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From disruption to innovation: The importance of the supply chain leadership style for driving logistics innovation in the face of geopolitical disruptions

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ABSTRACT

The intricate global supply chains and logistics operations have been acutely vulnerable to recent geopolitical conflicts and resulting disruptions. Meanwhile, research shows that the choice of an appropriate leadership style is pivotal for organisations striving to thrive in dynamic business environments and foster innovation. However, the current literature lacks a theory-driven empirical model that delves into the complex interplay between geopolitical disruptions and logistics innovation, as well as the influence of different leadership styles on this interplay. We address this knowledge gap by cross-pollinating logistics management and leadership literature. Drawing upon the strategic contingency theory and analysing 247 responses from manufacturing and distributing firms, our research reveals a multitude of compelling findings. Specifically, we ascertain that geopolitical disruptions exert a significant detrimental impact on logistics innovation performance. At the same time, we uncover the substantial mitigating effects of crises, participative, and transformational supply chain leadership styles on the negative influence of geopolitical disruptions on logistics innovation performance. That is, firms with supply chain leaders exhibiting higher levels of these three leadership styles experience a diminished negative impact compared to their counterparts. Interestingly, contrary to our initial expectations, the directive leadership style does not demonstrate any discernible effect in alleviating the adverse consequences of geopolitical disruptions on firms' logistics innovation performance. These findings contribute to a deeper understanding of the intricate dynamics at play and provide valuable insights for organisations seeking to navigate and overcome the challenges posed by geopolitical disruptions in their pursuit of logistics innovation.

1. Introduction

Recent geopolitical events, such as Russia-Ukraine war, the US-China conflicts, Brexit, and conflicts in the Middle East, have

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triggered shipping chaos and shortages of essential commodities, highlighting the need for more adaptive and innovative logistics systems. The imperative for such innovation is also underscored by the far-reaching impacts of the COVID-19 pandemic and the subsequent growth in omnichannel distribution (Gligor et al., 2022; Dovbischuk, 2022). Particularly, the escalating demand in e-commerce, coupled with the rising costs of fuel, introduces an additional layer of complexity to the current logistics landscape. In the face of these multifaceted global challenges, logistics innovation has transcended from being a mere option to an indispensable requirement in navigating today's intricate and demanding business environment.

Logistics innovation, as defined by Daugherty et al. (2011), represents a transformative concept in logistics operations, encompassing new ideas, procedures, or practices that deviate from a company's current approach. In a broader sense, it encompasses any elements within a firm's logistics framework that are novel or valuable to a specific target audience (Gligor et al., 2022). Undoubtedly, logistics innovation has emerged as a recognised catalyst for enhancing firm performance (Chu et al., 2018; Ramadani et al., 2017). The significance of logistics innovation becomes evident when considering its multifaceted benefits. For example, integrating innovation within logistics capabilities can serve as a viable alternative to outsourcing, empowering firms to enhance their supplier partnerships and establish a competitive edge (Ivan Su et al., 2011). Moreover, it enables companies to better fulfil customer demands, meet environmental requirements, expand their service portfolio, and elevate overall efficiency and effectiveness (Cui et al., 2012). Embracing logistics innovation also has far-reaching implications for enhancing a firm's logistics service quality, bolstering dynamic resilience (encompassing robustness and dynamic recovery), and ultimately elevating overall performance (Dovbischuk, 2022).

Leading global distribution and retail organisations, such as Amazon, Alibaba, FedEx and UPS, have resorted to logistics innovation to enhance operational excellence (Amling and Daugherty, 2020; Chen et al., 2020). Modern businesses are under continuous pressure to innovate their logistics capabilities as "what was considered 'good' logistics service in the past may not be sufficient anymore; rather, they must be responsive to changing customer needs and focus on creating superior customer experiences" (Chen et al., 2020, p. 316). Considering the impact of logistics innovation on various aspects of a firm's performance, resilience, and sustainability, it is important to understand the factors that facilitate or hinder its development. We refer to logistics innovation performance as the extent to which firms implement novel strategies, practices or technologies to drive innovation in the logistics and supply chain realm.

While, as indicated earlier, various recent developments have been shown to influence logistics innovation, in this research we are particularly interested in exploring the impact of geopolitical disruptions on firms' logistics innovation performance. Geopolitical tensions, such as Brexit in the U.K., the U.S.-China trade war, and Russia's invasion of Ukraine, have unleashed a wave of unprecedented disruptions that have reverberated through global trade and logistics operations (Moradlou et al., 2021). Although firms' logistics operations are particularly sensitive to geopolitical disruptions (Kotcharin and Maneenop, 2020; Roscoe et al., 2022), little is known about how geopolitical disruptions impact logistics innovation performance. Considering the increasing frequency and magnitude of geopolitical disruptions (World Economic Forum, 2020), it is important to develop a better understanding of how such events influence logistics innovation performance.

