from additive suppliers. Packaging suppliers supplied the blenders and LEAD_BUYER. Suppliers were selected for their product and service diversity to enable a richer contextual analysis. The data collection process lasted nine months, between January and September 2022.

3.1 Case study selection and context

The choice of the case study was based on the supply network complexity (i.e., number of suppliers, geographies, interactions), multisectoral and functional supplier diversity, and data accessibility. Heavily affected by diverse COVID-driven disruptions, LEAD_BUYER is a chemical multinational that has a vast supply network embedded in various industries. Open to provide access to their data in this case study, LEAD_BUYER's biggest suppliers in volume are also major players deeply anchored in the chemical,

transportation, and logistics industries. With numerous suppliers scattered in the United States, LEAD_BUYER sources from and delivers to multi-industrial actors. The case study focuses on the industrial lubricant division and the suppliers of the US multinational. Extreme contexts enable compelling portrayals of phenomenon characteristics (Scholten et al., 2014). As an extreme case, the COVID-19 pandemic context was chosen as an opportunity to delve into the concept of resilient interorganizational culture at the supply network-level. Multiple COVID-driven incidents were identified throughout the case, enabling the utilization of critical incident analysis (Flanagan, 1954) to understand how people perceived unfolding events. The case predominantly revolves around LEAD_BUYER and tier-1 and tier-2 suppliers, but also incorporates tier-3 and tier-4 suppliers. A network approach was selected to explore qualitatively how interorganizational cultural elements align to form supply network resilience.

3.2 Data collection

The study uses mainly 83 semi-structured interviews of individuals from 22 companies in the US chemical industry, plus other data (i.e., Table I: respondent profiles list). Representing all product categories needed to produce industrial lubricants, top tier-1 suppliers in volume selling to LEAD_BUYER were selected for interviews. All selected tier-1 suppliers working in Sales agreed to participate in the study. Then, based on a chain sampling process, these Sales participants referred the research team to other participants from their Supply Chain departments and top suppliers. These suppliers were tier-2 suppliers to LEAD_BUYER, which provided access to their suppliers, as well. Chain sampling continued until data saturation was reached, sometimes up to tier-3 and tier-4 suppliers.

To allow data-rich collection, individuals with different title levels and decision-making influence in Sales and Operations were selected and interviewed. Twelve company types were interviewed: an industrial lubricant manufacturer/lead buyer, two base oil suppliers, four blenders, two additive suppliers, three packaging suppliers, two distributors, one 4PL warehouse provider, two warehouses, one 4PL transportation provider, one LTL carrier, two bulk carriers, and one freight forwarder. On the buyer side, 20 individuals in Operations were interviewed from Production, Maintenance, Quality, Engineering, Planning, Purchasing, Procurement, Transportation, and Logistics at different levels (i.e., Analyst, Manager, Director). On the supplier side, 63 individuals were interviewed. Three people were interviewed per supplier from the Sales and Supply Chain departments at different levels (i.e., Analyst, Manager, Director, VP, President/GM/CEO). Additionally, information available in supplier-buyer project presentations, meetings, emails, and phone calls allowed for data triangulation, increasing the reliability and validity of the results (Yin, 2018). Data were collected and analyzed from participatory observations (i.e., 29 hours of

36 virtual and face-to-face meetings) and non-participatory observations (i.e., 12 hours of 15 virtual and face-to-face meetings). Interviews were recorded using Microsoft Teams and were transcribed.

Table I. Respondent profile

An in-depth interview protocol was built using open-ended questions with broad and known themes to enable understanding, exploration, and follow-up questions (i.e., Table II). The same interview questions were used for buyers and suppliers. Questions probed buyers and suppliers about their respective relationships. Interorganizational cultures and networks were investigated using words such as corporate culture similarities/differences, suppliers, and customers. SCRES was examined using words such as risk coping mechanisms/resilience, and the SCRES elements of collaboration, flexibility, visibility, and velocity. 95% of the interviewees had three or more years of experience in their respective organizations. Approximately 30% of respondents were female and 70% were male. The interview average time was 46 minutes. No pattern emerged from the employees' time in their organizations, titles, or core business functions.

Table II. Interview questions: themes and goals

Interviewees discussed certain disruption events that involved their organizations with others, explaining how one or more cultural alignment(s) helped them cope with disruptions and create resilience. These disruption events constituted narratives with respondents, organizations, cultural alignments/misalignments, and impacted SCRES elements. Every collected narrative was modeled by connecting the organizations of the disruption-driven story in a diagram/supply network where nodes represent the organizations and links/arcs characterize cultural alignments/misalignment embedded in material, informational, and financial flows. Respondents highlighted relevant cultural elements that impacted SCRES in their respective supply networks and narratives. Supply networks were only modeled and created when actors of the network discussed a specific disruption, respective cultural alignments/misalignments, and impacted SCRES elements with actors they were connected to in the modeled network. This enabled the identification of shared/interorganizational cultural elements running through the supply network between organizations during a specific disruption. Some disruptions were discussed in narratives where actors and cultural elements were different but embedded in supply networks of similar structure (i.e., same number of actors and links/arcs configuration). Thus, each diagram/supply network can represent multiple narratives or disruption stories between different actors discussing different cultural and SCRES elements.

3.3 Data analysis

The thematic and data analysis of the transcribed interviews was processed in NVivo, helping to systematize substantial textual data (Johnson et al., 2013). The coding and analysis process was conducted collaboratively among all researchers, ensuring consistency in theme identification and reducing individual biases. Consensus discussions were held throughout the coding process to refine interpretations and enhance reliability.

Interorganizational culture represents common goals, objectives, business philosophies, or management styles (Sáenz et al., 2014), assumptions (Chowdhury et al., 2019), norms, beliefs, and values (Hult et al., 2007). Using this definition, the data analysis unveiled (1) what specific interorganizational cultural elements impact SCRES and (2) how these interorganizational cultural elements impact SCRES at the supply network-level. Figure 2 shows the thematic analysis of interorganizational cultural elements surfacing from the data in a supply network context with a total of 101 codes. Staying faithful to the terms used by informants and the definition of interorganizational culture, the Gioia methodology (Gioia et al., 2013) was used to determine the interorganizational cultural elements aligning between partners to help enable SCRES in the supply network. Interorganizational cultural elements consisted of shared goals and expectations (i.e., 17 codes), understanding (i.e., 23 codes), processes (i.e., 24 codes), and values (i.e., 37 codes). Shared goals were comprised of shared delivery performance, business continuity, and safety goals, emerging as shared principles guiding all strategic and operational processes. Shared understanding entailed shared assumptions and narratives. Shared assumptions were beliefs assumed by partners to be true, such as logistical capabilities, while shared narratives were shared stories. Shared processes were agreed-upon norms consisting of forecast sharing, shared delivery scheduling processes, and shared invoice management processes. Shared values revolved around shared communication, empathy, and respect.

Figure 2. Interorganizational cultural elements emerging from the Gioia method

Ponomarov and Holcomb (2009) define SCRES as a supply chain adaptive capability to maintain operations continuity against disruptions at the desired level of connectedness and control over structure and function. Underexamined in the previous SCRES literature, the concept of connectedness over structure and function is explored in this work through the lens of cultural alignments, enabling cultural connectedness between partners. All actors in the supply network interacted through material, financial, and informational flows. The paper examines interorganizational cultural alignments embedded in these

flows. Quotes were selected and split into two categories: those describing aligned cultural elements and those depicting misaligned cultural elements.

To understand what and how interorganizational cultural elements influence SCRES elements, quotes including aligned/misaligned interorganizational cultural elements were sorted and connected to the SCRES elements of collaboration, flexibility, visibility, and velocity (Ali et al., 2017; Johnson et al., 2013; Jüttner and Maklan, 2011; Scholten et al., 2025). Firms are not self-sufficient and need each other's critical resources to operate and survive in supply networks. As such, resilience in supply networks depends on resources possessed by different supply network members (Nikookar and Yandori, 2022). These resources are often called network resources (Gulati, 1999), and among the most frequently cited are collaboration, flexibility, visibility, and velocity, which are consistently recognized in the literature as foundational to resilience (Ali et al., 2017; Johnson et al., 2013; Jüttner and Maklan, 2011; Scholten et al., 2025). In this study, only these four SCRES elements are examined, identified during the coding process and grounded in the case data. Scholten et al. (2025) identify five frequently cited SCRES elements: collaboration, flexibility, visibility, velocity, and redundancy, based on a qualitative case study of seven organizations facing twelve disruptions. Redundancy did not appear as a distinct mechanism in this study. Instead, flexibility is treated as an integrative capability that includes both adaptive reconfiguration and structural buffering, such as slack resources or excess capacity. This interpretation aligns with Stevenson and Spring's (2007) view of flexibility as the capacity to generate a diverse range of potential responses to disruption and reflects a synthesis of what Scholten et al. (2025) describe separately as flexibility and redundancy into a single, empirically grounded construct. Table III provides illustrative case study quotes and their links with these four SCRES elements. A total of 7,933 quotes (i.e., 164,083 words) discussing interorganizational cultural elements in SCRES emerged and were selected for an in-depth analysis. These cultural elements were ranked (i.e., Table IV) by the percentage of companies and people discussing them per SCRES elements. Table IV is only descriptive and is not at claim or generalization of how important cultural elements are for every SCRES element.

Table III. Illustrative case study quotes and their links with SCRES

Table IV. Distribution % and ranking of interorganizational cultural elements per SCRES element

Some minor contextual patterns were observed during the coding process. For example, upstream actors (e.g., base oil and additive suppliers) more often emphasized visibility challenges, while downstream partners (e.g., warehouses and carriers) focused on velocity and flexibility. Despite these differences in

operational focus, shared cultural goals, understanding, processes, and values were consistently cited across tiers as common resilience-enabling elements. As detailed in Table IV, cultural elements such as shared safety goals, communication, and assumptions were repeatedly associated with multiple SCRES capabilities across tiers. These recurring themes, observed across multiple organizations and supply network tiers, strengthen the credibility of the findings despite the study's qualitative nature, contextual specificity, and exploratory design.

Drawing from critical incident analysis (Flanagan, 1954), supply chain disruption events emanating from the case were scrutinized for connections between specific cultural elements and SCRES elements. Grounded in the data, a total of 22 critical types of supply chain incidents appeared: demand variability, demand visibility, production stoppage, warehouse space shortage, production staff shortage, selection of unsafe materials, supply shortage, supplier staff shortage, lack of training, supply price increases, unpaid suppliers, relationship tension, deception, driver and truck shortage, excessively high delivery performance goals, disrespectful and aggressive drivers, early deliveries, late deliveries, unpaid carriers, drivers not wearing PPE (i.e., Personal Protective Equipment), reckless drivers, and unsafe transportation operations. Nine supply structures surfaced from these critical incidents: six triads with three actors each (3), two tetrads with four actors each (4), one pentad (5), one hexad (6), one heptad (7), one octad (8), one nonad (9), one decad (10), and a 22-actor network representing all 22 organizations interviewed in this study. Bounded by their stories, the structures were always composed of the lead buyer and other suppliers. Throughout this study, networks with more than three actors will be called higher-order supply networks (i.e., Figure 3).

Building diagrams helped model, visualize, and grasp the nature of interorganizational cultural elements embedded in these flows between actors. The nature of the cultural relationship between actors for every cultural element was characterized in these diagrams using balance theory with a (+) for cultural alignment when partners in a dyad shared the same cultural element and a (-) for cultural misalignment when partners in a dyad did not share that cultural element (i.e., Figure 3).

Analyzing the disruptions, cultural alignments/misalignments, and impacted SCRES elements in different supply networks, two cultural mechanisms impacting SCRES surfaced from the data. These mechanisms were proliferative processes describing the movement or reproduction of cultural elements influencing SCRES throughout the supply network. They consisted of (1) cultural propagation and (2) cultural transitivity. Cultural propagation occurred in triads and higher-order supply networks where cultural alignments/misalignments shared in a dyad propagated to other dyads located downstream or upstream.

Cultural transitivity exclusively occurred in triads where cultural alignments/misalignments between actors A and B, as well as actors B and C, replicated/propagated or became transitive between actors A and C. The study used two levels of analysis, composed of a node or arc/dyadic level and a network-level (Kim et al., 2011; Kim et al., 2015), to determine how individual nodes and/or dyads influenced the resiliency of the entire supply network.

Figure 3. Supply network diagrams examining cultural alignments/misalignments in the data

(Diagrams A1 to D)

(Diagrams E to H)

(Diagram I)

4. Findings

All supply networks are built around the orchestrating lead buyer node. Results revealed two mechanisms: cultural propagation and cultural transitivity. Cultural propagation transpired in open networks where actors are more disconnected and spread out, whereas transitivity appeared in closed triads where all actors were interconnected. To clarify how cultural elements and mechanisms came to be, a table was built to connect them with their respective impacted SCRES elements, managerial activities such as joint meetings and communication enabling the mechanisms, network configurations (i.e., structure, number of tiers), diagrams, disruption types, and disruption tier origins (i.e., Table V).

Table V. Cultural mechanisms in supply networks and SCRES

4.1 Backward and forward cultural propagation

Findings are first presented through the triadic lens as the smallest unit of network found in the case. A broader view is then taken with higher-order supply networks.

