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Leadership style's role in fostering supply chain agility amid geopolitical shocks

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ABSTRACT

Geopolitical shocks can disrupt businesses on multiple fronts, such as sudden loss of buyers or suppliers, supply disruption and demand fluctuations, wielding the power to profoundly undermine a firm's ability to meet customer demands. The imperative to grasp the repercussions of geopolitical tumult and devise effective countermeasures has therefore drawn the attention of scholars and business leaders alike. Nevertheless, the empirical research in this area remains limited. This study addresses this gap by using 247 Australian manufacturing and distribution firms with a global footprint. We find that geopolitical shocks are inextricably linked to a decline in firms' supply chain agility. Our analysis further reveals that while crisis leadership and transformational leadership, when practiced alone, have limited effectiveness in mitigating the adverse effects of geopolitical shocks on supply chain agility, their combined application significantly reduces the negative impact. The synergistic approach highlights the significance of crisis leadership for immediate needs and swift action, along with transformational leadership for long-term strategies, vision, and continuous improvement, ensuring lasting business success. These insights are valuable for businesses aiming to enhance their resilience in the face of geopolitical uncertainties and stay competitive.

1. Introduction

The escalating tensions between various regions, persistent trade conflicts, and the lingering repercussions of the COVID-19 pandemic have presented businesses with a new array of challenges. In particular, the prevalence of recent geopolitical shocks— incidents or conditions stemming from political and economic factors that reverberate throughout global business operations—has emerged as a disturbingly frequent phenomenon in today's complex global business arena (Moradlou, Reefke, Skipworth, & Roscoe, 2021; Roscoe, Skipworth, Aktas, & Habib, 2020). By creating supply and demand failure, volatility, and risks that have the potential to disrupt business operations, geopolitical shocks wreak havoc on supply chain agility (SCA) (Shashi, Centobelli, Cerchione, & Ertz, 2020; Zahoor, Golgeci, Haapanen, Ali, & Arslan, 2022), that is, the ability of a business to sense and respond to customers need in a quickly and effectively manner maintaining competitive advantage (Gligor, Bozkurt, Gölgeci, & Maloni, 2020; Tarba et al., 2023). For example, supply disruptions can ripple through supply networks, affecting the timely availability of essential raw materials and components and undermining firms' ability to maintain agile supply chain operations. A recent survey by Forrester underlines the severity of the situation, revealing that 66 % of companies have witnessed a decline in revenue due to ongoing global conflicts (Graber, 2023).

In the wake of disruptions triggered by geopolitical shocks, recent scholarly discourse has witnessed a growth in research exploring various facets of business operations. This includes investigations into the impact of geopolitical shocks on manufacturing location decisions (Moradlou et al., 2021), the sustainability of global supply chains (Qin, Su, Umar, Lobonţ, & Manta, 2023), the capacity to effectively navigate supply chain (SC) uncertainty (Roscoe et al., 2020), and the formulation of strategic SC management approaches (Johnson & Haug, 2021), among others. However, our understanding of how geopolitical shocks influence SCA remains limited. One plausible explanation for this dearth in the literature may be that a major share of existing studies has predominantly examined factors that positively contribute to SCA and drive its development. These factors, for instance, include market orientation

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and learning orientation (Braunscheidel & Suresh, 2009), SC orientation (Gligor, 2016), SC integration (Khan & Wisner, 2019), SC flexibility (Gligor, Gligor, Holcomb, & Bozkurt, 2019), SC coordination, cooperation, and communication (Gligor & Holcomb, 2012), market sensitivity (Aslam, Blome, Roscoe, & Azhar, 2018), or possession of robust big data analytics capabilities (Dubey, Gunasekaran, & Childe, 2018). As such, there is a visible gap in research on the influence of negative external factors, such as geopolitical shocks, on SCA.

Geopolitical shocks, often causing enduring shifts in the operational landscape for businesses and SCs, require business leaders to instigate vital changes for survival in the new business environment. Recognizing the pivotal role that business leaders play in adapting to this evolving landscape and making astute decisions to confront emerging challenges, the realm of SC research has delved into the nuanced role of leadership in managing novel business challenges. For instance, Dubey (2023a, 2023b) highlighted the pivotal role of a crisis leadership style in fortifying the relationship between digital transformation and collaboration within the SC. Prabhu and Srivastava (2023a, p. 51) underlined the prowess of transformational leaders, emphasizing their capacity to drive agile initiatives by instilling a clear vision, encouraging innovative problem-solving, and providing individual mentorship to attain exceptional performance standards among SC members. Additionally, Shin and Park (2021) accentuated the substantial impact of an SC leader's style in fortifying the resilience of SCs, and Fritch (2020) argued that transformational leadership style positively influences SC performance. Yet, despite these initial insights into the leadership's role in sustaining SC performance, the critical question remains unanswered: to what extent and through what mechanisms can leadership style mitigate the adverse effects of geopolitical shocks on SCA? Particularly, while crisis leadership has been advocated as a valuable tool for swiftly addressing acute crises (Dubey, 2023a, 2023b; Littlefield & Quenette, 2007), and transformational leadership is known for transforming the beliefs and attitudes of individual employees to propel them beyond expected performance levels on sustained basis (Avolio, Bass, & Jung, 1999; Bass, 1990; Clifford Defee, Stank, & Esper, 2010), it remains unclear whether and how these leadership styles can empower firms to maintain agile SCs in the face of geopolitical shocks.

In a world fraught with geopolitical turmoil and with an evident void in current literature in the domain, this study is motivated to unravel the intricate dynamics between geopolitical shocks and SCA and assess whether crisis leadership and transformational leadership can hedge the adverse impacts of geopolitical shocks. In pursuit of this core objective, we pose two timely, yet unanswered, research questions: 1) *To what extent do geopolitical shocks disrupt the SCA of firms? 2) Is there a discernible difference in the SCA of firms that adopt both crisis and transformational leadership styles, compared to those that only adopt one or neither of these leadership styles?*

In pursuit of addressing these intriguing research questions, data was collected from 247 Australian manufacturing and distribution firms with a global presence. Drawing upon strategic contingency theory (SCT), the analysis yielded several interesting findings: First, we provide empirical evidence on the impact of geopolitical shocks on SCA in firms. Second, the study explores the moderating role of crisis leadership and transformational leadership in the relationship between geopolitical shocks and SCA. To this end, we found that crisis leadership and transformational leadership when practiced in isolation, are unable to significantly mitigate the negative impact of geopolitical shocks on SCA. However, when these two leadership styles are combined, the negative impact of geopolitical shocks on SCA is significantly reduced. This synergistic response, indeed, offers a holistic response, where crisis leadership is adept at swiftly addressing urgent needs and guaranteeing expeditious mitigation of disruptive impacts, while transformational leadership is concentrated on enduring strategies for sustained growth through the articulation of a captivating vision, fundamental values, and relentless improvement. Third, by showing how a good fit in the high levels of crisis and transformational leadership styles extenuates geopolitical shocks, our study contributes to the strategic fit mantra of SCT within SC literature.