Addressing the impact of geopolitical disruptions on logistics innovation is relevant for both, practice and academia. Without such insights firms' managers have little guidance on how to plan for the global positioning and allocation of their logistics capabilities in consideration of the development of geopolitical events. To illustrate using a recent example, industry sources reveal that Brexit has increased logistics costs for firms, which results in fewer resources available to be devoted to logistics innovation (Dfreight, 2023). Meanwhile, Brexit has also increased the need for innovation in logistics technology (Deloitte, 2023). Geopolitical disruptions thus exert a dual pressure on logistics innovation: on one hand, geopolitical disruptions can amplify the need for logistics innovation, and on the other hand, they can leave firms with fewer resources to innovate due to increases in costs (Supreme Freight Services, 2020).

Similarly, addressing this relationship is important for the logistics innovation literature. Considering that logistics services are particularly vulnerable to geopolitical disruptions as they have long-term implications (Dfreight, 2023), exploring this link can enrich the literature on the drivers of logistics innovation by uncovering additional factors that influence its development. Specifically, while past studies have primarily focused on operational-level drivers within firms (Falcone et al., 2020), our study augments this stream of literature by expanding our understanding of environmental-level factors, such as geopolitical disruptions.

Recent studies have shown that leaders within organisations hold significant importance in successfully manoeuvring, predicting, and adjusting to turbulent circumstances through continuous innovation (Ahmed et al., 2018; Odoardi et al., 2015; Alblooshi et al., 2021). As such, it is plausible that leadership styles might also influence the extent to which firms can successfully engage in logistics innovation. Leadership style "refers to a kind of relationship whereby someone uses his ways and methods to make people work together for a common task" (Nagendra and Farooqui 2016, p. 65). While literature acknowledges the moderating effect of leadership styles in dealing with intricacies and enhancing performance (Chatterjee et al., 2022), we focus on the supply chain (SC) leadership styles as they are more likely to influence the behaviour of the employees engaged in logistics innovation. To offer a more comprehensive understanding of the complex relationships between geopolitical disruptions and logistics innovation performance, we investigate the role of the firm's SC leadership. Specifically, we examine how SC leaders' various leadership styles, such as crisis leadership, participative leadership, directive leadership, and transformational leadership, can moderate the impact of geopolitical disruptions on logistics innovation performance. Among others, these leadership styles have been often discussed in the literature when exploring means to deal with changing business dynamics and foster innovation (e.g., Defee et al., 2010; Dubey, 2023; Euwema et al., 2007; Somech, 2006; Stoker et al., 2019). Nevertheless, prior research has missed the opportunity to examine their influence on the link between geopolitical disruption and logistics innovation.

Consistent with this agenda, our research objective is to offer insights into the relationship between geopolitical disruptions and logistics innovation performance, while accounting for the role of leadership styles of their respective SC leaders. In this vein, we put forth the following research questions: *How do geopolitical disruptions impact logistics innovation performance? and how does the leadership style of SC leaders influence the relationship between geopolitical disruptions and logistics innovation performance?*

To answer these research questions, we collected data from 247 managers of global firms and analysed it using structural equation modelling. Our research endeavour allowed us to derive several noteworthy theoretical and managerial implications Theoretically, it enriches the literature by shedding light on the relationship between geopolitical events and logistics innovation, addressing a notable gap in understanding the consequences of such disruptions. In doing so, we also explore the influence of SC leaders' leadership styles on the relationship between geopolitical disruptions and logistics innovation performance, drawing from both logistics management and leadership literature. The findings reveal how crisis, participative, and transformational leadership styles mitigate the negative impact of geopolitical disruptions on logistics innovation performance. Unexpectedly, our research finds that a directive leadership style does not alleviate this impact, challenging previous assumptions. This unexpected finding contributes to the debate on the effectiveness of directive leadership in fostering innovation.

From a practical standpoint, this study offers practical insights for supply chain executives and managers dealing with geopolitical shocks and striving for logistics innovation success. It highlights the broad impact of geopolitical disruptions on logistics innovation and suggests strategic measures to counter them. Particularly, this study emphasises the pivotal role of leadership styles—specifically crisis, participative, and transformational leadership—in mitigating the adverse effects of geopolitical upheavals and fostering innovation and performance. However, our research warns against using directive leadership during such periods, as it may hinder innovation and agility.