Modeling the disruption stories with supply networks, a (+) sign is assigned between two actors in a buyer-supplier dyad when both actors are aligned on a cultural element (i.e., (+) in Figure-3 | Diagrams). Cultural alignment propagation occurs when one actor in a dyad is aligned on a cultural element with the other actor and is forced by this actor to align the same element with an external actor who agrees. Repeating with other actors/dyads, this propagation process spreads the cultural element alignment to other dyads and cascades throughout the supply network, positively impacting SCRES. For example, a large steel manufacturer relied on LEAD_BUYER to deliver industrial lubricants punctually to various steel plants. To meet this demand, LEAD_BUYER implemented a business continuity plan with TRANSPORT_4PL, which

sourced carriers like BULK_CARRIER_1 and BULK_CARRIER_2. These carriers had backup measures to ensure on-time deliveries in case trucks/drivers were unavailable. Thus, delivery performance and business continuity goals can align between two actors in a dyad and propagate to others in the supply network.

A (-) sign is assigned between two actors in a buyer-supplier dyad when both actors are misaligned on a cultural element (i.e., (-) in Figure-3|Diagrams). When one actor in a dyad is misaligned on a cultural element with the other actor and is forced by this actor to align the same element with an external actor who disagrees, cultural misalignment propagates. Repeating with other actors, this propagation process spreads the cultural misalignment to other dyads and cascades throughout the supply network, negatively influencing SCRES.

Backward propagation is when the cultural alignment or misalignment propagates from a buyer to a supplier, then from this supplier to one or more of this supplier's suppliers. Forward propagation occurs when the cultural alignment or misalignment propagates from a supplier to a buyer, then from this buyer to one or more of this buyer's buyers. Throughout the case, cultural alignments were noticed to propagate both backward (Figure-3|Diagram-B2) and forward (Figure-3|Diagram-A3), while cultural misalignments were only propagating backward (Figure-3|Diagram-A1).

4.1.1 Cultural propagation in triads and SCRES

Spreading from LEAD_BUYER to TRANSPORT_4PL and then its suppliers/carriers, the propagation of delivery performance and business continuity goals flowed backward. Invited by TRANSPORT_4PL to joint-weekly meetings, carriers helped track deliveries, identify non-performance root causes, and resolve problems. Triadic in nature, these weekly performance meetings improved joint collaborative approaches, developing dedicated driver and backhauling models, and enhancing LEAD_BUYER's customer order fulfillment (Figure-3|Diagram-A2). Safety goals also propagated backward from LEAD_BUYER to upstream suppliers. For instance, LEAD_BUYER selected blenders following specific safety and material specifications, and these blenders selected additive suppliers following the same specifications, which avoided safety-driven supply disruptions (Figure-3|Diagram-A2).

Through joint brainstorming, business continuity goals and shared assumptions propagated backward from LEAD_BUYER to its suppliers, but also forward from suppliers to LEAD_BUYER to allow partners to understand and adapt to each other's contexts. In backward propagation, LEAD_BUYER expressed supply needs to distributors, which cascaded these needs to blenders. These needs were collaboratively

discussed in triadic joint brainstorming sessions to identify material and supplier alternatives, enabling flexibility during supply disruptions (Figure-3|Diagram-A2). In forward propagation, for example, PACKAGER_3 conveyed production line hiccups or chemical shortfalls to BLENDER_1. Learning these shared assumptions from PACKAGER_3, BLENDER_1 shared these issues with LEAD_BUYER to develop rapid and flexible plans sustaining deliveries to LEAD_BUYER's customers (Figure-3|Diagram-A3).

The shared value of communication in triads propagated both backward and forward between LEAD_BUYER and its suppliers, empowering information and mutual understanding to proliferate and support joint decisions. Shared communication allowed partners to find speedy and flexible solutions during supply shortages (Figure-3|Diagrams-A2/A3). For example, LEAD_BUYER communicated extensively with blenders to ensure base oil availability to produce blends. Thus, blenders had to communicate their needs to base oil suppliers. Any supply delays/allocations from base oil suppliers were communicated to blenders, who worked with LEAD_BUYER to find other base oil sources.

Sometimes, LEAD_BUYER had excessively high delivery performance goals with its suppliers. Overwhelmed, some suppliers disagreed with the expectations, as did their suppliers, making the delivery performance goal misalignment propagate backward throughout the supply network (Figure-3|Diagram-A1). For example, LEAD_BUYER expected a delivery performance level from BLENDER_1. However, BLENDER_1 did not meet these delivery standards due to resource constraints. Frustrated, BLENDER_1 then demanded the same performance from PACKAGER_3, who threatened to stop shipping materials, causing potential supply and collaboration disruptions.

4.1.2 Cultural propagation in higher-order supply networks and SCRES

Delivery performance and business continuity goals propagated backward from LEAD_BUYER to suppliers. For example, tetradic joint weekly meetings helped LEAD_BUYER, the transportation 4PL, and carriers to manage delivery performance goals and develop flexible solutions like dedicated drivers and backhauling systems (Figure-3|Diagram-B2). To maintain business continuity, LEAD_BUYER was constantly in touch with its blenders in need of raw material alternatives from distributors. Through brainstorming sessions, blenders and distributors exchanged their technical product knowledge in periods of shortfalls. For instance, in a hexad, DISTRIBUTOR_2 frequently recommended alternative suppliers or materials that BLENDER_4 used in blends for LEAD_BUYER (Figure-3|Diagram-D) to enable flexible sourcing, avoiding supply disruptions. Noticed in a decad, base oil suppliers, blenders, additive suppliers, and distributors

only purchased materials under LEAD_BUYER's safety specifications to ensure collaboration and product quality (Figure-3 | Diagram-H).

Reducing the spread of COVID and potential supply disruptions, safety goals and expectations propagated backward from LEAD_BUYER to upstream suppliers through audits, daily receipt evaluations, product specifications, supplier selection, and production protocols. Requesting to transport hazardous chemicals and people safely, LEAD_BUYER mandated suppliers to use PPE on all suppliers. LEAD_BUYER audited annually and monitored daily how safely products were handled by all tier-1 suppliers. LEAD_BUYER's tier-1 suppliers did the same with their suppliers, disseminating safety rules throughout the supply network to maintain safe and resilient joint operations (Figure-3 | Diagram-I). In a heptad, TRANSPORT_4PL and all carriers only selected drivers wearing PPE and respecting road regulations. Similarly, WAREHOUSING_4PL abided by LEAD_BUYER's expectations and contracted warehouses trained to deal with chemicals (Figure-3 | Diagram-E).

Shared understanding traveled backward and forward through communication between LEAD_BUYER, WAREHOUSE_1, WAREHOUSE_2, WAREHOUSING_4PL, TRANSPORT_4PL, BULK_CARRIER_1, BULK_CARRIER_2, and LTL_CARRIER. Seen in tetrads and pentads, shared assumptions such as warehousing space and resource shortages eased joint brainstorming on agile and flexible solutions, including load rescheduling and transportation mode diversity (Figure-3 | Diagrams-B1/C). COVID brought supply, pricing, demand, and resource challenges. This shared narrative ran through the entire supply network, creating a collaborative survival mode and increasing problem resolution velocity. Staying connected virtually, partners coordinated activities around the clock through the entire supply network (Figure-3 | Diagram-I).

From a shared process perspective, LEAD_BUYER shared forecasts and backlog reports with tier-1 suppliers early in the pandemic to enable visibility and joint workload predictions. Shared forecasts allowed suppliers to schedule production, purchasing, and transportation ahead of time with their suppliers, warehouses, carriers, and LEAD_BUYER. Propagating backward from LEAD_BUYER to upstream suppliers, forecast sharing improved network visibility in a nonad and the entire supply network, enabling distant actors to resiliently synchronize their supply chains with LEAD_BUYER (Figure-3 | Diagrams-G/I).

The shared value of communication enabled information to cascade backward and forward between LEAD_BUYER and all suppliers, enabling rapid responses, supply flexibility, and collaboration. Indeed, to respond to or preemptively alert LEAD_BUYER, most tier-1 suppliers reciprocated the communication with

LEAD_BUYER, but also with their suppliers in the supply network to tackle product unavailability, delays, and allocations (Figure-3|Diagram-I). For example, as observed in an octad, blenders were often low on additive supplies coming from ADDITIVE_2. Constant communication of this shortage from blenders enabled LEAD_BUYER to switch blenders quickly, but also use distributors to help find substitute additive sources for these disrupted blenders (Figure-3|Diagram-F).

In sum, cultural alignments on delivery performance, safety, business continuity, communication, and shared assumptions propagated backward and forward across triads and higher-order networks. This propagation allowed actors to coordinate, brainstorm, and adapt, supporting SCRES through flexible sourcing, joint planning, and workload adjustments. Cultural misalignments, especially around performance expectations, propagated backward and disrupted upstream relationships, reducing collaboration and resilience across the supply network. The direction (i.e., backward, forward) and quality of this propagation (i.e., alignments, misalignments) shaped how resilience emerged or weakened across the network.

4.2 Cultural transitivity

Cultural transitivity manifested when cultural alignments/misalignments between actors A and B, as well as actors B and C, propagated transitively between actors A and C. In this case study, cultural transitivity occurred exclusively in closed triads where LEAD_BUYER and two suppliers were all connected. The results are presented below using balance theory (Choi and Wu, 2009; Hummon and Doreian, 2003). Balanced triadic cultural relationships occurred when all three relationships in a triad were culturally aligned through transitivity of cultural alignments (i.e.,(+,+,+)|Figure-3|Diagram-A4) or when two relationships were misaligned and one relationship was aligned through transitivity of partial cultural misalignments (i.e.,(+,-,-)|Figure-3|Diagram-A6). Unbalanced triadic cultural relationships manifested when all three relationships in a triad were culturally misaligned through transitivity of cultural misalignments (i.e.,(-,-,-)|Figure-3|Diagram-A5).

4.2.1 Transitivity in balanced triadic cultural relationships and SCRES

Transitivity of cultural alignments in balanced triads (i.e.,(+,+,+)|Figure-3|Diagram-A4) influenced SCRES positively. It occurred for the cultural elements of shared goals and shared respect, and empathy. These cultural elements existed between LEAD_BUYER and a tier-1 supplier, but also between the tier-1 and tier-2 suppliers, making both LEAD_BUYER and the tier-2 supplier transitively aligned culturally on goals, respect, and empathy. On-time delivery performance, business continuity, and safety goals were aligned

between LEAD_BUYER and TRANSPORT_4PL (Figure-3|Diagram-A4). LEAD_BUYER had clear on-time expectations with TRANSPORT_4PL, requiring transportation operations continuity and safety in handling materials. Strengthening SCRES, these goals were disseminated by TRANSPORT_4PL to BULK_CARRIER_1, BULK_CARRIER_2, and LTL_CARRIER, deciding to comply, which created transitively a cultural alignment on shared goals with LEAD_BUYER. Respect and empathy humanized relationships, inclining parties to be more receptive and flexible with each other. For example, LEAD_BUYER had a respectful and empathetic relationship with TRANSPORT_4PL, which actively sought flexible bulk tier-2 carriers for LEAD_BUYER. Relationships between TRANSPORT_4PL, BULK_CARRIER_1, and BULK_CARRIER_2 were also respectful and empathetic, and bulk carriers were performant and attentive to LEAD_BUYER's needs by proposing flexible delivery times and leaving trailers on LEAD_BUYER's site to accommodate loading schedules. Making exceptional efforts to retain their relationship with TRANSPORT_4PL, bulk carriers often covered stressful same-day shipments with multiple drivers from base oil suppliers to LEAD_BUYER, subsequently developing a two-way empathetic relationship transitively with LEAD_BUYER (Figure-3|Diagram-A4).

Transitivity of partial cultural misalignments in balanced triads (i.e.,(+,-,-)|Figure-3|Diagram-A6) influenced SCRES negatively. It materialized when the cultural alignments of delivery performance goal, delivery scheduling process, forecast sharing process, respect and empathy, and communication existed between LEAD_BUYER and a tier-1 supplier but not between the tier-1 supplier and a tier-2 supplier, making LEAD_BUYER and the tier-2 supplier culturally misaligned transitively (Figure-3|Diagram-A6). LEAD_BUYER agreed on specific delivery schedules with WAREHOUSE_2. However, PACKAGER_2 frequently shipped too early to WAREHOUSE_2, creating order non-visibility for LEAD_BUYER and WAREHOUSE_2. This created delivery schedule contentions between PACKAGER_2 and WAREHOUSE_2, but also between LEAD_BUYER and PACKAGER_2. Neglecting LEAD_BUYER's shared forecasts, a few tier-2 suppliers created shortages for LEAD_BUYER. For example, BLENDER_2 translated LEAD_BUYER's blend forecasts into drum requirements and continuously shared drum needs with PACKAGER_2. Personnel rotation and lack of training accruing, PACKAGER_2 continuously struggled to incorporate drum forecasts and failed to supply drums to BLENDER_2 on time. Most distributors formulate products with additive suppliers for LEAD_BUYER, and when products are developed, distributors usually manage new product inventories and sell them to LEAD_BUYER. Aligned respectful, empathetic, and communicative relationships existed between LEAD_BUYER and DISTRIBUTOR_2. During the pandemic, ADDITIVE_2 decided not to notify DISTRIBUTOR_2 of a decision to work directly with LEAD_BUYER on new product development. Frustrated with this deceiving behavior, DISTRIBUTOR_2 started to work with other additive

suppliers to develop new products for LEAD_BUYER and convinced LEAD_BUYER not to work with ADDITIVE_2.