From a practical standpoint, our study underscores the necessity for supply chain managers to evaluate the impact of geopolitical shocks on SCA to devise recovery measures, as these disruptions often lead to delivery delays and negatively affect firms' SCA. Additionally, we propose that a comprehensive approach integrating crisis and transformational leadership styles is essential to effectively manage the multifaceted challenges posed by geopolitical shocks, ensuring organizations can respond to immediate crises while strategizing for long-term resilience.

The rest of the manuscript is structured as follows. In the following section, we continue with the theoretical background and detail the hypothesis development. Next, we present the manuscript's methodology. We conclude by detailing the theoretical and managerial implications of the findings and discussing avenues for future research.

2. Theoretical background and hypothesis development

There are several theoretical reasons prompting the examination of the disruptive impact of geopolitical shocks on SCA while considering the moderating roles of crisis leadership and transformational leadership. In this section, we discuss these concepts in detail and highlight the plausible relationships between them.

Agility, a crucial attribute for firm competitiveness (Goldman & Nagel, 1993), encompasses organizational structures, information systems, logistics processes, and mindsets (Christopher & Towill, 2001; Gligor & Bozkurt, 2021). It empowers firms to navigate unforeseen challenges, capitalize on changes as opportunities, and adapt to the evolving business environment (Sharifi & Zhang, 1999). While firm-level agility offers various advantages, competition has shifted to the supply chain (SC) level (Mentzer et al., 2001). Consequently, SCA has become indispensable for organizations (Feizabadi, Gligor, & Alibakhshi, 2021; Guo, Yin, & Liu, 2023; Li, Wang, Ye, Chen, & Zhan, 2022; Zahoor et al., 2022; Zhang, Liu, Chen, & Tang, 2022).

Sustained research efforts by supply chain scholars have identified various factors driving the development of SCA, including firm orientations (market and learning orientation) (Braunscheidel & Suresh, 2009), supply chain orientation (Gligor, 2016), supply chain integration, flexibility, coordination, cooperation, and communication (Gligor et al., 2019; Gligor & Holcomb, 2012; Khan & Wisner, 2019), market sensitivity (Aslam et al., 2018), and a robust big data analytics capability (Dubey et al., 2018). Interestingly, the majority of the studies examining the antecedents of SCA have primarily focused on those that facilitate its development, while the current literature offers fewer insights on the factors that hamper its development.

Importantly, SCA describes the ability to swiftly adapt tactics and operations in response to environmental changes (Gligor, Esmark, & Holcomb, 2015; Gligor, Gölgeci, & Holcomb, 2015; Gligor, Holcomb, & Stank, 2013), respond to changes in customer demands and foster collaboration (Patel & Sambasivan, 2022), and rapidly address supply chain disruptions (Müller, Hoberg, & Fransoo, 2023). These attributes are likely to be hampered by disruptions in the firm's environment, such as geopolitical shocks. Extant literature specifically notes that the emergence of globally dispersed supply chains (SCs) has made firms more susceptible to various disruptions and shocks (Brusset, Davari, Kinra, & La Torre, 2023). These disruptions can stem from different sources, categorized as internal to the firm, internal to the firm's network but external to the firm, and external to the firm's network (Samvedi, Jain, & Chan, 2013; Shekarian & Mellat Parast, 2021).

Internal risks within the firm encompass process risks (e.g., labor strikes, machine failures, IT infrastructure breakdowns, and product quality issues) and control risks (inadequate collaborative planning, limited visibility along the supply chain, suboptimal safety stock and transportation management policies) (Shekarian & Mellat Parast, 2021). Risks originating externally to the firm but within its network can be

divided into demand risks (e.g., volatile demand, forecasting errors, market changes, and innovative competitors) and supply risks (related to outsourcing, globalization, variable replenishment lead times, supplier commitment, poor supplier logistics performance, and supplier bankruptcy) (Samvedi et al., 2013).

Environmental risks, external to the firm, include natural disasters, social unrest, and geopolitical issues (Shekarian & Mellat Parast, 2021). Geopolitical risks, a subset of external risks, refer to political tensions among the economies (Bouoiyour, Selmi, Hammoudeh, & Wohar, 2019). Recent examples include military conflicts like the Israel-Palestine conflict and the Russia-Ukraine war, US-China trade conflicts, the dissolution of NAFTA, and the UK's Brexit. Prior research highlights the potential of these risks to disrupt supply chain operations (Moradlou et al., 2021; Roscoe et al., 2022). In many cases, these events necessitate a permanent redesign of global supply chains (Moradlou et al., 2021). The substantial stress that geopolitical shocks exert on global supply chains warrants a closer examination of their potential negative effects on firms' SCA.

Further, SCT indicates that to comprehensively understand this relationship, it is crucial to discuss the role of leadership styles. This theory argues that "a firm's superior performance is contingent on both internal and external environments of the firm" (Safari & Saleh, 2020, p.636). A key aspect of this theory hinges on the notion of uncertainty. In the context of SCT, uncertainty is presented as "an individual's perceived inability to predict outcomes in the general business environment accurately because of insufficient information or the inability to discriminate between relevant and irrelevant data" (Milliken, 1987, p. 136). This implies that the level of uncertainty that the organization experiences is impacted by the decision maker's understanding as they seek to evaluate and organize environmental information and comprehend the incoming stimuli (Roscoe et al., 2020). Organizational scholars proposed that firms could reduce uncertainty and improve performance by achieving fit between the organizational structure and the organization's external environment; this is now referred to as "structural" contingency theory (Lawrence & Lorsch, 1967).

Contingency variables can be grouped into four broad categories: firm size, national context and culture, strategic context, and other internal organizational context variables (Sousa & Voss, 2008). To address our research question, we consider crisis leadership and transformational leadership as contingency variables of interest. SCT supports our premise that firms with leadership styles aligned to their external environment disrupted by a geopolitical event would be better position to achieve superior performance in the form of SCA.

In this vein, past studies have shown that leadership styles can influence how firms deal with shocks, how they manage their SCs, and the level of agility within organizations (Azadegan, Shaheen, Linderman, & Fereidooni, 2021; Prabhu & Srivastava, 2023a; Tuan, 2022). In fact, determining the appropriate leadership style is a core issue within SC management as it's been determined to influence multiple aspects of performance (Gattorna, 2017; Verghese, Koufteros, Polyviou, & Jia, 2022).

Most organizations face disruptions at some point in their existence and they must rely on their leaders to navigate out of the crisis, making the selection of the right type of leadership a key criterion for successfully dealing with shocks (Bowers, Hall, & Srinivasan, 2017). As globalization has increased the complexity of SCs, scholars have begun to expand the scope of leadership from the individual level to the SC level and started exploring the appropriate type of SC leader when facing shocks (Prabhu & Srivastava, 2023b).