The rest of the manuscript is structured as follows. We first offer an overview of the theoretical foundations for our framework. We continue by presenting the theoretical arguments for our proposed hypotheses. Next, we describe the methodology and present the results. Finally, we detail the theoretical and practical implications of our findings and recognise the study's limitations and opportunities for future research.

2. Theoretical foundation and hypotheses

2.1. Logistics innovation

Logistics plays a critical role in the functioning of today's inter-connected fast-paced economies, orchestrating a seamless flow of goods and services and driving sustainable growth. Characterised by globalisation, just-in-time, outsourcing, e-commerce, complex SCs, and vertical disintegration, today's economies depend on logistics to meet customers' ever-changing and ever-shifting customer expectations (Chen et al., 2020). Logistics permeates multiple facets of the global economy. The U.S. retail logistics market size alone was valued at USD 43.17 billion in 2021, and it is expected to increase at a compound annual growth rate of 11 % until 2030 (Grand View Research, 2022). Overall, the U.S. logistics market approaches USD 2 trillion, or about 10 percent of the nation's GDP (Maiden, 2020). Its sheer size alone makes logistics a crucial factor for competitiveness and economic growth (Holl and Mariotti, 2022).

The ever-increasing pace of change and turbulence in the SC has exacerbated the need for logistics innovation (Falcone et al., 2020). While the need for innovation within logistics is accentuated by various challenges, growing environmental concerns represent one significant challenge that logistics must tackle through novel solutions. Transportation alone accounts for 17 percent of global greenhouse gas emissions and represents the fastest-growing source of emissions worldwide (Statista, 2023). As sustainability is becoming one of the chief concerns globally, logisticians need to innovate and develop sustainable solutions to reduce their environmental footprint.

In tandem with environmental pressures, changes in customer expectations are putting additional pressure on the logistics industry. Business customers and end consumers alike require increased flexibility, delivery speed, and more customised logistics solutions (Bozkurt and Gligor, 2021). To successfully accommodate such changes firms must develop new warehousing and delivery solutions. In this vein, firms are exploring the implementation of various innovations within their logistics operations, such as artificial intelligence, blockchain technology, or drone delivery (Gligor et al., 2022; Mithas et al., 2022).

Despite the need to innovate, the domain of logistics has been traditionally slow to embrace changes (Zinn and Goldsby, 2019). While logistics scholars have started to increasingly explore this topic, the logistics innovation literature is still maturing (Gligor et al., 2022). Recent research efforts have offered important insights into this phenomenon. For example, Amling and Daugherty (2020) sought to explain the role and impact of two megatrends: urbanisation and e-commerce. In their efforts to better understand logistics innovation in China, Falcone et al. (2020) conducted a case study on the retail giant Alibaba and its logistics affiliate Cainiao Network to reveal which logistics innovations are piloted and implemented in this country, while Giuffrida et al. (2020) explored the selection of an appropriate logistics solution for cross-border B2C e-commerce to China.

More recently, Gligor et al. (2022) explored logistics innovation from the perspective of firm managers and offered insights into the role of gender differences in logistics innovation, while Holl and Mariotti (2022) investigated the drivers for the adoption of logistics innovation. These studies offer an important foundation for understanding what drives logistics innovation but do not offer any insights into the possible impact of ongoing geopolitical disruptions. Furthermore, although Gligor et al. (2022) investigated the phenomenon using the manager as the unit of analysis, extant literature offers no insights into the role of the leadership styles of SC leaders in logistics innovation. Our study seeks to mitigate this current gap in the logistics innovation literature.

2.2. Geopolitical disruptions

Globalisation has made firms particularly sensitive to disruptions that can occur at various points along their internationally dispersed SCs (Kleindorfer and Saad, 2005; Gölgeci et al., 2023). SC disruptions can be described as events that disturb the normal flow of products and services within and across SCs and erode the firm's performance. SC disruptions can have natural causes, such as

floods, hurricanes, or wildfires, or can be man-made, such as political disputes, terrorism, or war (Hendricks and Singhal, 2005). Given their significant possible negative impact, SC and logistics practitioners and scholars alike have devoted significant efforts to understanding the impact of disruptions and how to better mitigate their effects (Ali et al., 2022; Ali, 2019; Gölgeci and Gligor, 2022). However, extant literature has primarily focused on the impact of natural disasters on SC and logistics, while fewer studies have addressed the impact of geopolitical disruptions (Moradlou et al., 2021; Roscoe et al., 2022).

Geopolitical events, such as conflicts in the Middle East, U.S.-China trade war, and Russia-Ukrain war, have caused firms to reconsider the design of their global SC through the repositioning of manufacturing facilities, which had a significant impact on their logistics operations. The 2019 political protests in Hong Kong caused the closure of the city centre and perturbated transportation networks (Roscoe et al., 2020), while the Russia-Ukraine war disrupted traditional SCs and completely reshaped logistics in the region (Kilpatrick, 2022).