Transitivity of partial cultural misalignments also occurred when the cultural alignments of the invoice management process, safety goals, and respect and empathy existed between LEAD_BUYER and a tier-1 supplier but not between LEAD_BUYER and a tier-2 supplier, making transitively both the tier-1 and tier-2 suppliers culturally misaligned (Figure-3|Diagram-A6). For instance, throughout the pandemic, LEAD_BUYER lost resources and encountered issues training personnel to process invoice payments to carriers. Unpaid carriers stopped working for LEAD_BUYER and automatically disengaged from TRANSPORT_4PL. Some of TRANSPORT_4PL's contracted drivers showed up at LEAD_BUYER's doors without PPE, becoming aggressive and disrespectful to LEAD_BUYER's personnel, who followed strict PPE procedures. Discontent with these disrespectful drivers causing transport disruption, LEAD_BUYER decided with TRANSPORT_4PL not to use carriers with misbehaved drivers.

4.2.2 Transitivity in unbalanced triadic cultural relationships and SCRES

Transitivity of cultural misalignments in unbalanced triads (i.e.,(-,-,-)|Figure-3|Diagram-A5) influenced SCRES negatively. It happened when on-time delivery performance goals became excessive and were not shared between LEAD_BUYER and a tier-1 supplier, but also between the tier-1 supplier and a tier-2 supplier, making both LEAD_BUYER and the tier-2 supplier transitively misaligned culturally on delivery performance goals. For example, LEAD_BUYER had on-time delivery performance issues with tier-1 WAREHOUSING_4PL, which contracted a tier-2 3PL warehouse that could not keep up with LEAD_BUYER's excessive expectations. The cultural misalignment in delivery goals between LEAD_BUYER and WAREHOUSING_4PL became similar between WAREHOUSING_4PL and the pressured 3PL warehouse. This created transitively a misalignment between the 3PL warehouse and LEAD_BUYER and engendered a triadic separation between all parties, interrupting shipments to LEAD_BUYER's customers (Figure-3|Diagram-A5).

In sum, cultural transitivity occurred in closed triads where the lead buyer and two suppliers were all connected. Balanced triads included transitivity of cultural alignments and partial cultural misalignments. Transitivity of cultural alignments supported SCRES by reinforcing shared goals, respect, empathy, and business continuity across tiers. These alignments enabled coordination, flexibility, and responsiveness through transport and delivery relationships. Transitivity of partial cultural misalignments disrupted collaboration in two ways. First, misalignments between a tier-1 and a tier-2 supplier on forecast sharing,

delivery scheduling, or empathy reached the lead buyer transitively. Second, misalignments occurred between the lead buyer and a tier 2 supplier despite alignment with the tier 1 supplier, as seen in cases involving invoice processing, safety compliance, and respect. In both cases, cultural misalignments propagated across the triad and disrupted SCRES. Unbalanced triads involved transitivity of cultural misalignments, where all ties were misaligned. These weakened SCRES by reinforcing excessive expectations and disengagement across all three actors. The presence and type of cultural transitivity (i.e., balanced or unbalanced) shaped how SCRES was strengthened or degraded across connected actors in the supply network.

5. Theoretical contributions and discussion

Going beyond a dyadic lens, this case study extends the SCRES literature by applying balance theory to resilient interorganizational cultures in supply networks, focusing on how cultural dynamics unfold across triads and beyond. This study refines balance theory by introducing cultural transitivity to explain how the alignment between two actors can reinforce or undermine the third tie in a triad, ultimately influencing SCRES outcomes. The study also complements balance theory by conceptualizing cultural propagation as the diffusion of alignment beyond triads, a network-level mechanism that shapes resilience across interconnected actors. This offers an exploratory lens that better reflects the complexity of modern supply chains (Choi and Wu, 2009; Hummon and Doreian, 2003; Kim et al., 2011).

Building on this foundation, the study contributes to network theory by showing how cultural alignment travels not only through direct ties but also across tiers via directional and transitive flows. These flows, moving backward and forward through the network, clarify how alignment evolves dynamically over time. Such dynamics influence the formation of shared practices and relational expectations, reinforcing or weakening resilience.

In advancing SCRES theory, the study frames interorganizational culture as a distributed, multi-tier capability that enables the core resilience elements of collaboration, flexibility, visibility, and velocity. It lays the groundwork for conceptualizing resilient interorganizational culture and its potential role in strengthening supply network resilience. These contributions are formalized through empirically grounded propositions that reflect how the cultural dynamics of alignment/misalignments, transitivity, and propagation operate at the network-level. In practical terms, the findings provide actionable insights for supply chain leaders seeking to enhance resilience through strategic cultural alignment beyond the boundaries of the firm.

The findings from this paper reinforce emerging views that position SCRES not merely as a firm-level capability, but as a distributed, digitally supported, and socially embedded capacity across supply networks (Berger et al., 2025; El Baz and Ruel, 2024; Gruchmann et al., 2024; Wang et al., 2025). This supports the shift toward systemic and multi-tier interpretations of resilience, consistent with relational and network-based perspectives on supply chain performance (Mesquita et al., 2008; Wang and Rajagopalan, 2015; Aman and Seuring, 2023).

Supply networks are vulnerable to disruptions propagating backward and forward from a node to neighboring nodes (Świerczek, 2014). This propagation process is called the ripple effect and can be caused, for example, by financial risk or supply and demand variability (Serrano et al., 2018). The study broadens this idea of propagation from disruption propagation to the propagation of cultural alignments, enabling SCRES, and examines cultural transitivity in culturally balanced and unbalanced triads. This shift reframes propagation not just as a vulnerability, but as a relational opportunity through which alignment can cascade and support resilience.

Overall, the case describes what a resilient supply network culture is and explains how it works. Table V summarizes the findings and guides the proposition development offered in this paper.

Surfacing from the case study data, supply network-level managerial activities in Table VI enable the SCRES elements of collaboration, flexibility, visibility, and velocity. In this case study, the supply network was led by the buyer. The buyers' managers accessed "invisible" suppliers in the supply network to achieve network-level cultural alignments through a centralization strategy (Choi et al., 2015). This buyer strategy entailed maintaining direct ties with suppliers to dictate cultural alignments and retain control, but also delegating the cultural alignment propagation process to entrusted tier-1 suppliers working with multi-tier suppliers.

Table VI. Managerial activities enabling SCRES elements

5.1 Cultural propagation in supply networks and SCRES

The cultural propagation mechanism occurs when cultural element alignments/misalignments disseminate throughout the supply network. Cultural alignment propagation affects SCRES positively, and cultural misalignment propagation influences SCRES negatively. Figure 4 visually encapsulates this dynamic.

Figure 4. The impact of cultural alignments/misalignments propagation in SCRES

Shared goals enable mutual understanding between partners (Johnson et al., 2013), facilitate decision-making (Sáenz et al., 2014; Hult et al., 2007; Razak et al., 2024), and create behavioral expectations (Fan and Stevenson, 2018), avoiding conflict (Villena et al., 2011). Spreading from LEAD_BUYER to upstream suppliers, shared goals propagated backward through buyer-led joint meetings, brainstorming, audits, and protocols. Shared on-time delivery and business continuity goals helped track deliveries, non-performance, and unsafe behaviors. Facilitating collaboration and flexibility, these goals enabled the development of solutions such as dedicated drivers, backhauling, product knowledge transfer, and alternative suppliers/materials. Requesting to handle hazardous chemicals and follow material specifications safely, LEAD_BUYER ensured processes and materials followed specifications through methodical supplier selection, audits, and daily operational evaluations. This buyer-led safety behavior triggered suppliers to behave similarly to their suppliers.

Instrumental in supply risk mitigation (Chowdhury et al., 2019), shared business continuity goals propagated backward and forward between LEAD_BUYER and suppliers. LEAD_BUYER discussed business continuity risks regularly with suppliers. This resulted in conversations between tier-1 and tier-2 suppliers looking collaboratively for flexible sourcing. Similarly, tier-2 suppliers often proposed contingency plans to tier-1 suppliers to sustain activities. Tier-1 suppliers communicated these plans to LEAD_BUYER for approval. Shared understanding enables rapid supply risk identification and alleviation (Fan and Stevenson, 2018; Johnson et al., 2013). Shared understanding flowed from downstream to upstream actors and vice versa, creating a collaborative survival mode. Organizational cultures supporting communication enhance value creation, strategic alliances, risk mitigation (Rajaguru and Matanda, 2019; Ali et al., 2023), and collaboration outcomes (Prasanna and Haavisto, 2018). Throughout the case study, shared communication empowered information to circulate quickly between LEAD_BUYER and suppliers, improving problem-solving, rapid responses, flexibility, and collaboration.

These combined cultural elements strengthened SCRES. Overall, this proposition is put forward:

P1. Shared goals, expectations, understanding, and values propagate back and forth in a supply network between the lead buyer, tier-1, and tier-2 suppliers, enabling collaboration, flexibility, visibility, and velocity during supply chain disruptions.

In addition to these broader cultural elements, shared processes such as forecast communication and backlog reporting also played a key role in enhancing SCRES across multiple tiers. Shared processes are key for collaboration (Daghar et al., 2023). Throughout the pandemic, LEAD_BUYER shared forecasts and backlog reports with suppliers, enabling them to schedule production and purchasing in advance with their suppliers, a practice supported by digital tools and secure information-sharing mechanisms (Rodríguez-González et al., 2023; Wong et al., 2023). Propagating from LEAD_BUYER to upstream suppliers, forecast sharing improved visibility, enabling multi-tier actors to synchronize their supply chains.

Thus, this proposition emerges:

P2. Shared processes propagate backward in a supply network. The lead buyer shares processes with tier-1 suppliers. These processes are passed on from tier-1 to tier-2 suppliers, then from tier-2 to tier-3 suppliers, and finally from tier-3 to tier-4 suppliers, enabling collaboration and visibility during supply chain disruptions.

Shared goals clarify responsibility and reduce disagreements, while misaligned goals can create conflict (Villena et al., 2011). The only misaligned cultural element that propagated backward was the delivery performance goal. Tier-1 suppliers sometimes disagreed with LEAD_BUYER's high delivery performance expectations. To abide by these excessive expectations, these tier-1 suppliers often tried to pressure their tier-2 suppliers, who became overwhelmed, making the misalignment propagate backward throughout the supply network, and sometimes causing supply network fractures.

Therefore, the following proposition surfaced:

P3. Misaligned and excessive expectations from the lead buyer towards tier-1 suppliers can propagate and be imposed by tier-1 on tier-2 suppliers. This can cause tier-2 suppliers to refrain from collaborating with culturally misaligned tier-1 suppliers and the lead buyer. Tier-1 suppliers can also decide to refrain from collaborating with the culturally misaligned lead buyer, causing supply network collaboration disintegration during supply chain disruptions.

5.2 Cultural transitivity in supply networks and SCRES

The cultural transitivity mechanism happens when cultural alignments/misalignments between actors A and B, as well as actors B and C, propagate transitively between actors A and C. Cultural alignment transitivity affects SCRES positively, while cultural misalignment transitivity impacts SCRES negatively. Figure 5 visually illustrates this dynamic.

Figure 5. The impact of cultural alignments/misalignments transitivity in SCRES

In balance theory, a triad is balanced when firms A and B are transitively allies because they both have a positive relationship with firm C (i.e.,+,+,+) or a negative relationship with firm C (i.e.,+,-,-). Balance theory also defines unbalanced triadic relationships when triads have two positive relationships and one negative (i.e.,+,+,-), and when triads have three negative relationships (i.e.,-, -, -) (Choi and Wu, 2009).

Culturally balanced triads with positive cultural relationships (i.e.,+,+,+) formed in the case. LEAD_BUYER shared goals with tier-1 suppliers, who communicated expectations to tier-2 suppliers. Tier-2 suppliers fulfilling expectations aligned transitively and culturally on shared goals with LEAD_BUYER, promoting supply network collaboration, flexibility, and contingency planning needed to prevent disruptions. Buyer empathy can increase supplier performance (Altay et al., 2018; Daghar et al., 2023). LEAD_BUYER and tier-1 suppliers developed respectful and empathetic values. These tier-1 suppliers used respect and empathy to seek flexible solutions from tier-2 suppliers. LEAD_BUYER recognized tier-2 suppliers' willingness to adjust to expectations by proposing flexible deliveries or supply. This developed respectful and empathetic transitive values between LEAD_BUYER and these tier-2 suppliers.

Hence, the following proposition is derived:

P4. The lead buyer sharing goals, expectations, and values with tier-1 suppliers can influence these suppliers to propagate these cultural elements to their tier-2 suppliers, generating the same shared cultural elements between the lead buyer and tier-2 suppliers and overall collaborative, flexible, and culturally balanced triads during supply chain disruptions.