Distinct types of leadership were also shown to yield different levels of performance within SCs. To illustrate, Sharif and Irani (2012a, 2012b) investigated the impact of leadership on SCs and found that it plays a key role in SC performance. Birasnav, Mittal, and Loughlin (2015) built on this perspective and found that transformational leadership can promote information exchange within SCs and ultimately increase performance. In this vein, Birasnav and Bienstock (2019) revealed that transformational leadership facilitates internal integration, further enhancing firm performance. Jia, Zuluaga-Cardona, Bailey, and Rueda (2018) explored the influence of leadership in the context of sustainability practices. Their case study of three international firms revealed that by applying distinct leadership styles towards different suppliers the firm can facilitate the SC's sustainable performance. Leadership styles were also found to play a key role in agri-food SCs, where a strong relationship between the leadership style of the SC managers and the SC's social and operational performance was found. As such, consistent with the tenets of SCT, leadership styles, such as transformational leadership and crisis leadership, can influence the relationship between geopolitical shocks and SCA. Next, we provide more in-depth theoretical arguments for our proposed hypotheses.

2.1. Hypothesis development

The stabilization of global SCs is a key condition for the world's sustainable development (Qin et al., 2023). Geopolitical shocks have been shown to impact various aspects of SCs across the globe (Solingen, 2021) with geopolitical risk being a principal disruptor of global SCs (Qin et al., 2023).

There are several factors contributing to geopolitical events' disruptive impact. One chief modus operandi is the impact on infrastructure. During geopolitical conflicts, infrastructure (e.g., production facilities, storage facilities, roads, airports) can become a main target of attacks. For example, during the Kosovo War of 1999, the North Atlantic Treaty Organization (NATO) bombed infrastructure for 78 days in the former Federal Republic of Yugoslavia. This led to the destruction of 12 railways, five highways, 50 bridges, and five civilian airports, causing SCs with stakes in that area to significantly slow down their operations or even bring them to a halt (O'Loughlin & Kolossov, 2020), significantly reducing the firms' SCA.

Another means through which geopolitical shocks can negatively impact SCs is through the generation of multi-lateral sanctions, especially economic ones. To illustrate, the Russia-Ukraine military conflict of 2022 has triggered the European Union, the US, and other parties, to impose multiple rounds of sanctions on Russia. These sanctions ranged across a variety of domains such as food, energy, semiconductors, defence, telecommunications equipment, and computers, and have directly and indirectly disrupted SCs worldwide and made it difficult for firms to respond to their customers' needs (Adekoya, Oliyide, Yaya, & Al-Faryan, 2022). In return, Russia imposed counter-sanctions on countries considered to have unfriendly behaviours, especially in the energy and fuel fields, leading to worldwide increases in fuel and energy costs (Chen, Jiang, Wang, & Wang, 2023). Increases in energy and fuel prices have a direct impact on SCA, for example, firms might choose a slower but more fuel-efficient mode of transportation (e.g., rail versus truck) in order to contain costs and maintain price competitiveness on their products and services.

Geopolitical shocks can have such a profound and long-lasting effect on global economies that their occurrence can warrant the redesign of global SCs (Roscoe et al., 2022). The Russian-Ukraine war completely disrupted logistics in Eastern Europe, provoking significant challenges for firms relying on suppliers located in that region (Kilpatrick, 2022), and prompting them to identify alternate suppliers in other parts of the world. Brexit has caused the majority of firms to relocate their facilities (Moradlou et al., 2021) and significant delays at border crossings, ensuing increases in logistics expenses for firms importing and exporting goods to and from the UK/ European Union. The U.K. government revealed "clear increases in costs, paperwork, and border delays" (UK Parliament, 2022), and shipments crossing from the UK into the European Union were delayed about 38 % of the time during the 2022 fourth quarter (Murray, 2023), directly impacting firms' SCA.

Considering the significant stress and pressures induced on global SCs by geopolitical shocks, it is warranted to consider their plausible negative impact on firms' SCA and put forth the following for empirical

examination:

H1. Geopolitical shocks negatively influence the supply chain agility.

Leadership within organizations has long been a point of interest for organizational management scholars as it's been shown to impact a firm's strategies and, ultimately, various metrics related to firm performance (Bryman, 2013). As organizations have become increasingly interwoven through inter-and intra-organizational SCs, scholars have been increasingly examining the role of leadership within SCs (Sharif & Irani, 2012a, 2012b; Purwanto & Juliana, 2022). Research shows that SC leadership style influences many aspects of a firm's SC, including the extent to which firms can successfully deal with various shocks (Azadegan et al., 2021; Verghese et al., 2022).

Research examining the role of leadership in SCs provides some unique insights. SC leaders are uniquely positioned in that they can not only influence the performance of their respective organizations but also that of their SC members (Robinson & Malhotra, 2005), further highlighting the importance of understanding its impact. Leadership has been recognized to guide the extent to which firms initiate and disseminate sustainable practices within their SCs, and ultimately their levels of sustainability (Gosling, Jia, Gong, & Brown, 2016). Building on this, Jia, Gong, and Brown (2019) revealed that SC leadership can drive the learning of sustainability practices within their SCs. Further revealing its role, Sharif and Irani (2012a, 2012b) showed that the leadership of the SC drives customer satisfaction and superior financial results (Sharif & Irani, 2012a, 2012b). Their findings were complemented by Fritch (2020) who argued that SC leadership also drives SC costs, quality, and performance.

Studies have also revealed that leadership style has also been shown to influence how SCs deal with shocks. To illustrate, Azadegan et al. (2021) found that leadership styles can enhance the effectiveness of firm responses throughout various response stages. Similarly, in their study exploring major shocks within SCs, Shaheen, Azadegan, Lucianetti, and Qi (2017) concluded that different types of leadership are better suited when dealing with shocks that impact SCs. Given that SC leadership influences how SCs cope with various shocks, it is plausible that they might also play a role in how they handle geopolitical shocks. Moreover, Shin and Park (2021) found that the SC leader's style can play a role in improving SC resilience-related capabilities. As such, there are theoretical reasons to believe that they can also improve SCA in the context of geopolitical shocks.

SCT supports the premise that SC leadership style can play a role key role in how firms reconfigure their SC resources to align their organizational and SC structures with their new environment post-geopolitical shocks (Roscoe et al., 2020). We pose that crisis leadership is one type of leadership style that can attenuate the negative impact of geopolitical shocks on SCA. Crisis leaders can be defined as leaders who "act to prepare for the occurrence of unexpected crises, deal with the salient implications of crises, and grow from the disruptive experience of crises" (Wu, Shao, Newman, & Schwarz, 2021, p.3). Such leaders can facilitate collaboration between members of the SC in the aftermath of a geopolitical shock. Clear, fast, and honest communication are also core characteristics of crisis leadership (Kim, 2021), which can in turn limit the shock's impact. Considering that two key antecedents of SCA are cooperation and communication (Gligor & Holcomb, 2012), it is plausible that this leadership style can play a mitigating role in the relationship between geopolitical shocks and SCA.