Geopolitical events can also cause an increase in the complexity of firms' logistics operations and lead to delays at border crossings and subsequent increases in logistics costs. As a result of Brexit and the UK's split from the European Union, UK firms have experienced significant logistics-related challenges when trading with the European Union. To illustrate, over-the-road shipments crossing the Schengen border were delayed about 38 percent of the time in the fourth quarter of 2022 (Murray, 2023). This is confirmed by UK government officials who indicated "clear increases in costs, paperwork, and border delays" for UK firms since Brexit (UK Parliament, 2022). The effects of Brexit have further generated a significant need for logistics innovation as highlighted by industry experts (DFFreight, 2022). Because geopolitical disruptions do accentuate the need for logistics innovation, it is important to examine whether such events facilitate or impede logistics innovation.

2.3. Leadership styles

Past studies have shown that leadership styles can influence various aspects of innovation within firms. Bossink (2004) found that charismatic, instrumental, strategic, and interactive innovation leadership styles facilitate ecological innovation only when the manager also injects the project with ecological knowledge, information, and competence. In their study exploring the role of group and psychological processes, Odoardi et al. (2015) revealed that the participative leadership style can indirectly influence innovative work behaviour via perceptions of group processes (group support for innovation and group vision) and psychological empowerment. Later, Ahmed et al. (2018) explored the impact of paternalistic, authentic, and democratic leadership styles on open innovation and found support for a direct and positive relationship.

More recently, Echebiri and Amundsen (2021) investigated the association between two opposite leadership styles (empowering and directive) and employee-driven innovation. Their findings showed that empowering leaders typically have a positive relationship with their subordinates which stimulates employee-driven innovation, while directive leaders stifle employee-driven innovation. Noteworthy, Alblooshi et al. (2021) conducted a systematic literature review to explore the relationship between leadership styles and organisational innovation. Twenty-three different leadership styles were examined by these authors, including "transformational, transactional, ambidextrous, authentic, complexity, charismatic, ethical, altruistic, humble, paternalistic, humorous, entrepreneurial, spiritual, cluster, distributed and shared, developmental, servant, participative, strategic, integrative, political, self-leadership, and CEO". They concluded that, depending on the particular leadership style, different leadership styles can directly affect an organisation. Alblooshi et al. (2021) also revealed that certain leadership styles can have both, an indirect and a direct effect on organisational innovation. Highlighting the significance of the leadership style, Verghese et al. (2022) found that customers' leadership style positively influences suppliers' resilience. Research on behavioural operations also establishes a link between soft skills (e.g., leadership style) and organisational performance (Liu et al., 2020).

The arguments presented above offer theoretical reasons to consider the role of SC leaders' leadership styles in the relationship between geopolitical disruptions and logistics innovation performance. While, as illustrated above, extant literature recognises the existence of a plethora of leadership styles that SC leaders could exhibit, in this article we focus on the moderating role of four styles of leadership: crisis, participative, directive, and transformational (Arnold and Loughlin, 2013; Bowers et al., 2017; Wu et al., 2021), which have been often discussed in the literature to thrive in the turbulent business environment and harness innovation (e.g., Defee et al., 2010; Dubey, 2023; Echebiri and Amundsen, 2021; Euwema et al., 2007; Somech, 2006; Stoker et al., 2019). In the hypothesis development section, we further shed light on these leadership styles in the selected context.

2.4. Strategic contingency theory

The strategic contingency theory (SCT) indicates that organisations try to identify a fit between the organisational structures, systems, and processes and how they are aligned to the external environment by reconfiguring resources, processes, and systems (Lawrence and Lorsch, 1967; Thompson, 1967). While SCT scholars have used a variety of terms to explain its tenets, they "generally chose centralisation, specialisation and formalisation as the underlying dimensions of organisational structure" (Shenkar and Ellis, 2021, p.786). Centralisation delves into the chain of command, formalisation captures the extent to which the organisation relies on formal procedures and rules, while specialisation describes the division of labour/work specialisation (Miller et al., 1991). Despite its popularity, SCT has never been explicitly linked to the contingency leadership model, particularly in the international business or supply chain context. We seek to use SCT as a complementary framework to leadership theories. We link the SCT dimensions of decentralisation, informalisation, and despecialisation to various leadership styles to reveal the isomorphic relationship between SCT and leadership theory (Fiedler, 1971).