Culturally balanced triads also surfaced when two firms had a positive cultural relationship in the triad (i.e.,+,+,-). Cultural alignments of delivery performance goals, delivery scheduling, and forecast sharing processes, respect, empathy, and communication existed between LEAD_BUYER and a tier-1 supplier, but sometimes not between this tier-1 supplier and a tier-2 supplier. This transitively made LEAD_BUYER culturally misaligned with the tier-2 supplier, affecting SCRES negatively. Sometimes, tier-2 suppliers can become competitors of tier-1 suppliers by directly working with the buyer (Rossetti and Choi, 2005). Aligned, respectful, empathetic, and communicative values existed between LEAD_BUYER and tier-1 suppliers. However, during the pandemic, a few tier-2 suppliers decided deceptively to cut tier-1 suppliers and work with the LEAD_BUYER directly. Culturally aligned on values, LEAD_BUYER and the tier-1 suppliers decided to avoid working with these opportunistic tier-2 suppliers. This reflects prior research showing

that value alignment strengthens trust and strategic alignment in interorganizational relationships (Cartwright and Cooper, 1993; Kumar et al., 2018).

Subsequently, this proposition is formed:

P5. When misaligned goals, expectations, processes, and values exist between tier-1 and tier-2 suppliers, and the lead buyer is culturally aligned with tier-1 suppliers, these misalignments can propagate from tier-2 suppliers to the lead buyer. This can lead the culturally aligned lead buyer and tier-1 suppliers to refrain from collaborating with the culturally misaligned tier-2 suppliers, thereby negatively impacting collaboration, flexibility, visibility, and velocity in triads during supply chain disruptions.

Cultural alignments of invoice management processes, safety goals, and respect and empathy existed between LEAD_BUYER and a tier-1 supplier, but sometimes not between LEAD_BUYER and a tier-2 supplier. This transitively made the tier-1 and tier-2 suppliers culturally misaligned, influencing SCRES negatively. In this scenario (i.e.,+,-,-), triads became culturally balanced when LEAD_BUYER and the culturally aligned tier-1 supplier refrained from working with the culturally misaligned tier-2 supplier.

Accordingly, the following proposition is considered:

P6. When misaligned goals, expectations, processes, and values exist between the lead buyer and tier-2 suppliers, and tier-1 suppliers are culturally aligned with the lead buyer, these misalignments can propagate from tier-2 to tier-1 suppliers. This can lead the culturally aligned lead buyer and tier-1 suppliers to refrain from collaborating with the culturally misaligned tier-2 suppliers, creating culturally misaligned triads and dysfunctional collaboration during supply chain disruptions.

Triads became culturally unbalanced when all actors became culturally misaligned (i.e.,-,-,-). In the case, this occurred when excessive delivery performance expectations were not shared between LEAD_BUYER and a tier-1 supplier, nor between the same tier-1 supplier and a tier-2 supplier. These misalignments compounded transitively, leading the tier-1 supplier to become culturally misaligned with LEAD_BUYER. This created a complete cultural fracture within the triad and suggests that fully unbalanced triads reinforce cultural separation and inhibit resilience during supply chain disruptions.

This leads to the following proposition:

P7. When excessive expectations are not shared between the lead buyer and tier-1 suppliers, and between tier-1 and tier-2 suppliers, these compounded misalignments can lead tier-1 suppliers to become culturally misaligned with the lead buyer through transitive misalignment. This can result in fully unbalanced and culturally misaligned triads, reinforcing cultural separation and negatively affecting collaboration during supply chain disruptions.

5.3 Definition of resilient interorganizational culture

Prior research has emphasized that culturally aligned interorganizational relationships enhance performance and collaborative synergies (Cao et al., 2015), while cultural compatibility in philosophies, values, and norms reduces friction and fosters integration across partners (Rajaguru and Matanda, 2019). Using the propositions developed above, the insights from Table V, and the case data observed, this study proposes the following exploratory definition of the resilient interorganizational culture phenomenon observed in this study:

Resilient interorganizational culture is a supply network-wide cultural phenomenon, defined by shared goals, expectations, understanding, processes, and values that may strengthen a supply network's ability to foster the key SCRES capabilities of collaboration, flexibility, visibility, and velocity. Unlike firm-level organizational culture, resilient interorganizational culture emerges through the alignment, propagation, and transitivity of these cultural elements across supply network actors, reinforcing SCRES.

By defining resilient interorganizational culture as a multi-tier phenomenon, this research highlights how cultural propagation and transitivity help strengthen SCRES beyond dyadic exchanges. This study contributes to SCRES research by suggesting that resilience is shaped not only by structural and relational factors, but also by the way cultural elements move and take hold across a supply network.

6. Managerial implications, future research, and limitations

6.1 Managerial implications

This study invites practitioners to recognize the importance of interorganizational cultural alignments/misalignments, learn what and how interorganizational cultural elements impact SCRES through propagation and transitivity, and use this new lens to assess and adjust their cultural match with partners in their supply networks. Figure 6 summarizes how cultural elements and their mechanisms

influence SCRES in supply networks, and Table VII synthesizes the propositions elaborated in the discussion section to help practitioners visualize the cultural dynamic in SCRES.

Figure 6. The influence of cultural elements and their mechanisms on SCRES in supply networks

Table VII. Effect of cultural mechanisms, states, and elements on SCRES elements

Overall, cultural alignment propagation and transitivity influence SCRES positively, while cultural misalignment propagation and transitivity impact SCRES negatively. For example, LEAD_BUYER shared on-time delivery goals with TRANSPORT_4PL in bi-weekly meetings. TRANSPORT_4PL aligned with LEAD_BUYER and disseminated this goal to tier-2 carriers who performed (i.e., LTL_CARRIER, BULK_CARRIER_1, BULK_CARRIER_2). This created an on-time delivery alignment between LEAD_BUYER and tier-2 carriers transitively. Conversely, when TRANSPORT_4PL considered LEAD_BUYER's on-time delivery goal unrealistic, this misalignment spread to the carriers, who were unwilling to comply. This created an on-time delivery misalignment between LEAD_BUYER and tier-2 carriers transitively.

Understanding the essential role of interorganizational culture in SCRES can help decision-makers make more informed choices regarding network risk assessments, joint practices, partner selection, relationship arrangements, supplier evaluation, contracts, sourcing practices, processes, and network configurations. Indeed, supply chain practitioners are urged to consider balanced and unbalanced cultural states in their relationships as they can impact the resilience of their supply networks. While disconnection from culturally misaligned suppliers may be considered in extreme or persistent cases, this study primarily aims to offer a nuanced framework that supports early identification of misalignments and encourages engagement, dialogue, and collaborative practices to strengthen cultural fit. Illustrating the profound implications of cultural relationships, this work develops the ideas of cultural propagation and transitivity and highlights the cultural aspects that professionals can consider for SCRES. This research encourages practitioners to expand their perspective from a traditional buyer-supplier dyadic view to a multi-tier supply network approach, emphasizing the need to evaluate cultural dynamics in supply network resilience.

6.2 Future research agenda

Firstly, interorganizational cultures and their impacts on SCRES may vary depending on factors such as industry, geography, company size, types of disruptions, and supply network configurations. Thus, future research could explore multi-network studies within or across industries to examine nuances related to networks, industries, and geographies, including variations in geographical dispersion or concentration.

Using supply networks as the unit of analysis, this work could enable supply network resiliency comparisons across different industries and regions. Moreover, the role of the network lead in culture and SCRES presents a compelling avenue for research. Network leads may act as cultural moderators, adopt a controlled approach, or favor a more delegative approach, each of which could influence the theoretical propositions examined in this paper. Different regulatory frameworks, cultural norms, and market dynamics highlight the importance of exploring the potential trade-offs and challenges associated with achieving cultural alignments in diverse, global, or fragmented supply networks. Furthermore, this study targets buyer-led networks, but supplier-led networks are also worth probing. Building on this, future studies could investigate how interorganizational culture and SCRES mechanisms differ between domestic and foreign supplier contexts, particularly in light of cross-border regulatory divergence and cultural distance. These insights would also help assess the broader generalizability of resilient interorganizational culture across varied industries and geographies. As resilient supply chains also underpin societal well-being, future research could explore how cultural resilience supports stability in essential sectors such as healthcare, food, and energy.

Secondly, the connections between interorganizational cultural elements could be explored through large-scale survey data. Shared goals, understanding, processes, and values might trigger, mediate, and/or moderate each other to enable SCRES. Largely focusing on cultural elements, this study might downplay the interaction between culture and other factors such as technological capabilities, financial resources, and regulatory environments. Thus, a quantitative validation (e.g., surveys) could provide a more robust argument for relationships observed in this case study and test potential connections between interorganizational cultural elements from within while controlling for other factors. Also, misaligned cultural elements emerged as potential risks to examine because they can destabilize SCRES. Additionally, understanding what triggers a supply network to transition from culturally aligned to misaligned or vice versa and why is essential to understanding SCRES levers and disruptors.

Thirdly, investigating how the embeddedness of cultural elements in social capital can influence SCRES is appealing. Indeed, cultural elements are part of cognitive capital (i.e., shared codes, language, narratives) (Daghar et al., 2021) and can influence structural (i.e., shared routinized processes, network configuration structure) and relational capitals (i.e., closeness, reciprocity, trust) needed in SCRES (Daghar et al., 2023; Johnson et al., 2013). Similarly, examining how cultural elements connect with relational governance could help clarify the relational role of culture in SCRES. According to relational exchange theory, relational

governance consists of trust and relational norms linked conceptually to culture such as flexibility, reliance, solidarity, social bonds, reciprocity, values, culture, and goals (Zhou et al., 2023).

Fourthly, aside from the SCRES lens used in this work, other SCRES lenses are worth exploring, including the framework of SCRES temporal capabilities to prepare, respond, recover, and learn (Ali et al., 2017; Christopher and Peck, 2004; Daghar et al., 2023) and the framework of transformability or anti-fragility, based on embracing and learning from disorder to achieve growth (Nikookar et al., 2021; Wieland and Durach, 2021). Other SCRES frameworks, such as the dynamic capability perspective could deepen the exploration of balance theory in SCRES. The dynamic capability lens investigates the SCRES capabilities to sense opportunities and threats, seize a timely plan to leverage opportunities or respond to threats, and reconfigure resources after a change (Teece et al., 2007). For example, complementing the SCRES element lens used in this paper, Nikookar and Yandori (2022) propose a SCRES dynamic capability framework that considers supply chain visibility as a sensing capability, supply chain responsiveness as a seizing capability, and supply chain flexibility as a reconfiguration capability. Understanding how culturally balanced and unbalanced supply networks are formed for each SCRES dynamic capability is essential.

6.3 Research Limitations

This study advances the conceptualization of resilient interorganizational culture as a supply network-wide phenomenon; however, it is not without limitations. The empirical evidence stems from a single case study within the US chemical sector during the COVID-19 disruption. While the crisis context offered a valuable opportunity to observe SCRES dynamics, the specificity of the industry and geographical setting limits the generalizability of the findings. The study does not claim to present a universal theory but instead offers a context-bound, exploratory conceptualization of resilient interorganizational culture. Although the case involved 83 interviews across 22 organizations, variation exists in the roles, visibility, and decision-making scope of the respondents. For instance, while the lead buyer and tier-1 suppliers held cross-tier visibility, other actors, such as the warehousing 4PL or freight forwarder, focused more on localized operational activities and lacked a broader strategic perspective across tiers. Nonetheless, as discussed in Section 3.3 in Table IV, all cultural and SCRES elements were consistently cited across tiers. This provides limited but reinforcing confidence in the findings, despite the study's qualitative and context-specific design. Additionally, the study relied on qualitative methods and critical incident analysis, which, despite the use of triangulation and collaborative coding, may introduce interpretive subjectivity. Finally, while the study moves beyond the dyadic view and introduces the mechanisms of cultural propagation and transitivity, the conceptualization of resilient interorganizational culture remains exploratory. Further multi-case,

cross-industry, and quantitative research would be required to clarify what these mechanisms entail, determine when and where they apply, and assess their generalizability across different types of supply networks.

Data availability statement: Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data are not available.