Crisis leaders also exhibit traits that allow them to navigate chaotic times, prioritize resources and activities, maintain appropriate flexibility, and capitalize on emerging opportunities (Dubey, 2023a, 2023b). Maintaining flexibility and capitalizing on emerging opportunities are core attributes of SCA (Gligor et al., 2013; Gligor et al., 2019). As such, we pose the following hypothesis:

H2. Crisis leadership style extenuates the influence of geopolitical shocks on supply chain agility such that the stronger the crisis leadership style, the weaker the adverse impact of geopolitical shocks on supply chain agility.

Along with crisis leadership, there are also theoretical reasons to explore the moderating role of transformational leadership. Such leaders are considered visionary and possess the ability to stimulate others to do more for the well-being of the organization (Mesu, Sanders, & Riemsdijk, 2015). Transformational leaders not only assist followers to better embrace the company mission, but they also encourage them to look beyond their self-interests (Islam, Tariq, & Usman, 2018). These characteristics can be crucial when dealing with geopolitical shocks as resources might be scarce and followers might need to be willing to sacrifice for the well-being of the organization and to ensure adequate resources are devoted to deploying the desired level of SCA.

Transformational leaders seek ways for their followers to find meaning in their work tasks so that they achieve their full potential and find a sense of purpose within their work. Such leaders resort to altering job characteristics to shape their followers' tasks and behaviours (Piccolo & Colquitt, 2006). Because in the aftermath of geopolitical shocks, followers might be discouraged by the events taking place around them, this leadership style is optimal for guiding followers to find meaning in their tasks and thus be more willing to devote themselves to improving the firm's SCA to better deal with the shocks.

Leaders embracing the transformational style are effective change catalysts and can objectively assess the firm's current culture and identify ways to improve it (Kuntz, Davies, & Naswall, 2019). Geopolitical shocks typically lead to permanent changes to the environment in which firms and SCs operate (e.g., due to relocating facilities, and a new regime), thus often requiring changes to the company's culture to adapt to the new environment. Thus, such leaders can support followers in creating a new culture within the organization to deploy the level of SCA required in the aftermath of the geopolitical shock.

In addition, transformational leadership has been specifically linked to superior agility within SCs. Specifically, Prabhu and Srivastava (2023a, p. 51) found that "transformational leaders drive agile initiatives in the SC by setting and communicating a vision, encouraging SC members to think of innovative solutions for problems, and mentoring them individually to achieve high-performance standards". As such, there are theoretical reasons to investigate the following:

H3. Transformation leadership style extenuates the influence of geopolitical shocks on supply chain agility such that the greater the transformational leadership style the lesser the influence of geopolitical shocks on supply chain agility.

The key tenets of SCT find support in extant SC management research. The notion of alignment, or fit, has been investigated in several contexts. Wagner, Grosse-Ruyken, and Erhun (2012) found that SC fit, in the form of strategic consistencies between the products' demand and supply uncertainty and the underlying SC design, results in superior firm performance. Gligor (2018) argued that the fit between suppliers' flexibility and their customers' expected flexibility improves performance, while Gligor, Feizabadi, Pohlen, Maloni, and Ogden (2022) found that SC orientation fit between SC members leads to increased financial performance. In addition, Gligor (2016) revealed a strong relationship between SC fit and agility, further suggesting the importance of aligning multiple contingencies to improve performance.

Importantly, "a key premise of SCT is that strategic fit is organizationally and temporally unique, rather than common across many organisations in a given context" (Roscoe et al., 2020, p. 1501). With this in mind, when firms engage in strategic changes to achieve fit with one contingency variable, but, in the process, significantly decrease fit with another contingency variable the firms' performance will suffer (Zajac, Kraatz, & Bresser, 2000). Strategically, a misfit happens when a firm cannot alter, due to various reasons (e.g., unwillingness to change, insufficient resources, unawareness of the need to change) when environmental shifts occur (Zajac et al., 2000). This supports the premise

that, although crisis leadership or transformational leadership, each on their own, attenuate the negative impact of geopolitical shocks on SCA, the alignment of these leadership styles (i.e., high levels) can further mitigate this negative impact. Therefore, we investigate the following:

H4. A combination of crisis leadership style and transformational leadership style extenuates the negative influence of geopolitical shocks on supply chain agility such that the effect of geopolitical shocks is weaker at a stronger combination of crisis leadership style and transformational leadership style.

3. Methodology

This study aligns with the positivist paradigm, employing observable and quantifiable data (Zikmund, Babin, Carr, & Griffin, 2013) for unbiased data collection and reliable findings. We use theory-supported hypotheses and a survey instrument following established procedures (Dillman, 2000) to focus on Australian manufacturing and distribution firms.

Australian manufacturing and distribution are essential for domestic and global production and distribution (Australian Bureau of Statistics (ABS), 2023). Our research centres on the impact of geopolitical shocks on firms' SCA. Geopolitical factors, like trade conflicts (e.g., Australia-China, Russia-Ukraine, US-China), influence SCs' agility. To thrive in the face of these challenges, industry leaders must emphasize innovation and adaptability, including leadership style selection. Our research examines whether firms adopting both crisis and transformational leadership styles differ in agility from those adopting only one or neither. Studying successful leaders in these industries yields valuable insights into effective leadership practices amid geopolitical disruptions, aligning with our research focus.

Our findings may apply to economies with well-developed manufacturing and distribution networks like New Zealand, Canada, Singapore, Japan, and the UK—countries that are also Australian trading partners. These contexts offer insights into leadership's role in driving innovation and adaptation amid geopolitical shocks, crucial for our SCA research.

3.1. Constructs and measures

We obtained most measurement scales from existing literature, while 'geopolitical shocks,' a unique concept, required us to create new items following Churchill's (1979) guidelines. This involved item creation based on relevant literature (Moradlou et al., 2021; Roscoe et al., 2020; Roscoe et al., 2022), preliminary testing, content validity assessment, and evaluations of reliability and dimensionality. We used a 5-point Likert scale with five items to measure this construct, yielding acceptable psychometric properties (see Table 1). Transformational leadership, adapted from prior studies (Avolio et al., 1999; Bass, 1990; Clifford Defee et al., 2010), was assessed using a 5-point Likert scale (1 = not at all, 5 = frequently). Crisis leadership, adapted from Dubey (2023a, 2023b) and Littlefield and Quenette (2007), was assessed with a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). SCA measures were adapted from Gligor et al. (2020) and assessed using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

3.2. Control variables

In this study, the main covariates tested were firm size, industry subcategories, and managerial experience, which could influence our primary model outcomes. As such, we controlled these covariates or control variables. To do this, we utilized dummy coding for firm size (1 = small, 2 = medium, 3 = large), industry sectors (1 = Beverage Manufacturing, 2 = Pharmaceutical, 3 = Machinery and Equipment, 4 = Metal Products, 5 = Logistics), and managerial experience (1 ≤ 5 years, 2 = 5–10 years, 3 ≥ 10 years) in our primary model, employing regression analyses.

Table 1
Reliability and validity of constructs and measures.