The reconfiguring process aims to adapt strategy to the environment, reduce uncertainty and improve organisational performance

through the structural contingency approach (Lawrence and Lorsch, 1967; Lee and Miller, 1988; Thompson, 1967). The rationale behind employing SCT in our study lies in its capacity to delve deeper into the nuanced ways in which various leadership styles reconfigure structures and interact with geopolitical disruptions (external contingencies) to sustain logistics innovation. Geopolitical disruptions have increased lately (i.e., the global food crisis, the Sichuan earthquake, the Russia-Ukraine war, and China and US tension) (World Economic Forum, 2022). In a SC context, tensions associated with geopolitical disruptions or uncertainties might occur between buyer–supplier relationships (Simangunsong et al., 2012p. 4494; Wagner and Bode, 2008). Due to the current situation, one of the firm's competitive priorities is to formulate and implement strategies that achieve a fit between the organisation and external stimuli. As we indicate in the subsequent sections, the four leadership styles examined in this study (directive, crisis, participative, transformational) impact how firms navigate geopolitical disruptions, maintaining logistics innovation.

2.5. Hypotheses development

The SCT can be used to examine how events such as geopolitical disruptions, which are external factors beyond an organisation's control (environmental contingencies), influence the intricate dynamics of logistics innovation within the global landscape. The significance of logistics in the global economy serves as the linchpin for the efficient distribution of products to consumers across the world (Liu et al., 2018). Logistics success hinges greatly on SC integration (Wong et al., 2011), which seeks to harmonise an organisation's internal structures, systems, and processes with the ever-evolving external environment, which is in line with the tenet of the SCT (Burns and Stalker, 1994; Lawrence and Lorsch, 1967; Thompson, 1967). Within this harmonisation lies the catalyst for strategic collaboration (Donkor et al., 2021) between organisations and their partners, fostering cooperative planning, joint product development, and the exchange of invaluable information—including novel concepts, procedures, and practices—with suppliers and customers alike. This synergy often leads to the emergence of logistics innovation (Gligor et al., 2022; Chu et al., 2018; Ramadani et al., 2017).

Geopolitical disruptions, representing environmental contingencies (Lawrence and Lorsch, 1967; Moradlou et al., 2022), pose challenges in establishing robust supply chain collaboration and making significant investments in research and development endeavours and innovative initiatives. For instance, logistics innovation would expect substantial investments in cutting-edge technology or processes through collaborative relationships within the supply chain. However, the research shows that environmental factors could influence the behaviours towards investment in technology (Ravichandran and Liu, 2011). Specifically, the unpredictable nature of geopolitical events represents instability, delivery delays, and supply–demand failures due to trade wars, which often fosters an atmosphere of uncertainty and risk aversion (Ho et al., 2015). This would, in turn, impede businesses' willingness to make investments in new technologies and processes towards logistics innovation. Given these intricate dynamics, it is plausible to pose the hypothesis that geopolitical disruptions, acting as external contingencies, could exert a negative influence on the logistics innovation performance:

H1: Geopolitical disruption negatively affects logistics innovation performance.

The unpredictable nature of geopolitical events, characterised by instability and trade tensions, often leads to disruptions in supply chain processes (Bednarski et al., 2023). These disruptions manifest in various forms, including delivery delays, supply–demand imbalances, and trade restrictions, necessitating swift adaptation strategies from supply chain stakeholders (Moradlou et al., 2021; Roscoe et al., 2022). Crisis leaders possess the acumen to act as transformative agents fostering flexibility and collaboration through decentralization, informalisation, and despecialisation in time of crisis (Schaedler et al., 2022; Dubey, 2023). Particularly in the context of geopolitical disruptions, crisis leaders can deal with the immediate effects of crises and can more effectively spot opportunities within crises that allow their organisations to continue to grow (Bundy et al., 2017; James et al., 2011). Their influence extends to fostering a culture of quick response, facilitating swift resource mobilisation, seizing emerging opportunities, and articulating collaboration (Dubey, 2023; Littlefield and Quenette, 2007). Furthermore, crisis leaders excel in the rapid dissemination of reliable information, thereby mitigating misinformation and preventing panic among both employees and stakeholders (Littlefield and Quenette, 2007; Dubey, 2023). The structured and swift response by crisis leadership to the contingencies imposed by geopolitical dynamics serves as a powerful catalyst, actively contributing to the preservation of logistics innovation amidst the uncertainties presented by external disruptions.