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FIGURES

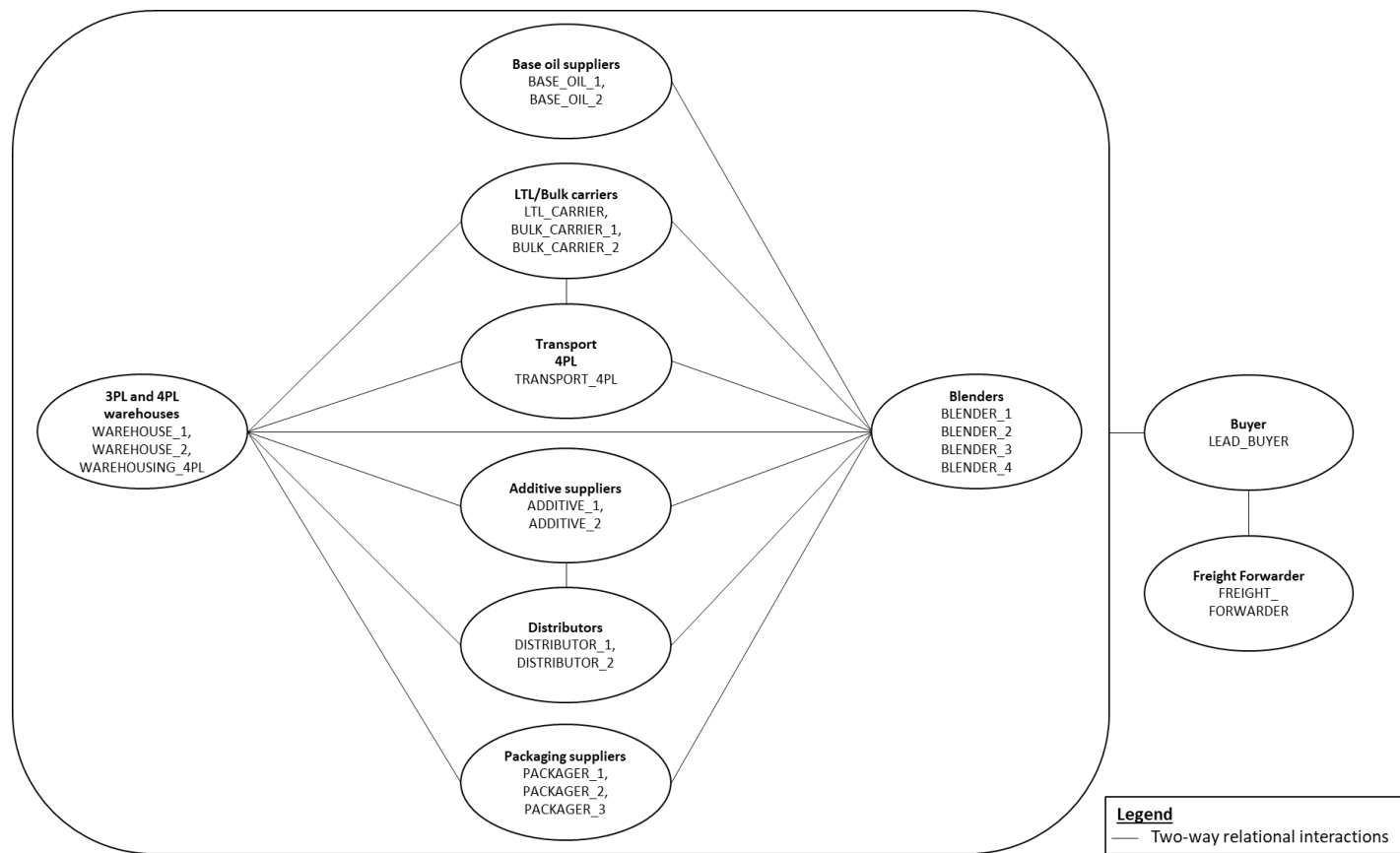


Figure 1. Examination of LEAD_BUYER's supply network

FIRST-ORDER CONCEPTS	SECOND-ORDER THEMES/ELEMENTS	AGGREGATE ELEMENTS
<ul style="list-style-type: none"> Suppliers need to deliver results on-time as initially agreed upon with their customers On-time delivery expectations from customers are rippling back to the lead buyer and its suppliers The goal of any actor is to deliver high-quality products on-time to avoid supply chain disruption Failure to keep the business operating affects negatively customers If work stops, there will be supply chain resource inefficiencies, downtime and costs associated Operational non-performance prevents collaboration, profit and survival Safety is crucial to avoid fatalities All operations are supervised using safety protocols and procedures Suppliers are selected based on how safe they run 	<ul style="list-style-type: none"> Shared on-time delivery performance goals Shared business continuity goals Shared safety goals 	Shared goals and expectations
<ul style="list-style-type: none"> Understanding partners logistical capability helps coordinate deliveries with carriers Misunderstandings between partners (e.g., delivery time, PPE needs,) create conflict and waste time Partners prioritize high revenue generating customers Suppliers want to increase their business volumes with customers The lack of supply, increased demand, resource shortages and inflation created a shared narrative Shared COVID-driven contexts and problems helped resolving situations collaboratively Lack of resources due to the pandemic delayed operations. This was understood by most people 	<ul style="list-style-type: none"> Shared assumptions Shared narratives 	Shared understanding
<ul style="list-style-type: none"> Customers became alert about their backlog growing, and scheduled more meetings to follow up and prioritize shipments Scheduling deliveries became critical, with the lack of logistics and production resources across the supply chain network Managing suppliers and their performance is necessary to identify weaknesses in the supply network and coordinate deliveries The focus of the buyer was on customers sharing their forecasts to increase demand predictability Partners shared forecasts to manage supply allocation and prioritize backlogs Forecasts were shared between the lead buyer and suppliers to anticipate supply needs Customers not paying invoices were on the red list. Deliveries to these customers stopped Suppliers scheduled frequent meetings with customers to discuss unpaid invoices A few small to medim size unpaid suppliers suffered financially and were on the brink of collapsing 	<ul style="list-style-type: none"> Shared delivery scheduling process Shared forecasts process Shared invoice management process 	Shared processes
<ul style="list-style-type: none"> Communication is the number one tool to resolve any problem A few communicative actors are key at determining substitutable materials, and finding alternatives Working from home made emails, phone calls and virtual meetings essential to communicate There is a need for absolute transparency and honestly to help understand and fix problems Adaptability to customers' requests and suppliers' contexts sustained collaborative relationships Sometimes mistakes are made and being apologetic can alleviate the situation No one wants to work with aggressive drivers or customers with an attitude Suppliers who are responsive and supportive are easy to work with and take precedence over others Commitments are taken very seriously, and are a sign of professionalism Creative suppliers accommodating customers, for example by stationing trucks overnight at the customer site are very helpful Lots of questions are asked, out of curiosity. Answers to these questions help resolve problems Suppliers lying or overpromising are pushed to the side. Integrity is essential for business Partners who understand each other's pain tend to be patient and help each other more Compatibility of personalities between partners can make or break relationships Respectful, trustworthy, and professional relationships improve collaboration Friendly partners with a team spirit help reach solutions quicker 	<ul style="list-style-type: none"> Shared communication Shared respect and empathy 	Shared values

Figure 2. Interorganizational cultural elements emerging from the Gioia method



Diagram A1



Diagram A2



Diagram A3

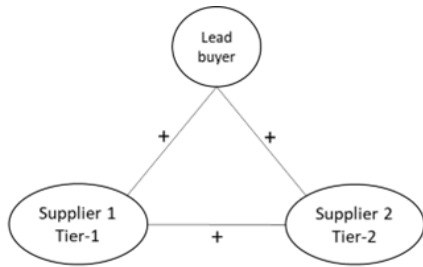


Diagram A4

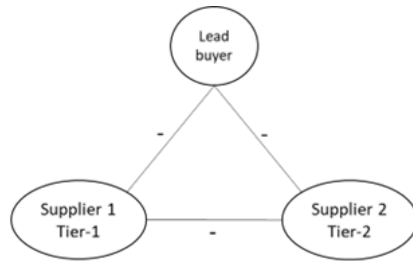


Diagram A5

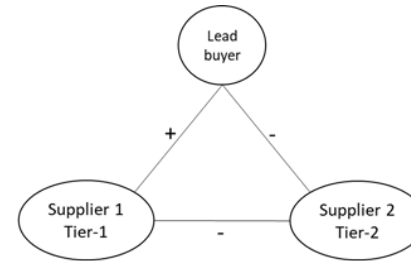


Diagram A6

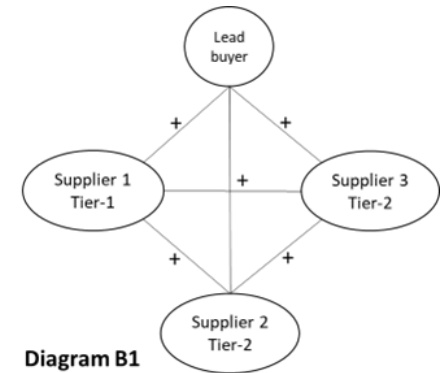


Diagram B1

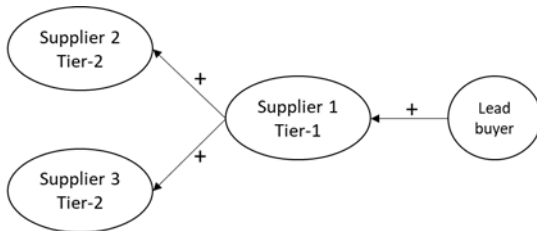


Diagram B2

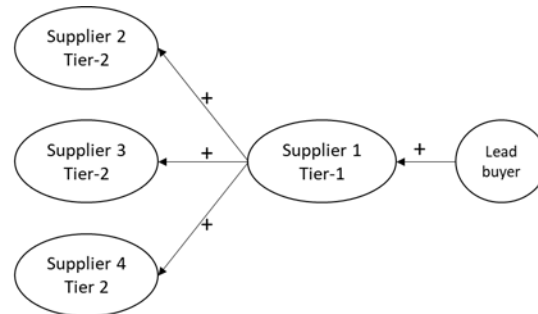


Diagram C

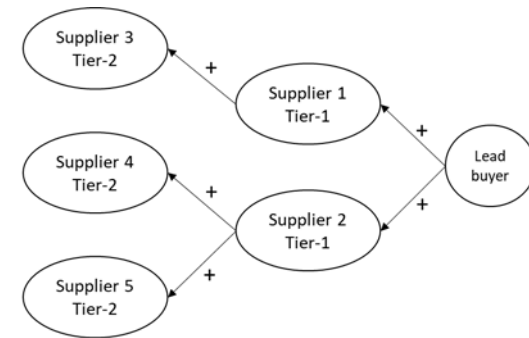


Diagram D

Figure 3. Supply network diagrams examining cultural alignments/misalignments in the data (Diagrams A1 to D)

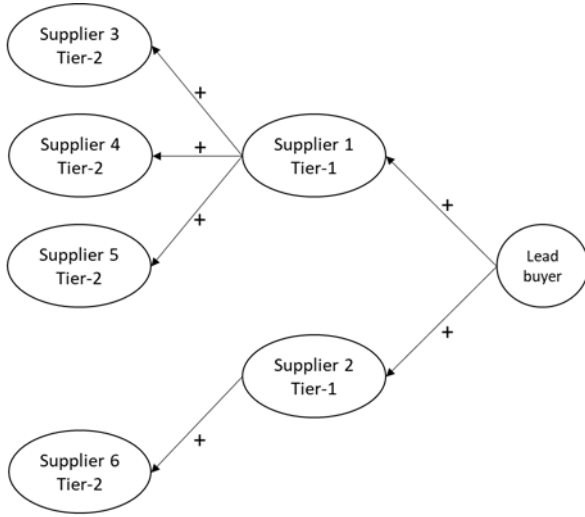


Diagram E

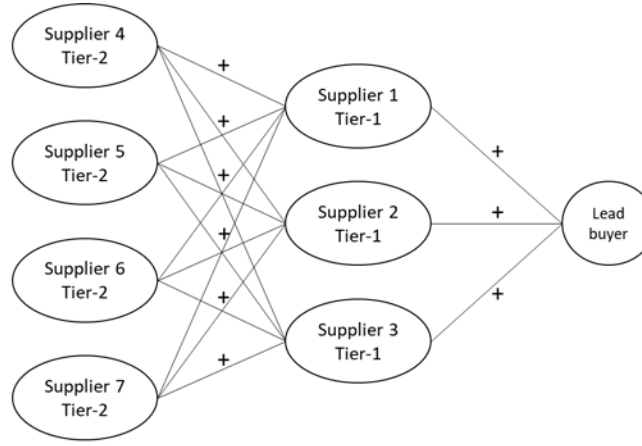


Diagram F

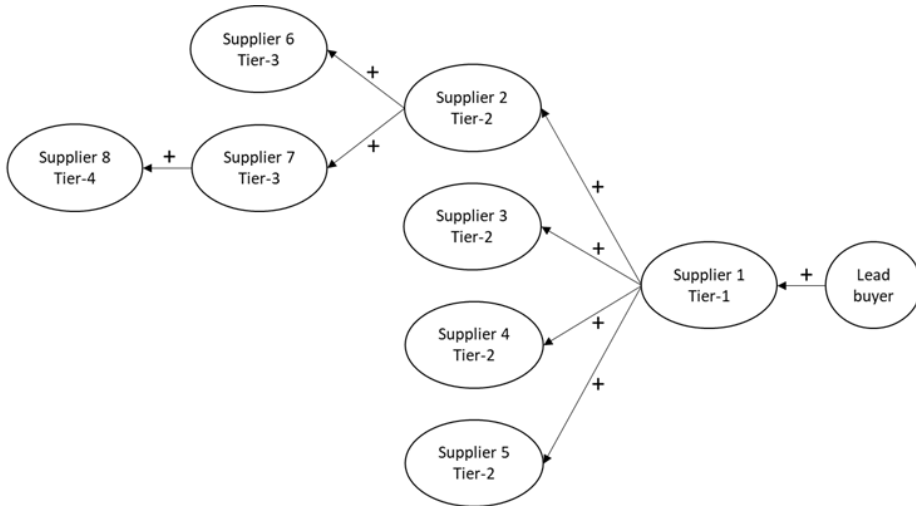


Diagram G

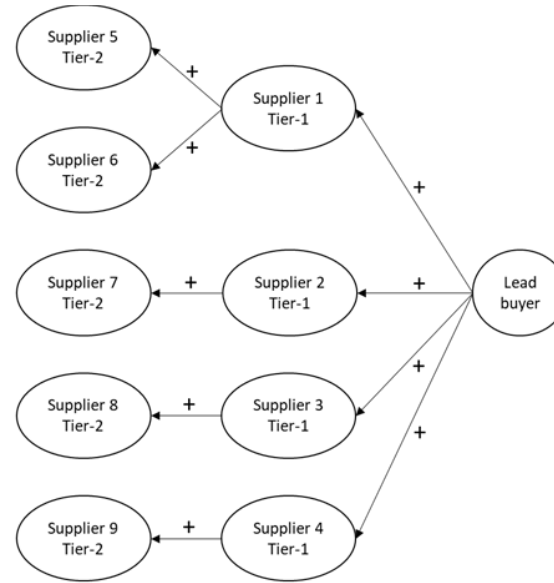


Diagram H

Figure 3. Supply network diagrams examining cultural alignments/misalignments in the data (Diagrams E to H)