Construct	Measures	Loadings
Geopolitical Shocks	*α = 0.91, AVE = 0.81, CR = 0.94* To what extent (1 = very low, 5 = very high) does your firm experience the following:	
	1. Supply failures due to trade wars or diplomatic conflicts.	0.91
	2. Demand failures due to trade wars or diplomatic conflicts.	0.92
	3. Delivery delays due to trade wars or diplomatic conflicts.	0.89
	4. Loss of key suppliers due to trade war or diplomatic conflicts.	0.93
	5. Loss of key buyers due to trade war or diplomatic conflicts.	0.88
Crisis leadership style	*α = 0.87, AVE = 0.75, CR = 0.92* Please indicate to which extent (1 = strongly disagree to 5 = strongly agree) you agree with the following statements regarding your SC leader:	
	1. "The SC leader continuously interacts with the workers to understand their problems"	0.87
	2. "The SC leader continuously interacts with the selected media and provides transparent and timely information to prevent panic situation".	0.86
	3. "The SC leader plays a significant role in promoting digital technologies to create transparency and collaboration among the workers and the stakeholders".	0.88
	4. "The SC leader immediately makes decisions and takes necessary actions to mitigate the crisis impact".	0.84
	5. "The SC leader immediately takes the necessary steps to adjust strategies and handle the crisis properly".	0.89
Transformational leadership	*α = 0.91, AVE = 0.82, CR = 0.95* "Please indicate to which extent (1 = not at all to 5 = frequently) the following statements describe your SC leader. My SC leader:	
	1. Articulates a compelling vision of the SC's future".	0.87
	2. "Clarifies the central purpose underlying actions of all SC members."	0.94
	3. "Seeks differing perspectives from the employees when solving problems."	0.88
	4. "Fosters the culture of continuous improvement and innovation."	0.90
	5. "Asks employees for ideas on how to better solve SC problems."	0.91
	6. "Communicates a clear, long-term vision that aligns with firm and SC goals."	0.93
	7. "Encourages employees to continually improve their SC skills."	0.96
Supply Chain Agility	*α = 0.81, AVE = 0.67, CR = 0.94* Could you please rate the following statements on a scale of 1 (strongly disagree) to 5 (strongly agree)? As compared to our competitors:	
	1. "My firm can quickly reconfigure its supply chain resources to respond to changes in supply availability".	0.92
	2. "My firm can quickly reconfigure its supply chain resources to respond to changes in orders from its customers (e.g., customers increasing, decreasing, or modifying orders)".	0.93
	3. "My firm can quickly reconfigure its supply chain resources to respond to changes in its environment (e.g., tariff	0.87

(*continued on next page*)

Table 1 (*continued*)

Construct	Measures	Loadings
	changes, economic policies, and political changes)".	
	4. "My firm is usually quicker to respond to changes in supply availability (e.g., supply shortages)".	0.85
	5. "My firm is usually quicker to respond to changes in orders from its customers (e.g., customers increasing, decreasing, or modifying orders)".	0.89
	6. "My firm is usually quicker to respond to changes in its environment (e.g., tariff changes, economic policies, political changes)".	0.91

Results revealed that none of these control variables or covariates had a statistically significant effect ($p > .05$) on the dependent variable, supply chain agility. Moreover, the inclusion of these control variables didn't impact our original model results.

3.3. Pre-test

To ensure content validity for both items and constructs, we extensively consulted with experienced academics possessing practical and theoretical expertise and sought input from six senior industry executives. Their insights and recommendations greatly improved the questionnaire's language and format. For the reliability test, a group of 70 respondents from the relevant sector participated in a pre-test of the questionnaire. During this phase, we assessed the reliability of measuring items and associated constructs, with all constructs exceeding the established Cronbach's alpha threshold of 0.7 (Hair, 2009), affirming their reliability. It's important to note that participants in the pre-test phase were distinct from those in the main survey and subsequent analysis.

3.4. Data collection

Data was gathered from manufacturers and distributors who have globalized business operations but are based in Australia. We used a reputable market research firm, Dynata (accessible at https://www.dynata.com), to create and administer a survey to 980 Australian firms for data collection. After sending two reminders, we received a total of 259 responses. After the data cleaning and screening process, a final dataset consisting of 247 responses was achieved, with a response rate of approximately 25 %. The G*Power analysis (with a medium effect size, $f^2 = 0.15$, α error probability of 0.01, power of 0.95, and 4 predictors) determined a required sample size of 169 (Faul, Erdfelder, Buchner, & Lang, 2009), which is significantly lower than our actual sample size of 247. This confirms that the study has a more than adequate sample size. The demographic information, available in Appendix 1, highlights the diversity of our sample.

4. Analysis and results

4.1. Measurement reliability and validity

We conducted both exploratory and confirmatory factor analyses (CFA) to assess the validity and consistency of our measurements. The scales we employed demonstrated satisfactory psychometric properties, as shown in Table 1. To establish convergent validity, we verified that all items were loaded onto their corresponding latent variables (no cross-loading was noted) and exhibited factor loading values exceeding 0.60 (refer to Table 1). Moreover, all constructs exceeded the recommended threshold of 0.70 for Cronbach's Alpha values (Hair, 2009). Both the average variance extracted (AVE) and composite reliability (CR) values surpassed the respective thresholds of 0.60 and 0.70, in line with established criteria. According to the criteria proposed by Fornell and Larcker (1981), each construct's AVE exceeded its association with all other constructs (see Table 2). Additionally, the discriminant validity of constructs was assessed using the Heterotrait-Monotrait Ratio (HTMT), where all values were below the recommended threshold of 0.85 (Henseler et al., 2015), confirming discriminant validity was established between all constructs. With a maximum VIF of 2.31 in our dataset, the variance inflation factor (VIF) test result was notably lower than the maximum value of 10.

Considering that outliers may impact the reliability of findings, we also conducted a *Z*-score test for outliers using SPSS statistical software for three key variables: geopolitical shocks, crisis leadership style, transformative leadership style, and supply chain agility. Utilizing the "Descriptive Statistics" function under the "Analyze" menu in SPSS, we calculated Z-scores for each of the four variables. Following our analysis, no outliers were detected for any variables; that is, all values were found within the ±2 threshold. This rigorous approach to outlier detection using SPSS ensured the robustness and reliability of our findings. Going beyond, we also performed a normality test where the *p*-values for Kolmogorov-Smirnov and Shapiro-Wilk tests were greater than 0.05, indicating data was normally distributed.

4.2. Non-response bias

To assess potential non-response bias, we followed the guidelines outlined by Armstrong and Overton (1977), a method previously utilized in similar survey-based research within the field (e.g., Chowdhury, Quaddus, & Agarwal, 2019). A comparison between early and late responses was conducted based on the primary constructs (leadership styles, geopolitical shocks and SCA) of our model (see Fig. 1). Specifically, independent sample *t*-tests comparing the mean scores between the early (151) and late (96) responses yielded p-values greater than the threshold of 0.05 for all three constructs, indicating that the timing of respondents' participation did not significantly influence their responses. Thus, non-response bias was not a concern in this study.