When considering the three structural dimensions of SCT (Fiedler, 1971), crisis leaders can adeptly trigger a swift-response mechanism by steering the organisation towards decentralisation, informalisation, and despecialisation. These strategic manoeuvres not only cultivate a dynamic and adaptive organisational environment but also empower efficient responses to challenges, fostering innovation in logistics despite the uncertainties presented by geopolitical upheavals (Roscoe et al., 2022). For instance, in times of crisis, such leaders institute a decentralised decision-making process involving their teams and stakeholders, thus allowing diverse and innovative ideas. Simultaneously, their informalisation style supports open communication channels by moving away from rigid rules and formalised protocols, thereby fostering quick adjustments in response to changing circumstances (Fiedler, 1971). The encouragement of cross-functional collaboration and knowledge sharing among team members embodies the principle of despecialisation, encouraging the adoption of varied tasks and roles in a unified response, which are integral to quickly adopting the latest logistics technologies and processes (Gligor et al., 2022). In light of the SCT, we, therefore, have theoretical reasons to consider that a positive fit or alignment between crisis leadership style and geopolitical disruptions can improve or maintain logistics innovation performance:

H2: The crisis leadership style of SC leaders positively moderates geopolitical disruption's negative influence on logistics innovation performance.

The research suggests that participative leadership acts as a bridge, transforming the challenges posed by geopolitical disruptions into fertile ground for innovative solutions. Active involvement of subordinates in decision-making and a culture of open communication, hallmarks of participative leadership, empower organisations to leverage the collective intelligence of their workforce (Somech, 2005, 2006; Kapucu and Ustun, 2018; James et al., 2011; Bartsch et al., 2021). This inclusivity and adaptability are pivotal for navigating uncertainties of geopolitical disruptions and fostering innovation in logistics (Roscoe et al., 2022), including investment in new technologies and processes. In addition, the autonomy and two-way information exchange mechanism, which are inherent in decentralisation and informalisation, adopted by the participative leaders (Schyns et al., 2020; Euwema et al., 2007; Stoker et al., 2019) are deemed instrumental in dealing with contingencies and harnessing innovative solutions (Raza et al., 2021; Schoemaker et al., 2018). These attributes of participative leaders resonate with Fiedler's (1971) decentralisation, informalisation and despecialisation theorisation, making participative leaders well-equipped to continue with innovative logistics solutions amid geopolitical turmoil (Roscoe et al., 2022). As such, based on the SCT perspective, we argue that the alignment of participative leadership style with geopolitical disruptions can sustain or enhance logistics innovation performance, encompassing factors like the speed of technology adoption, the rate of change in logistics processes, and the introduction of new products/services. Consequently, we advance the following hypothesis:

H3**:** The participative leadership style of SC leaders positively moderates geopolitical disruption's negative influence on logistics innovation performance.

The directive leader, embodying decisiveness, strength, and a take-charge approach with clear expectations, commands followership with an expectation for unwavering commitment and limited autonomy (Arnold and Loughlin, 2013; Bowers et al., 2017). This leadership style, which elicits controlled autonomy and decision-making freedom to subordinates, can trigger swift actions, empowering organisations to innovate their processes and systems promptly, thereby aligning with the dynamic environment (Thompson, 1967; Euwema et al., 2007; Stoker et al., 2019). In the dynamic context of geopolitical disruptions, direct leadership can be explained with the centralisation, formalisation, and specialisation dimensions of SCT. For instance, directive leadership, when employed thoughtfully, emerges as a potent mechanism for resolving tasks and role ambiguities inherent in times of crises (Euwema et al., 2007; Stoker et al., 2019). This leadership, well-aligned with the tenets of centralisation, enables centralised decision-making processes, reducing the likelihood of process loss and promoting efficiency in team accomplishments. The provision of defined protocols and role-relevant directions by directive leaders (Lorinkova et al., 2013), which resonates with formalisation, reduces variability in team interactions and tasks (Krause et al., 2022). Moreover, a directive leader's ability to provide clear, role-relevant directions aids in the efficient allocation of resources and expertise, ensuring that each team member operates within their specialised domain. This interplay of centralisation, formalisation, and specialisation can enhance organisational responsiveness to external disruptions, cultivating an environment where logistics innovation can flourish despite the challenges imposed by geopolitical dynamics (Moradlou et al., 2021; Roscoe et al., 2020). Therefore, building on theoretical arguments, the proposition stands that directive leadership could swiftly nurture a firm's adaptive capacity, fostering innovation within its logistics function following geopolitical disruptions:

H4**:** The directive leadership style of SC leaders positively moderates geopolitical disruption's negative influence on logistics innovation performance.

Originally introduced by Burns (1979) and subsequently developed by Bass (1985), transformational leadership inspires followers to achieve their potential at work, intellectually stimulates them (Judge and Piccolo, 2004; Mesu et al., 2015) and offers them a sense of purpose, by enhancing the value of the tasks assigned to them (Laila et al., 2022). Transformational leadership is particularly conducive to situations when the leader wishes to achieve high performance beyond the organisation's existing goals (Laila et al., 2022), that is, extra-role performance (Podsakoff et al., 1990).