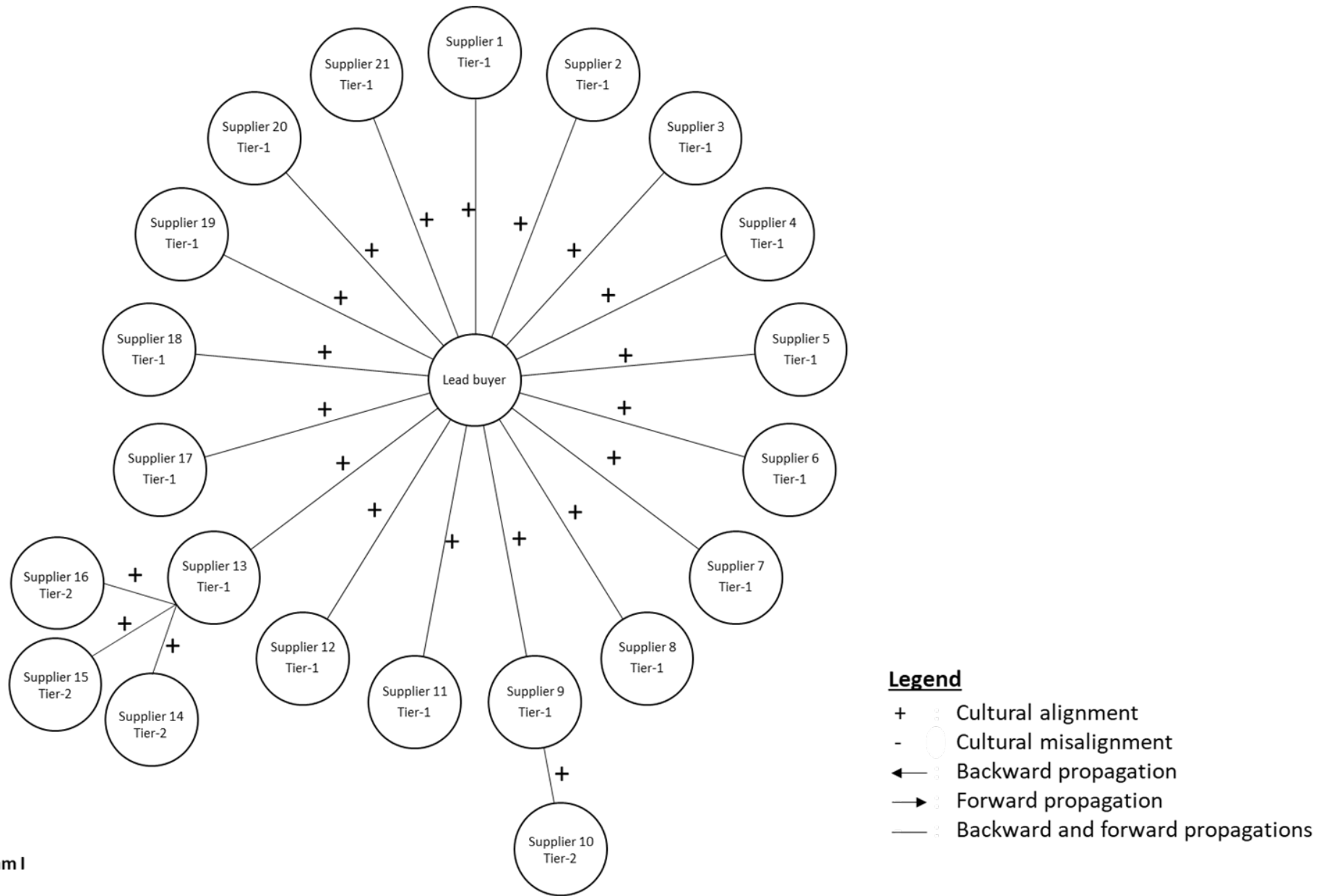


Figure 3. Supply network diagrams examining cultural alignments/misalignments in the data (Diagram I)

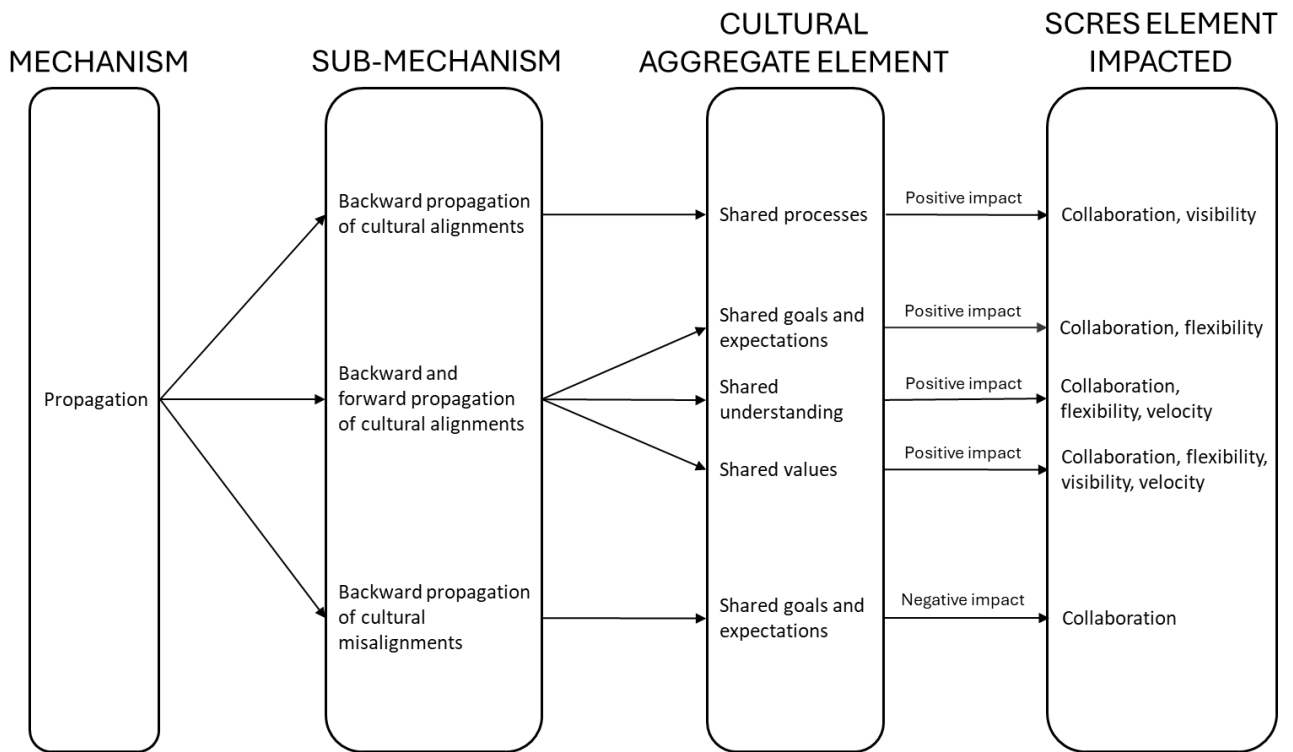


Figure 4. The impact of cultural alignments/misalignments propagation in SCRES

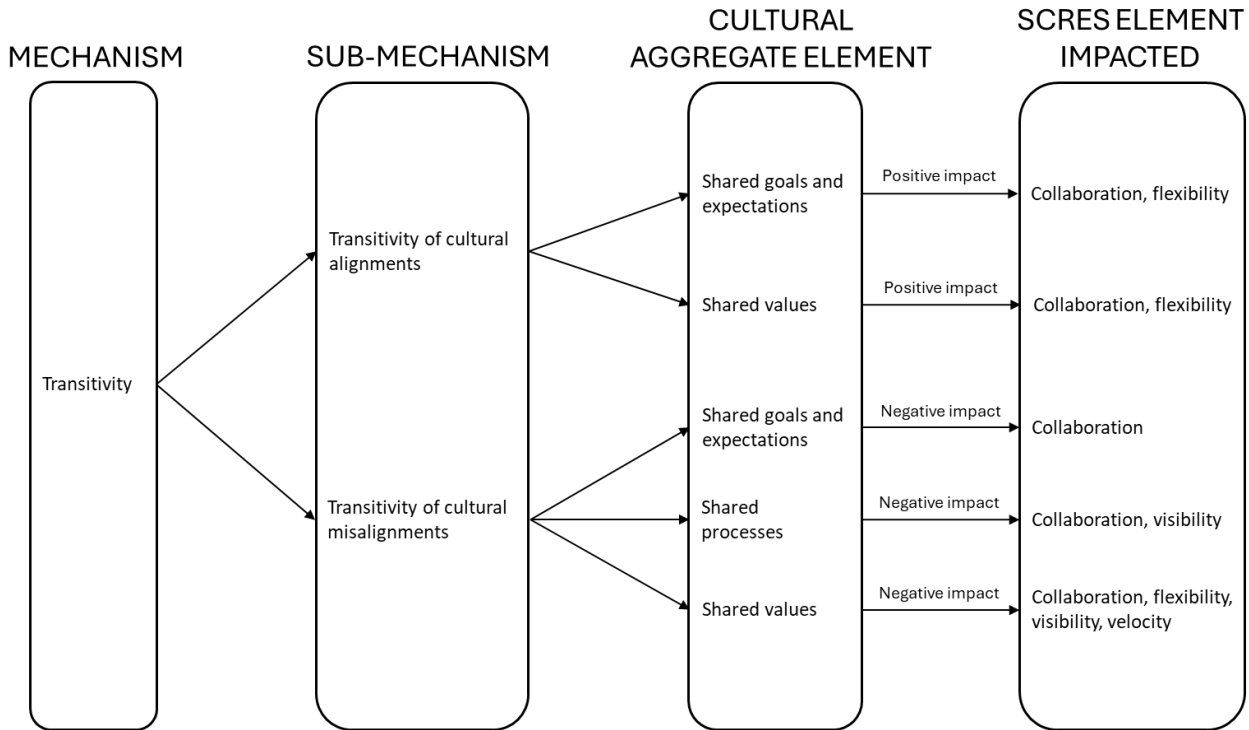


Figure 5. The impact of cultural alignments/misalignments transitivity in SCRES

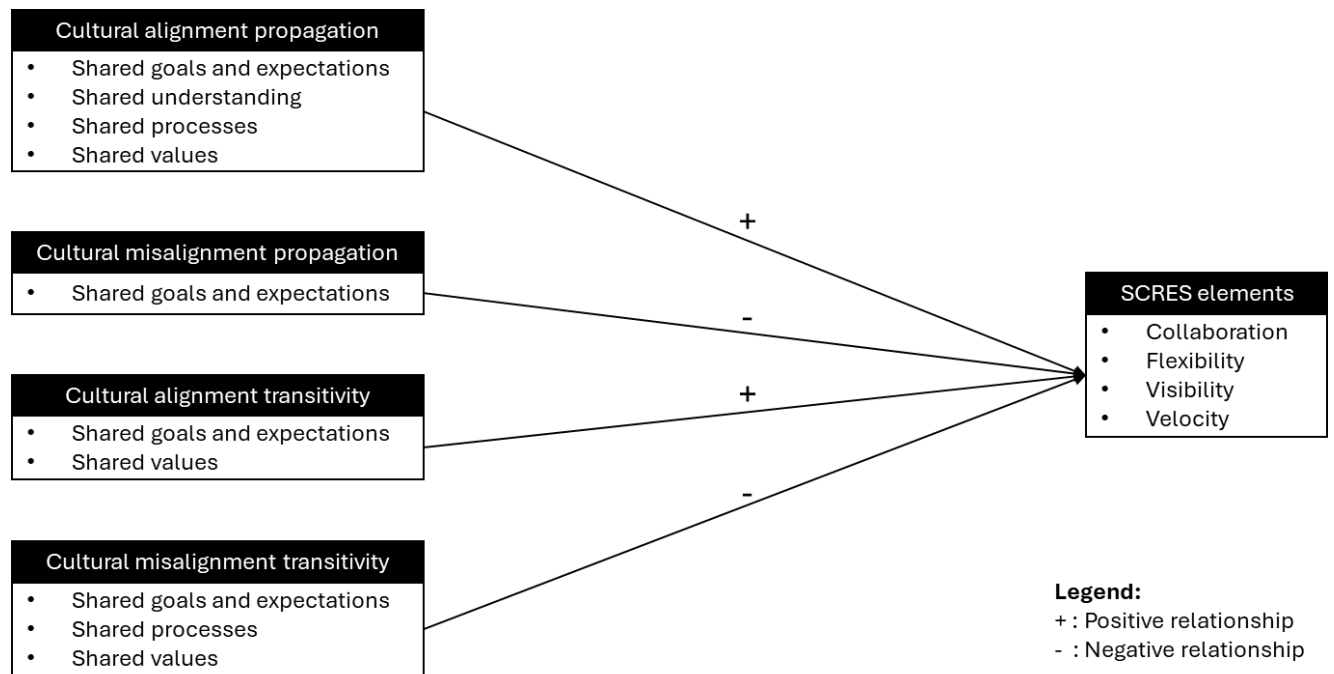


Figure 6. The influence of cultural elements and their mechanisms on SCRES in supply networks