4.3. Common method bias

To address potential common method bias (CMB), we implemented a series of measures based on prior research (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). These measures included both ex-ante and ex-post actions. Ex-ante measures were taken in advance and involved: selecting measurement items from established scales, using varied wording for scales, ensuring respondent anonymity, structuring the questionnaire into distinct sections, and separating independent and dependent variables. Ex-post measures, carried out subsequently, involved specific statistical analyses. Initially, we conducted Harman's (1976) single-factor test, which included extracting six components with eigenvalues exceeding 1 and verifying that the average variance of each construct was significantly below the 50 % threshold. Following this, we adopted Lindell and Whitney's (2001) approach, which involved introducing a marker variable (MV) unrelated to the primary variables of interest (Lindell & Whitney, 2001). We used a personal character as the marker variable, assessed through three items: "I exhibit a cheerful disposition," "I have a preference for the color green," and "I maintain a sizable social circle." If a strong correlation had emerged between the

Table 2
Convergent and discriminant validity of the variables.

Parameters	GS	CL	TL	SCA
1. GS	**0.81**			
2. CL	0.02	**0.75**		
5. TL	0.01	0.01	**0.82**	
6. SCA	0.29	0.11	0.24	**0.79**

AVE = Diagonal values in bold.

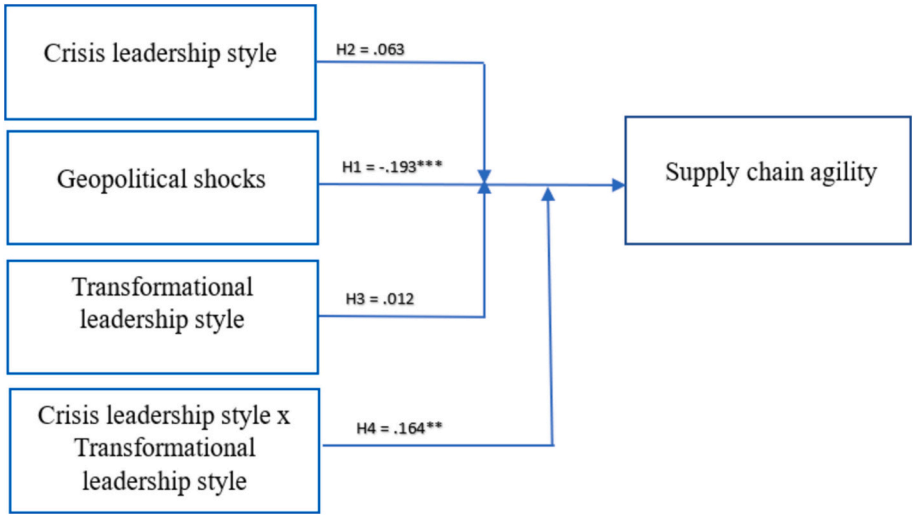


Fig. 1. Statistically validated model.

marker variable and the variables of interest, it could have indicated consistent response tendencies, potentially leading to misleading correlations between variables (Lindell & Whitney, 2001). However, our correlation analysis showed no significant associations between the marker variable and the key model variables (highest R-value = 0.08). This finding aligns with prior studies (Ali, Nagalingam, & Gurd, 2018; Chowdhury et al., 2019), supporting our testing approach's validity. Further analysis indicated that none of the variable correlations lost significance after partial adjustments. Finally, we introduced a common latent factor (CLF) loaded with all observed variables. Comparing the model's standardized regression weights with and without the CLF revealed no discernible difference ($p > .05$). In summary, these results collectively suggest that CMB is unlikely to be a significant concern in this study.

4.4. Endogeneity test

To minimize the risk of endogeneity before testing our hypotheses, we implemented several measures. Firstly, we aligned our hypotheses with established theory (SCT), as recommended by Antonakis, Bendahan, Jacquart, and Lalive (2014) and Damali, Miller, Fredendall, Moore, and Dye (2016), to minimize endogeneity. This theory doesn't support the concept of reverse causality, negating the possibility of SCA causing geopolitical shocks. Secondly, given the satisfactory values of composite reliability and average variance extracted (AVE), the possibility of endogeneity stemming from measurement error is minimized (Ketokivi & McIntosh, 2017). Thirdly, we conducted the residual analysis to scrutinize the presence of unobserved factors, also known as omitted variables, which could introduce endogeneity (Hill, Johnson, Greco, O'Boyle, & Walter, 2021; Sande & Ghosh, 2018). This involved examining the correlation between the independent variable and residuals (error terms) of the dependent variable in our model. Our analysis revealed non-significant ($p > .05$) correlations between the independent variable and residuals (unobserved factors), thus reducing the likelihood of endogeneity (Hill et al., 2021). To illustrate, since residuals capture unobserved factors like omitted variables, a non-significant relationship between residuals and the independent variable indicates minimal risk of omitted variables. Fourthly, following Antonakis et al.'s (2014) advice, we incorporated control variables into our analysis to minimize the risk of omitted variables contributing to endogeneity. Finally, a lack of common method bias, as evident in our analysis, also reduces the risk of endogeneity (Antonakis et al., 2014; Guide Jr & Ketokivi, 2015). Given the multiple recommended measures, it is evident that endogeneity is not an issue in this research.

4.5. Hypotheses testing

We employed IBM SPSS Amos 26 to assess the direct and moderating relationships in our model. First, the model analysis unveiled significant negative associations between geopolitical shocks (GS) and SCA ($\beta = -0.193$; $p < .001$), supporting H1. Referring to the model fit criteria established by Hu and Bentler (1999) and Hair et al. (2009), our analysis indicated an acceptable model fit, as evidenced by the following fit indices: *CIMN/DF = 2.11, p < .001, NFI = 0.924, CFI = 0.931, TLI = 0.915, AGFI = 0.914, RMSEA = 0.032, and SRMR = 0.034*.