By navigating the dimensions of decentralisation, informalisation, and despecialisation (Fiedler, 1971), transformational leaders can facilitate a harmonious alignment between organisational functions and the external environment (Drazin and Van de Ven, 1985). By wielding the strategic flexibility inherent in decentralisation, they ensure that decision-making processes are adapted to the specific demands of the external context. Simultaneously, through the lens of informalisation, transformational leaders encourage a structured yet adaptive approach to communication and collaboration, fostering an environment conducive to innovation (Defee et al., 2010). Furthermore, their proficiency in orchestrating despecialisation ensures a strategic allocation of resources and expertise, aligning the organisational structure with the dynamic external landscape (Donaldson, 1999). This intricate interplay between decentralisation, informalisation, and despecialisation not only establishes a coherent synergy but also emerges as a precursor to fostering logistics innovation (Gligor et al., 2022; Chu et al., 2018), such as advances in technologies and processes. The capabilities of exploiting operational efficiencies and exploring innovative opportunities (Ojha et al., 2016) position transformational leaders as architects of superior logistics innovation performance. Consequently, theoretical foundations suggest that the transformational leadership style of SC leaders, in the light of SCT, serves as a mitigating force against the negative impact of geopolitical disruptions on logistics innovation performance. This proposition propels our investigation into the following hypothesis:

H5**:** The transformational leadership style of SC leaders positively moderates geopolitical disruption's negative influence on logistics innovation performance.

3. Methodology

The research presented in this study adheres to the positivist paradigm, utilising observable and quantifiable data (Zikmund et al., 2013). By adopting this philosophy, researchers can maintain an unbiased approach to data collection, ensuring that the findings are reliable (Zikmund et al., 2013). The hypotheses of the study are theory-supported, guaranteeing a deductive research strategy. A survey instrument was chosen as the suitable data collection tool to answer the research questions. A widely cited procedure was followed to structure the survey questionnaire and conduct the sampling (Dillman, 2000). Our unit of analysis is at the firm level including Australian manufacturing and logistics industries.

The Australian manufacturing and logistics industries are crucial to the production and distribution of commodities in both domestic and international markets. More specifically, the manufacturing industry is responsible for producing goods while the logistics industry plays a critical role in ensuring that goods are delivered to consumers on time. Australia imports and exports a wide variety of products from across the globe (Australian Bureau of Statistics (ABS), 2023). Due to their global presence, the firms in the Australian manufacturing and logistics industries are not immune to the threats posed by current geopolitical turmoils, such as trade wars and political upheavals (e.g., Australia-China, Russia-Ukrain, US-China etc.) that can have significant impact on SCs and logistics operations. To stay competitive in the face of these challenges, leaders in the Australian manufacturing and logistics industries must drive innovation and adapt to changing circumstances. One way they can do this is by selecting the right leadership style. By examining how successful leaders in these industries have navigated these challenges, we can gain valuable insights into effective leadership practices amid ongoing geopolitical interruptions.

Our findings have the potential to be generalisable as the Australian context shares some similarities with other economies that have well-developed manufacturing and logistics networks, such as New Zealand, Canada, Singapore, Japan, and the UK – all of which are also Australia's trading partners. As such, the Australian manufacturing and logistics industries offer intriguing contexts to examine how leaders drive innovation and adapt to these challenges by selecting the right leadership style.

3.1. Constructs and measures

While we adapted most measurement scales from published articles, the unique concept of 'geopolitical disruption' required to generate new items from the literature. In doing so, we followed Churchill's (1979) steps for new items generation, including item generation from relevant literature in the domain (Moradlou et al., 2021; Roscoe et al., 2020; Roscoe et al., 2022), pre-testing, content validity, and assessments of reliability, dimensionality test, and others. The construct was measured using five items on a 5-point Likert scale (1 = very low to 5 = very high) and analysis showed acceptable psychometric properties (Table 1). Second, the items used to gauge logistics innovation performance were adapted from established scales on innovation performance (Prajogo and Ahmed, 2006), plus insights gleaned from recent research on logistics innovation (Gligor et al., 2022). While Projogo and Ahmed (2006) employed eight measures, following discussions with highly accomplished scholars in the logistics innovation domain and relevant industry executives, we have incorporated five measures specifically tailored to the context of our study. The items were measured with five items on a five-point Likert scale (1 = worst in the industry, 5 = best in the industry) and they showed acceptable psychometric properties. Third, crisis leadership (Dubey, 2023; Littlefield and Quenette, 2007) was assessed using five items on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Fourth, participative leadership, derived from literature sources (Euwema et al., 2007; Stoker et al., 2019), was measured with five items on a five-point Likert scale (1 = non-participative to 5 = very participative). Fifth, directive leadership, also adapted from existing literature (Euwema et al., 2007; Stoker et al., 2019), was evaluated with five items on a five-point Likert scale (1 = non-directive to 5 = very directive). Lastly, transformational leadership, adapted from Defee et al. (2010) and inspired by Aldoory and Toth (2004), was assessed with seven items on five-point Likert scale (1 = not at all, 5 = frequently).