TABLES

Interviewee number	Gender	Age	Title	Company years of experience	Interview time in minutes	Anonymous company name	Core business
1	Male	44	Purchasing Manager	5	40	LEAD_BUYER	Buyer
2	Female	38	Distribution and Logistics Supervisor	3	55		
3	Male	41	Transportation and Logistics Analyst	7	40		
4	Female	43	Buyer	4	41		
5	Male	45	Transportation and Logistics Analyst	6	54		
6	Male	63	Warehouse Manager	43	43		
7	Male	42	Customer Service and Distribution Manager	5	51		
8	Male	60	Supply Chain Manager	31	67		
9	Male	49	Buyer	2	46		
10	Female	41	Production Planner	3	42		
11	Male	59	Warehouse and Transportation manager	37	41		
12	Male	46	Production Manager	4	41		
13	Male	74	Senior Business Consultant	3	77		
14	Male	61	Technical Director	9	45		
15	Male	31	Planner	4	41		
16	Male	52	Sourcing Project Director	11	50		
17	Female	32	Buyer	2	47		
18	Male	38	Maintenance Manager	15	40		
19	Female	44	Buyer	2	41		
20	Male	61	Health, Safety, Environment, and Quality Manager	43	42		
21	Female	26	Account Manager	4	43	BASE_OIL_1	Base oil supplier
22	Male	54	Senior Sales Executive	20	43		
23	Male	44	Senior Supply Chain Analyst	5	44		
24	Male	55	Account Manager	15	40	BASE_OIL_2	
25	Female	38	Director of Supply Chain Planning	3	39		
26	Male	44	Director of Customer Accounts	4	34		
27	Male	54	General Manager	31	39	ADDITIVE_1	Additive supplier
28	Male	61	Vice President of Sales	11	39		
29	Female	62	Sourcing and Procurement Manager	12	46		
30	Male	51	Director of Sales	15	40	ADDITIVE_2	
31	Female	59	Transportation Manager	36	36		
32	Male	46	Transportation, Logistics, and Packaging Category Manager	10	36		
33	Female	38	Business Development Manager	3	43	BLENDER_1	Blender
34	Female	59	Purchasing Manager	27	42		
35	Male	44	President	17	43		
36	Male	58	Vice President of Manufacturing and Supply	17	44	BLENDER_2	
37	Male	64	Chief Operating Officer and General Manager	39	46		
38	Female	58	Director of Customer Relations	30	40		
39	Male	62	Vice President of Sales	34	42	BLENDER_3	
40	Male	54	Senior Operations Manager	22	35		
41	Male	45	Senior Customer Service Manager	11	42		
42	Male	44	Director of Business Account	17	40	BLENDER_4	
43	Male	42	Production Manager	9	41		
44	Female	44	Purchasing and Procurement Manager	8	52		

Interviewee number	Gender	Age	Title	Company years of experience	Interview time in minutes	Anonymous company name	Core business
45	Female	44	Senior Sales Account Manager	4	52	DISTRIBUTOR_1	Distributor
46	Male	52	Vice President of Supplier Development	24	68		
47	Male	44	Director of Supplier Relationships	6	45		
48	Female	44	Vice President of Corporate Accounts East	22	50	DISTRIBUTOR_2	
49	Male	56	Vice President of Corporate Accounts West	25	42		
50	Male	55	Senior President of Commercial Operations and Supply	20	43		
51	Male	46	President	20	53	PACKAGER_1	Packaging supplier
52	Male	70	Director of Sales	6	57		
53	Female	45	Procurement Manager	20	44	PACKAGER_2	
54	Male	58	Account Manager	31	48		
55	Female	48	Procurement Manager	18	39		
56	Male	62	Corporate Logistics Manager East Region	36	34		
57	Male	40	Production Manager	7	54	PACKAGER_3	
58	Male	36	Supply Chain Manager	6	44		
59	Female	42	Sales Manager	17	41		
60	Female	41	National Account Manager	3	73	FREIGHT_FORWARDER	Freight Forwarder
61	Male	43	Sales Manager	2	42		
62	Male	58	Vice President of Sales and Customer Accounts	4	62		
63	Male	56	Director of Accounts	29	64	TRANSPORT_4PL	Transportation 4PL
64	Female	47	Purchasing and Support Services Director	22	42		
65	Male	43	Director of Business Development	12	52		
66	Male	57	Senior Vice President of Strategic Planning	27	34	LTL_CARRIER	LTL carrier
67	Male	62	Senior Vice Presdient of Sales	31	38		
68	Male	62	Vice President of Maintenance	33	48		
69	Male	63	Chief Operating Officer and General Manager	38	46	BULK_CARRIER_1	Bulk carrier
70	Male	32	Senior Dispatch Analyst	8	36		
71	Female	58	General Manager	38	41		
72	Male	38	Business Development Manager	16	49	BULK_CARRIER_2	
73	Male	50	Chief Operating Officer and President	30	84		
74	Male	66	Chief Financial Officer	42	43		
75	Female	35	Director of Customer Success	3	54	WAREHOUSING_4PL	Warehousing 4PL
76	Female	44	Head of Supply Chain Experience	3	36		
77	Female	38	Procurement Manager	3	42		
78	Male	46	Warehouse Manager	7	56	WAREHOUSE_1	Warehouse
79	Male	46	Vice President of Marketing and Strategy/General Manager	12	38		
80	Male	54	Vice President of Business Development	6	43		
81	Male	62	General Manager	27	41	WAREHOUSE_2	
82	Male	46	Warehouse Manager	4	43		
83	Female	62	Sales Manager	8	36		

Table I. Respondent profiles

Interview Question	Theme	Goal
Q1. How has the pandemic affected the continuity of your operations with your suppliers and customers?	Supply chain disruption impact	Examining operational continuity challenges
Q2. What actions, jointly with your suppliers and customers, did you take to respond to your affected operations?	Collaborative response strategies	Identifying joint actions taken with suppliers/customers
Q3. What cultural alignments with your suppliers and customers did facilitate your ability to cope with the disruption before and during the pandemic?	Cultural alignment as an enabler of SCRES	Determining positive effects of cultural alignment
Q4. How and why did these alignments help you to cope with the disruption with your suppliers and customers before and during the pandemic?		
Q5. What alignments with your suppliers and customers did negatively influence your supply chain before and during the pandemic?	Cultural alignment as a hindrance to SCRES	Determining negative effects of cultural alignment
Q6. How and why did these alignments hamper your ability to cope with the disruption with your suppliers and customers before and during the pandemic? How did you fix this?		
Q7. What cultural misalignments or complementarity elements with your suppliers and customers did facilitate your ability to cope with the disruption before and during the pandemic?	Cultural misalignment and complementarity in SCRES	Identifying positive cultural misalignment or complementarity effects
Q8. How and why did these misalignments or complementarity elements support your ability to cope with the disruption with your suppliers and customers before and during the pandemic?		
Q9. What cultural misalignments with your suppliers and customers did negatively influence your supply chain before and during the pandemic?	Cultural misalignment as obstacle to SCRES	Determining negative impacts of cultural misalignment
Q10. How and why did these misalignments hurt your ability to cope with the disruption with your suppliers and customers before and during the pandemic? How did you fix this?		

Table II. Interview questions: themes and goals

Aggregate element	Element	Illustrative quote
Shared goals and expectations	Shared on-time delivery performance goals	<p><u>Alignment quote:</u> "The goals are we're trying to get as much product to customers that they need to fill their needs, and then we're working with the customers on what their priorities for each order is to make that efficient. So, it's much more dialogue and it's driven by communication so that you can meet goals on a weekly basis until we get out of this time of turmoil" (Interviewee 35, President at BLENDER_1).</p> <p><u>Misalignment quote:</u> "I've got one supplier that pisses me off all the time, because we placed orders, I give plenty of lead time, in this case for six weeks. And then they're late in delivery or they don't have the products available, but you know, I've learned to deal with it. And, also have learned that if they say they're going to ship on this date that I better plan on something else because it isn't coming on that date" (Interviewee 40, Senior Operations Manager at BLENDER_3).</p>
	Shared business continuity goals	<p><u>Alignment quote:</u> "I think the overarching cultural benefit that we all faced was that the pandemic seemed like a huge unknown, and we didn't know how bad it was going to be. There was this overarching, you know, culture that we don't know the details, but we're going to try to make you move forward with what we can do to maintain operations, regardless. So, a little bit of we're going to try until we can't, and luckily, we found out that we could move forward. And so, our leadership was pushing us to continue to supply as long as we can get material from our suppliers. We sought alternatives. And, in the conversations with our suppliers, it was very plain that they wanted to supply us, as well. So, I think the overarching culture was let's try to move forward regardless of the restrictions from COVID" (Interviewee 46, Vice President of Supplier Development at DISTRIBUTOR_1).</p> <p><u>Misalignment quote:</u> none.</p>
	Shared safety goals	<p><u>Alignment quote:</u> "So, I'm not saying money is irrelevant because it is business. However, generally it doesn't work when the first bits of conversation with a customer are directed at money, and not directed at the quality of your work and the safety of your fleet and the quality of the people doing the work, whether it's our back office staff or their back office staff. So, I think on the customer side, we're definitely looking at that fit of culture with a focus on safety and getting it done right" (Interviewee 72, Business Development Manager at BULK_CARRIER_02).</p> <p><u>Misalignment quote:</u> "Showing up at a plant without PPE is a dry run. For that, does my customer pay for the driver I dispatched the truck? Do I have to eat that? Was it my fault? No, it's the culture. I had an SOP for that particular chemical plant that when drivers come they have to do pre vehicle inspection. They have to fill out the form for the pre vehicle inspection. They have to check to make sure they've got hard hat safety glasses, reflective vest, hearing protection, steel toe boots, long sleeve shirts, fire retardant, the whole nine yards. This guy shows. He didn't show up in like shorts and flip flops, but I mean, he didn't have his stuff. Dry run. Yeah, so anyway, that's an example of what can cause cost and cause me problems. Because now guess what? I'm supposed to pick up the container. I've been having that truck booked out for a week to pick up that container for a week. Now what? Now the customers container doesn't ship because I can't find another truck for another three days. So, it's not just that a driver showed up without PPE. There's a knock on effect for the cost of my customers, sitting on another container then for another three days before I can pull it" (Interviewee 62, Vice President of Sales and Customer Accounts at FREIGHT_FORWARDER).</p> <p><u>Misalignment quote:</u> none.</p>

Aggregate element	Element	Illustrative quote
Shared understanding	Shared assumptions	<p><u>Alignment quote:</u> "We know what Scott's capabilities are. I know he's got six trucks. I know he's got five drivers. I know he's got some other customers that he has to deal with. So, I understand that about him and he knows we can't unload two trucks at the same time. So he'll send one and then he'll send another one two hours later because he knows that's how long it takes. His understanding of our business and our operations makes it easy for him to do business with us" (Interviewee 20, Health, Safety, Environment, and Quality Manager at LEAD_BUYER).</p> <p><u>Misalignment quote:</u> none.</p>
	Shared narratives	<p><u>Alignment quote:</u> "I think the idea that everybody was in the same boat was sort of, I don't want to say helpful. It's not really the right word, but it sort of helped everybody understand the stakes. So, everybody was suffering the same way and everybody was basically trying to make sure that they were doing the right thing by their customers and their suppliers. I think that really was a big one" (Interviewee 1, Purchasing and Procurement Manager at LEAD_BUYER).</p> <p><u>Misalignment quote:</u> none.</p>
Shared processes	Shared delivery scheduling process	<p><u>Alignment quote:</u> "You need to keep a tight schedule if you do not want to lose customers. So, we were working with customers and carriers to make sure they communicated with freight forwarders to make sure everything was on schedule and met the schedules. So, I guess, if I can say anything over the pandemic, it actually created better communication between us and the customers" (Interviewee 30, Director of Sales at ADDITIVE_2).</p> <p><u>Misalignment quote:</u> "The only thing is that they'll do a pop up. They'll just bring on a delivery without us knowing. That supplier just comes and does whatever they want. They shouldn't have come without letting us know. And, this was a PO that was pending from July. And, it was under my name. So, when I saw it, I couldn't believe it and so Rob called me Friday morning at six in the morning. He goes we have two trucks here. And I'm like what truck is that. I'm like send me a picture of the PO. That PO was from July of last year that the supplier came with. Unbelievable. You just don't want to work with these reckless suppliers" (Interviewee 38, Director of Customer Relations at BLENDER_2).</p>
	Shared forecasts process	<p><u>Alignment quote:</u> "There was something we did mutually with the suppliers and with our customers. We executed more often operational and forecast meetings where we discussed more about forecasting. So, we discussed long term forecasts and long term goals to understand their long term aspirations and requirements to prepare our production. During the pandemic, we had these forecast meetings more often to align and help us now go back to our suppliers to be able to meet the customers demand" (Interviewee 57, Production Manager at PACKAGER_3).</p> <p><u>Misalignment quote:</u> "Some of the customers thought their name was on a drum reserved in our warehouse. We had to really go back to the customers and have these conversations about we need you to forecast what you need because other people need your products and materials are very, very tight right now. So, I think we had difficult conversations trying to get them to understand forecasting" (Interviewee 50, Senior President of Commercial Operations and Supply at DISTRIBUTOR_2).</p>
	Shared invoice management process	<p><u>Alignment quote:</u> "When we call some customers and we have a problem, they put us to the top of the list. So, I know when those invoices come in, they also go to the top of the list. We have, I guess, a stronger relationship with vendors who pay us on time. I avoid those who don't" (Interviewee 71, General Manager at BULK_CARRIER_1).</p> <p><u>Misalignment quote:</u> "There is definitely an issue in the sense of payments and the dragging out of the company being so corporate minded and dragged over a lot of stuff on getting some answers on issues. For us, that's the only frustrating thing. We don't want to deal with delinquent payers" (Interviewee 22, Senior Sales Executive at BASE_OIL_1).</p>