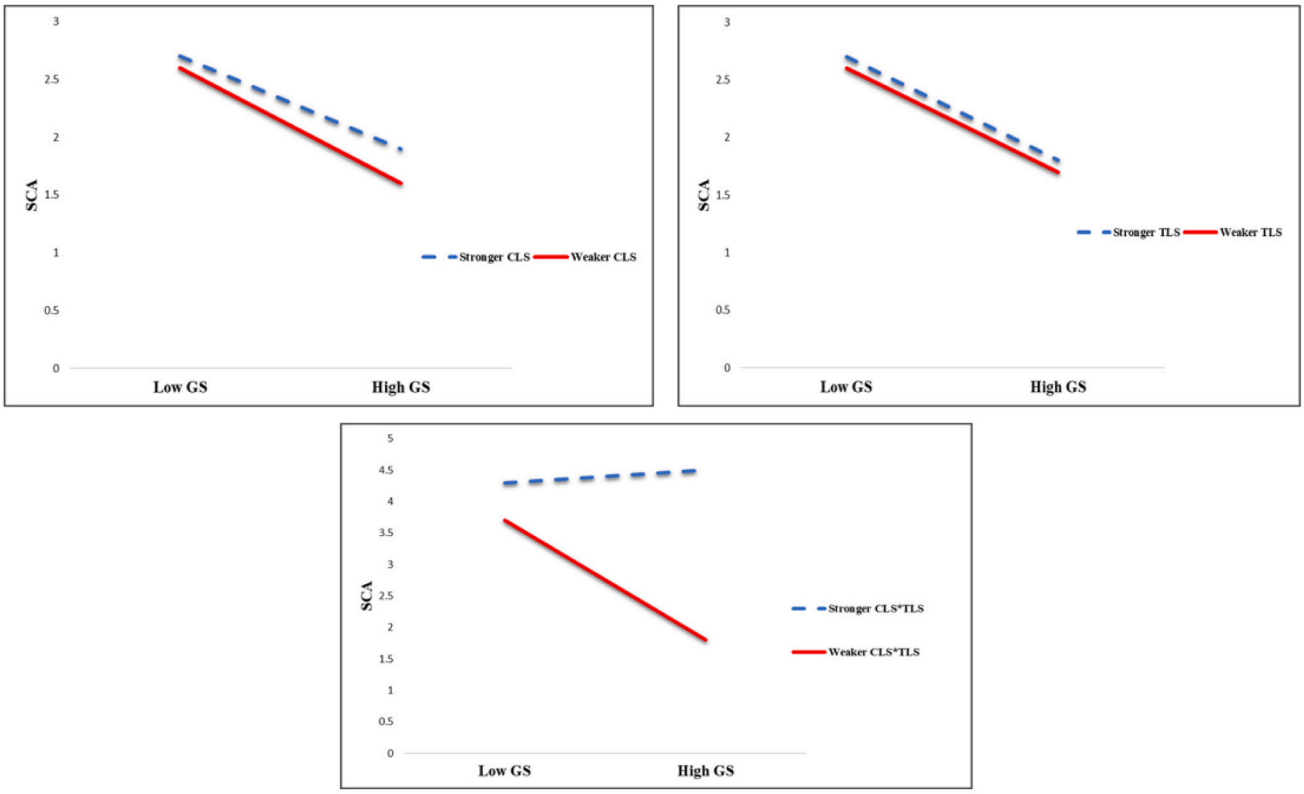
In the subsequent step, we conducted a moderation analysis (see Table 3) to examine the individual and combined effects of crisis leadership style (CLS) and transformational leadership style (TLS) on the relationship between GS and SCA. To achieve this, we initially mean-centered three variables of interest, including CLS, TLS, and GS. Subsequently, we generated three moderators using three interaction terms (following Ambulkar, Blackhurst, & Grawe, 2015; Ali et al., 2018): i) CLS x GS; ii) TLS x GS; iii) CLS x TLS x GS. Employing SEM in Amos, we regressed each interaction term or moderator on SCA.

The analysis revealed that CLS acts as a moderator with a positive but statistically insignificant influence ($\beta = 0.063$, $p > .05$) in mitigating the negative impact of GS on SCA; thus, H2 was not supported. Similarly, TLS serves as a moderator and has a positive but statistically insignificant effect ($\beta = 0.012$, $p > .05$) in alleviating the negative impact of GS on SCA, thereby H3 was not supported. Finally, analysis unveiled that a combination of CLS and TLS significantly ($\beta = 0.164$, $p > .001$) diminishes the influence of GS on SCA. Thus, H4 was supported.

To provide a more comprehensive explanation of the moderating influence, we have created an interaction effect chart (Fig. 2) that effectively illustrates how different leadership approaches impact the relationship between GS and SCA. The lines on the graph reveal that neither CLS nor TLS, when considered independently, significantly alters the adverse impact of GS on SCA. Conversely, when CLS and TLS are combined, they significantly moderate the adverse effects of GS on SCA. This means that with each increase in the levels of these leadership styles, the negative influence of GS on SCA proportionally decreases.

Table 3
Direct and moderation effects.

Hypotheses	Results	Remarks
H1: GS → SCA	$\beta = -0.193$; $p < .001$	Supported
H2: CLS x GS → SCA	$\beta = 0.063$, $p > .05$	Not supported
H3: TLS x GS → SCA	$\beta = 0.012$, $p > .05$	Not supported
H4: TLS x CLS x GS → SCA	$\beta = 0.164$, $p > .001$	Supported



CLS= Crisis leadership style, TLS = Transformational leadership style, GS = Geopolitical shocks

Fig. 2. Independent and joint moderating impact of crisis leadership style and transformational leadership style.
CLS = Crisis leadership style, TLS = Transformational leadership style, GS = Geopolitical shocks.

5. Discussion

As supply chains have been severely impacted by geopolitical disruptions (Moradlou et al., 2021; Roscoe et al., 2020), our fine-grained analysis provides valuable insights into the relationship between geopolitical shocks, crisis and transformational leadership styles, and SCA. Our study contributes to (i) the recent discussion among researchers on the profound impact of geopolitical disruptions on SCA (Shashi et al., 2020; Zahoor et al., 2022) to allow firms to maintain their continuity and performance (Gligor et al., 2020; Tarba et al., 2023); and (ii) the managerial world by discussing how organizations can use different types of leadership to enable organizations achieve agility and respond to expected and unexpected global challenges such as geopolitical disruptions. The following sections offer useful theoretical contributions and managerial implications of this study.

5.1. Theoretical contributions

Our study makes several useful theoretical contributions to the literature at the intersection of geopolitical shocks, leadership style, and SCA. First, we empirically found that there is a negative association between geopolitical shocks and SCA. This means that geopolitical shocks, encompassing issues such as supply failures, demand fluctuations, delivery delays, and loss of suppliers and buyers, present formidable challenges to maintaining firms' SCA. For example, supply disruptions ripple through the supply chain, affecting the timely availability of essential raw materials and components, thereby undermining firms' ability to respond rapidly and exhibit flexibility to customer demands. This particular finding contributes to the existing stream of literature in two ways: (i) our study recognizes the factors that negatively impact SCA. Nonetheless, the majority of extant studies have examined factors that positively contribute to SCA and drive its development, such as market orientation and learning orientation (Braunscheidel & Suresh, 2009), supply chain orientation (Gligor, 2016), supply chain integration (Khan & Wisner, 2019), supply chain flexibility (Gligor et al., 2019), supply chain coordination, cooperation, and communication (Gligor & Holcomb, 2012), market sensitivity (Aslam et al., 2018), or possessing a strong big data analytics capability (Dubey et al., 2018); (ii) we examine the impact of geopolitical disruptions on SCA phenomena. Past studies show how geopolitical shocks impact manufacturing location decisions (Moradlou et al., 2021), the sustainability of global supply chains (Qin et al., 2023), the ability to manage supply chain uncertainty (Roscoe et al., 2020), or supply chain management strategies (Johnson & Haug, 2021).

Second, we further contribute to the literature by investigating the mitigating effects of leadership styles. To this end, we revealed that the crisis leadership style, when practiced in isolation, did not have a statistically significant effect in mitigating the negative influence of geopolitical shocks on SCA. While analysis shows a positive association, the magnitude of this influence was insufficient to be considered meaningful. As such, our research enriches the current landscape of supply chain literature, both in its specific focus on crisis leadership style and its broader exploration of leadership styles. For instance, Dubey (2023a, 2023b) underscored the positive moderating role of the crisis leadership style in enhancing the relationship between digital transformation and collaboration within the supply chain. Additionally, Shin and Park (2021) emphasized the role of a supply chain leader's style in bolstering supply chain resilience-related capabilities. These findings resonate with those of Jia et al. (2019), who argued that supply chain leadership style also exerts a profound influence on supply chain

sustainability. Nonetheless, our study, by exploring the nuanced dynamics of crisis leadership style within the context of geopolitical shocks and SCA, contributes contemporary knowledge to the existing scholarship in the domain.

Third, we found that while the transformational leadership style has a positive influence, the effect was minimal in alleviating the negative impact of geopolitical shocks on SCA. By doing so, our study adds new insights into the literature on transformational leadership. Specifically, while extant research (Prabhu & Srivastava, 2023a; Birasnav & Bienstock, 2019; Ojha, Acharya, & Cooper, 2018; Sharif & Irani, 2012a, 2012b) has underscored the pivotal role of transformational leadership in shaping supply chain performance, our study recognizes the influence of transformational leadership on geopolitical shocks.

Fourth, we explored that a combination of crisis leadership style and transformational leadership style significantly reduces the influence of geopolitical shocks on SCA. This means blending crisis leadership, characterized by continuous worker interaction, media management, and immediate action during crises, with transformational leadership, known for articulating the vision, clarifying purpose, seeking diverse perspectives, and promoting skill development, offers a powerful strategy for mitigating the impact of geopolitical shocks on SCA. This combined approach provides an integrated response, where crisis leadership excels at addressing immediate, pressing needs, ensuring swift actions are taken to mitigate the impact of the disruption, while transformational leadership focuses on long-term strategies to thrive over time by articulating a compelling vision, clarifying core values, and promoting continuous improvement. This finding adds to the recent literature on supply chains and leadership (Mokhtar, Genovese, Brint, & Kumar, 2019), as well as literature on leadership styles as these have been discussed in relation to changing business dynamics fostering innovation (e.g., Dubey, 2023a, 2023b; Euwema, Wendt, & Van Emmerik, 2007; Somech, 2006; Stoker, Garretsen, & Soudis, 2019). Our study advances two research streams: (i) the studies that focus on geopolitical shocks, but do not focus on SCA (Moradlou et al., 2021; Roscoe et al., 2020); (ii) we highlight the importance of the combination of crisis and transformational leadership as being important in relation to geopolitical shocks and SCA, adding to those studies on role transformational leadership style only (Mokhtar et al., 2019; Ojha et al., 2018) or transactional and transformational leadership style (Hult, Ketchen, & Chabowski, 2007) to performance.

Fifth, we expand the supply chain research on strategic fit within supply chains. Past studies have shown that, in a supply chain context, various forms of fit can lead to superior firm performance, such as strategic consistencies between the products' demand and supply uncertainty and the underlying supply chain design (Wagner et al., 2012), fit between suppliers' flexibility and their customers' expected flexibility (Gligor, 2018), or fit between the supply chain orientation of the supply chain members (Gligor et al., 2022). We complement this stream of research by revealing that alignment, in the form of high levels of crisis leadership and transformational leadership, has a positive impact on firms in the form of superior SCA in the aftermath of geopolitical shocks.

5.2. Practical implications

As geopolitical shocks spread and have a devastating impact on organizations and supply chains, our study offers useful takeaways for managerial practice. First, we argue that supply chain managers and leaders would need to assess the potential impact of geopolitical disruptions on SCA. Such shocks often result in delivery delays due to factors such as transportation blockades, port closures, or heightened customs scrutiny, negatively impacting firms' SCA. By assessing the impact, firms will be able to devise recovery measures to deal with the repercussions of these disruptions.

Second, our findings suggest that crisis and transformational leadership per se cannot be the sole solutions to address the multifaceted challenges posed by geopolitical shocks, as they need a more integrated approach to enhance SCA. We argue that leaders should use *both* crisis and transformational leadership together when dealing with the challenges posed by geopolitical shocks. Crisis leadership is primarily focused on making prompt decisions and reacting quickly to unexpected challenges, whereas transformational leadership promotes an environment of ongoing learning and empowerment. By integrating these two strategies, leaders can effectively navigate crises while simultaneously leveraging these events as a chance to develop the skills of supply chain personnel. For instance, swift actions in response to a crisis may include cross-training employees for multiple functions, thereby increasing their flexibility and enhancing their skill sets. This approach ultimately contributes to greater agility within the supply chain during future geopolitical upheavals.

6. Conclusion and future research directions

This paper investigated the role of crisis and transformational leadership on hedging the negative influence of geopolitical shocks on firms' SCA. Drawing on SCT, our findings suggested that crisis and transformational leadership can together have a synergistic effect on the SCA. Those firms, hence, that can combine crisis and transformational leadership can enjoy SCA at times of geopolitical upheavals compared to those firms that apply either one or none of these strategies.

The study is not without any limitations. First, we have used a survey to measure the constructs of interest. However, there may be opportunities for researchers to use secondary data to enhance this study. Second, our study focused on the firm as the unit of analysis; to generalise the findings, our data could be collected from different industries. Third, we focus on two types of leadership and how they affect agility at times of geopolitical disruptions; future research could explore the influence of other leadership styles (e.g. authentic, charismatic). Fourth, apart from leadership types, there can be other factors influencing SCA. Future research, thus, could focus on their use to further explore the link between crisis and transformational leadership on SCA. Fifth, prospective research could employ longitudinal or panel data to observe the influence of leadership styles on disruption and agility over time. Sixth, business management research has a severe shortage of action research methods – a collaborative and iterative process where researchers systematically investigate and address problems within their specific contexts, aiming for positive change and improvement. Therefore, action research could be an intriguing approach to examine the nexus between leadership styles, disruption and SCA.

CRediT authorship contribution statement

Imran Ali: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **David Gligor:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Maria Balta:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **Thanos Papadopoulos:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization.

Declaration of competing interest

None.

Appendix 1. Demographic information

Job Role	Supply Chain Assistant	61
	Assistant Procurement Manager	47
	Distribution Coordinator	43
	Deputy Supply Chain Manager	41
	Distribution officer	30
	Product Developer	25
Industry Type	Food and Beverage Manufacturing	58
	Pharmaceutical	50
	Machinery and equipment	47
	Metal products	46
	Logistics	46
Experience	< 5 years	49
	5–10 years	85
	11–20 years	113
Firm Size	Small (5–19)	30
	Medium (20–199)	89
	Large (>200)	128
Education Level	High School	48
	Bachelor's	139
	Master's	60

Data availability

The data that has been used is confidential.

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