Aggregate element	Element	Illustrative quote
Shared values	Shared communication	<p><u>Alignment quote:</u> "The customer enjoys talking to the supplier base and vice versa. That is when those core cultural values align. We're always involved in the conversation like a three way conversation. We're always willing to all get into a room and say, okay, here's the issue or the barrier that we face. How do we work together to get through it? Because success means success for all three of us. Yeah, so it's not one person trying to win. It's like how do we the three of us work together to succeed at the end? That has always existed. For the most part, our core suppliers appreciated that so much that they were like, Hey, let's just get together and we'll go talk and we'll figure a solution out" (Interviewee 64, Director of Accounts at TRANSPORT_4PL).</p> <p><u>Misalignment quote:</u> "I think what's missing with this supplier is more of a proactive communication. The person is not as effective I feel and lacks timely response and effective communication. So, maybe they need to have a more effective person to make sure order processing isn't disrupted. We cannot delay a business because of one person not answering. So, I feel that culturally they need to be on the same page and be able to communicate and process order on time to keep the business flowing. Otherwise, without communication on orders, nothing ships and we lose our business. At the end, my emails are not being answered and that means I need to find another supplier" (Interviewee 5, Transportation and Logistics Analyst at LEAD_BUYER).</p>
	Shared respect and empathy	<p><u>Alignment quote:</u> "This vendor or supplier is more empathetic in his communication, because I mean, we're all in the same boat going through the same thing. So, small things like that can really go a long way and makes me want to work with the guy even more. A lot of them are great in that sense. They're very understanding about our needs, and then how we can achieve those goals and maybe things we can't do and what our constraints are. So, speaking with them, it's been great. There does seem to be a light at the end of the tunnel because it does seem like everyone's working to improve and build upon what we have now. This positive energy gets us going even when everything is falling apart" (Interviewee 15, Supply Chain Planner at LEAD_BUYER).</p> <p><u>Misalignment quote:</u> "We have some drivers that come in here that got attitude problems. They want to get out of here right away. There was one guy that just a couple of months back was down here. He's yelling at Phil and I went out there and all of a sudden there were three or four of us gathered around this guy. He said: where's my paperwork? How come I'm still here? And, he was screaming at the top of his lungs. I told him go wait in your truck and he did. We finally got rid of him. I called his dispatcher and said I don't want this driver any longer" (Interviewee 11, Warehouse and Transportation Manager at LEAD_BUYER).</p>

Table III. Illustrative case study quotes and their links with SCRES

SCRES COLLABORATION				
Cultural aggregate element	Rank	Cultural element	% of companies	% of people
Shared goals and expectations	1	Shared safety goals	100%	43%
	2	Shared on-time delivery performance goals	45%	30%
	3	Shared business continuity goals	32%	20%
Shared understanding	1	Shared narratives	59%	33%
	2	Shared assumptions	40%	29%
Shared processes	1	Shared invoice management process	55%	24%
	2	Shared forecasts process	41%	17%
	3	Shared delivery scheduling process	41%	15%
Shared values	1	Shared communication	100%	64%
	2	Shared respect and empathy	45%	16%
SCRES VISIBILITY				
Cultural aggregate element	Rank	Cultural element	% of companies	% of people
Shared processes	1	Shared forecasts process	38%	20%
	2	Shared delivery scheduling process	35%	14%
Shared values	1	Shared communication	100%	41%
SCRES FLEXIBILITY				
Cultural aggregate element	Rank	Cultural element	% of companies	% of people
Shared goals and expectations	1	Shared business continuity goals	27%	18%
Shared understanding	1	Shared assumptions	50%	31%
	2	Shared narratives	38%	24%
Shared values	1	Shared communication	87%	60%
	2	Shared respect and empathy	36%	12%
SCRES VELOCITY				
Cultural aggregate element	Rank	Cultural element	% of companies	% of people
Shared understanding	1	Shared assumptions	52%	29%
	2	Shared narratives	21%	17%
Shared values	1	Shared communication	78%	54%

Table IV. Distribution % and ranking of interorganizational cultural elements per SCRES element

Mecanism	Sub-mecanism	Cultural aggregate element	Cultural element	SCRES element impacted	Managerial activities enabling SCRES element	Disruption type	Disruption tier origin	Network configuration and number of tiers	Diagram	
Propagation	Backward propagation of cultural alignments	Shared goals and expectations	Shared on-time performance	Collaboration	Joint meetings to communicate, track and schedule deliveries; non-performance root cause identification and problem resolution	Driver shortage	Tier-2	Triad (two tiers)	A2	
			Shared business continuity	Collaboration, flexibility	Joint brainstorming to share product knowledge, and material and supplier alternatives	Supply shortage, transportation disruption, demand variability	Tier-1, tier-2	Tetrad (two tiers)	B2	
						Driver shortage	Tier-2	Triad (two tiers)	A2	
			Supply shortage, transportation disruption, demand variability	Tier-1, tier-2	Hexad (two tiers)	D				
		Shared safety	Collaboration	Audits, daily safety evaluations, product specifications, supplier selection	Selection of unsafe materials, drivers not wearing PPE, reckless drivers	Tier-1, tier-2	Triad (two tiers)	A2		
	Shared processes	Shared forecasts	Collaboration, visibility	Virtual communication	Demand visibility, delivery coordination, supply shortage	Tier-1, tier-2, tier-3, tier-4	Nonad (four tiers), 22-actor network (two tiers)	E, H, I		
	Backward and forward propagation of cultural alignments	Shared goals and expectations	Shared business continuity	Collaboration, flexibility	Joint brainstorming to share product knowledge, and material and supplier alternatives	Supply shortage, production stoppage	Lead buyer, tier-1, tier-2	Triad (two tiers)	A2, A3	
		Shared understanding	Shared assumptions	Collaboration, flexibility, velocity	Virtual communication; joint brainstorming to share flexible transportation and warehousing solutions	Warehouse space shortage, transportation disruption	Tier-2	Tetrad, pentad (two tiers)	B1, C	
			Shared narratives	Collaboration, flexibility, velocity	Virtual communication	Supply shortage, transportation disruption, demand variability, price increases, staff shortage	Tier-1, tier-2	22-actor supply network (two tiers)	I	
		Shared values	Shared communication	Collaboration, visibility, flexibility, velocity		Supply shortage, transportation disruption, demand variability	Lead buyer, tier-1, tier-2	Triad (two tiers)	A2, A3	
					Supply shortage, transportation disruption, demand variability, staff shortage	Tier-1, tier-2	Octad, 22-actor network (two tiers)	F, I		
	Backward propagation of cultural misalignments	Shared goals and expectations	Shared on-time performance	Collaboration	Joint meetings to communicate, track and schedule deliveries; non-performance root cause identification and problem resolution	Excessive high delivery performance goals, relationship tension	Lead-buyer	Triad (two tiers)	A1	
	Transitivity	Transitivity of cultural alignments	Shared goals and expectations	Shared on-time performance	Collaboration	Joint meetings to communicate, track and schedule deliveries; non-performance root cause identification and problem resolution	Late deliveries	Tier-1, tier-2	Triad (two tiers)	A4
Shared business continuity				Collaboration, flexibility	Late deliveries, unsafe material and operations					
Shared safety				Collaboration			Supply shortage, transportation disruption, demand variability	Lead buyer, tier-1, tier-2		
Shared values			Shared respect and empathy	Collaboration, flexibility						
Transitivity of full cultural misalignments		Shared goals and expectations	Shared on-time performance	Collaboration	Joint meetings to communicate, track and schedule deliveries; non-performance root cause identification and problem resolution	Excessive high delivery performance goals, relationship tension	Lead-buyer	Triad (two tiers)	A5	
Transitivity of partial cultural misalignments		Shared goals and expectations	Shared on-time performance	Collaboration	Joint meetings to communicate, track and schedule deliveries; non-performance root cause identification and problem resolution	Excessive high delivery performance goals, relationship tension	Lead-buyer	Triad (two tiers)	A6	
			Shared safety	Collaboration	Daily operations management	Selection of unsafe materials, drivers not wearing PPE, reckless drivers	Tier-2			
		Shared processes	Shared delivery scheduling	Collaboration, visibility	Joint meetings to communicate, track and schedule deliveries	Early and/or late shipments				Lead-buyer
			Shared forecasts	Collaboration, visibility	Virtual communication	Demand visibility, delivery coordination, supply shortage				
			Shared invoice management process	Collaboration	Supplier management	Staff shortage, lack of training, unpaid carriers				
		Shared values	Shared communication	Collaboration, visibility, flexibility, velocity	Virtual communication	Deception	Tier-2			
			Shared respect and empathy	Collaboration, flexibility		Daily operations management				Disrespectful and aggressive drivers

Table V. Cultural mechanisms in supply networks and SCRES

SCRES element	Managerial activities emerging from the case and enabling SCRES	Disruption tier origin	Number of tiers and network configuration
<u>Collaboration:</u> Represents the level of tactical, operational, and strategic shared decision-making and joint efforts (Jüttner and Maklan, 2011).	Joint meetings to communicate, joint brainstorming, track and schedule deliveries; non-performance root cause identification and problem resolution, daily operations management, supplier selection, supplier management, audits, daily safety evaluations, product specifications assessment, virtual communication.	Lead buyer, tier-1, tier-2, tier-3, tier-4.	<ul style="list-style-type: none"> • Two tiers: triad, tetrad, pentad, hexad, heptad, octad, decad, 22-actor supply network. • Four tiers: nonad.
<u>Flexibility:</u> Aptitude of a supply chain to change the number and heterogeneity of possible solutions to respond to a market event while maintaining performance (Stevenson and Spring, 2007). This could manifest in flexible supply, demand, processes, capacity, and order fulfilment or transportation (Ali et al., 2017).	Virtual communication, joint brainstorming to share product knowledge and material and supplier alternatives, joint brainstorming to share flexible transportation and warehousing solutions.	Lead buyer, tier-1, tier-2.	<ul style="list-style-type: none"> • Two tiers: triad, tetrad, pentad, hexad, octad, 22-actor supply network.
<u>Visibility:</u> Ability for the supply chain to capture timely information about identification, location, and status of supply chain events or entities (Johnson et al., 2013).	Joint meetings to communicate, virtual communication, delivery tracking.	Lead buyer, tier-1, tier-2, tier-3, tier-4.	<ul style="list-style-type: none"> • Two tiers: triad, octad, 22-actor supply network. • Four tiers: nonad.
<u>Velocity:</u> Revolves around the adaptation speed by which a supply chain responds to and recovers from a market event (Christopher and Peck, 2004).	Virtual communication, joint meetings to communicate, joint brainstorming.	Lead buyer, tier-1, tier-2.	<ul style="list-style-type: none"> • Two tiers: triad, tetrad, pentad, octad, 22-actor supply network.

Table VI. Managerial activities enabling SCRES elements

Mecanism	Cultural state	Cultural aggregate element	SCRES element impacted
Propagation	Cultural alignment	Shared goals and expectations	Collaboration, flexibility
		Shared processes	Collaboration, visibility
		Shared understanding	Collaboration, flexibility, velocity
		Shared values	Collaboration, visibility, flexibility, velocity
	Cultural misalignment	Shared goals and expectations	Collaboration
Transitivity	Cultural alignment	Shared goals and expectations	Collaboration, flexibility
		Shared values	Collaboration, flexibility
	Cultural misalignment	Shared goals and expectations	Collaboration
		Shared processes	Collaboration, visibility
		Shared values	Collaboration, visibility, flexibility, velocity

Table VII. Effect of cultural mechanisms, states, and elements on SCRES elements



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2025-11-25

Emerald

<https://doi.org/10.1108/scm-10-2024-0685>

Daghar A, Alinaghian L, Turner N. (2025) Resilient interorganizational culture in multi-tier supply networks: the “what” and “how”. *Supply Chain Management: An International Journal*, Volume 30, Issue 6, November 2025, pp. 652-680