3.2. Pre-test

The adopted measuring items were subject to content validity and reliability testing in the context of this study, even though most of the items used for constructs were validated by prior research. The items and constructs were discussed with two academics with strong practical and theoretical understanding, as well as six senior industry executives to assure content validity. Incorporating their suggestions, the questionnaire's language and format were improved. 70 respondents from the sector participated in a pre-test of the questionnaire. The reliability of the measuring items and related constructs was assessed, and all associated constructs had Cronbach's alpha values that were greater than the cutoff point of 0.7 (Hair et al., 2014). The main survey and subsequent analysis did not include the pre-test individuals.

3.3. Data collection

The data were collected from firms in the manufacturing and logistics industries. We used an authentic market research firm, Dynata (https://www.dynata.com), to generate and distribute a questionnaire to 980 firms in Australia for data collection. With two reminders, 259 responses were received. During data cleaning and screening, seven responses were removed due to missing data related to logistics innovation performance and directive leadership. Additionally, five outliers, which represent responses significantly deviating from the rest of the data, were excluded. This has resulted in a final dataset of 247 responses leading to a response rate of about 25 %. The demographic information demonstrates the heterogeneity of our sample (see Appendix 1).

4. Analysis and results

Non-response bias was tested following the guidelines outlined in Armstrong and Overton (1977), as adopted in previous survey-based studies in the field (e.g., Chowdhury et al., 2019; Ko et al., 2021). A comparison between early and late responses was made based on the main constructs of the model (Fig. 1). The independent sample *t-test* showed no significant differences between early and late responses, meaning non-response bias was not a concern in this study.

To control for common method bias (CMB), we undertook numerous *ex-ante* and *ex-post* remedies (Podsakoff et al., 2003). The *ex-ante* remedies involved procedural measures such as ensuring measurement items were drawn from established scales, using different wordings for scales, guaranteeing respondent anonymity, dividing the questionnaire into various sections, and separating the independent and dependent variables. *Ex-post* remedies involved some common statistical analyses. First, we performed Harman's (1976) single-factor test, which involved extracting six components with eigenvalues above 1 and ensuring that the average variance of each construct was significantly below the 50 % cut-off point. Second, we followed Lindell and Whitney (2001) and employed a marker variable (MV). The marker variable needs to have no theoretical relationship to the relevant variables (Lindell and Whitney, 2001). We used a personal character, a theoretically unrelated variable, in the questionnaire, which was measured with three items: "*I am a cheerful person*", "*I like the green colour*", and "*I have a lot of friends*". If there is a strong correlation between the marker variable and the variables of interest, this shows that respondents tend to respond to items in a particular way across different measures, leading to erroneous correlations between variables and vice versa (Lindell and Whitney, 2001). Our correlation analysis showed that there are no significant relationships between the MV and any of the important model variables (highest R-value = 0.08). According to previous studies (Ali et al., 2022; Chowdhury et al., 2019), the test strategy is appropriate. The analysis indicated that none of the correlations among the variables became insignificant after partial adjustments. Third, a common latent factor (CLF) was loaded with all observed variables. A comparison of the model's standardised regression weight with and without CLF revealed no discernible difference ($p > 0.05$). These numbers demonstrate that CMB is not likely to be a problem in this investigation.

4.1. Measurement reliability and validity

We used exploratory and confirmatory component analysis (CFA) to evaluate the measures' validity and reliability. Our scales had adequate psychometric characteristics (see Table 1). Convergent validity was confirmed because all items were loaded onto their respective latent variables and had factor loading values higher than 0.60 (Table 1). All constructs' Cronbach's Alpha values were higher than the suggested threshold of 0.70 (Hair, 2009; Nunnally, 1978). Average extracted variance (AVE) values and composite reliability values were both above thresholds of 0.50 and 0.70, respectively (Hair et al., 2014). According to Fornell and Larcker (1981), the AVE of each construct was higher than its connection with all other constructs. Last but not least, the variance inflation factor (VIF) test result was substantially lower than the greatest value of 10 (higher VIF = 2.312).

4.2. Endogeneity test

Before testing the hypotheses, possible measures should be taken to test and reduce the risk of endogeneity, which may occur when

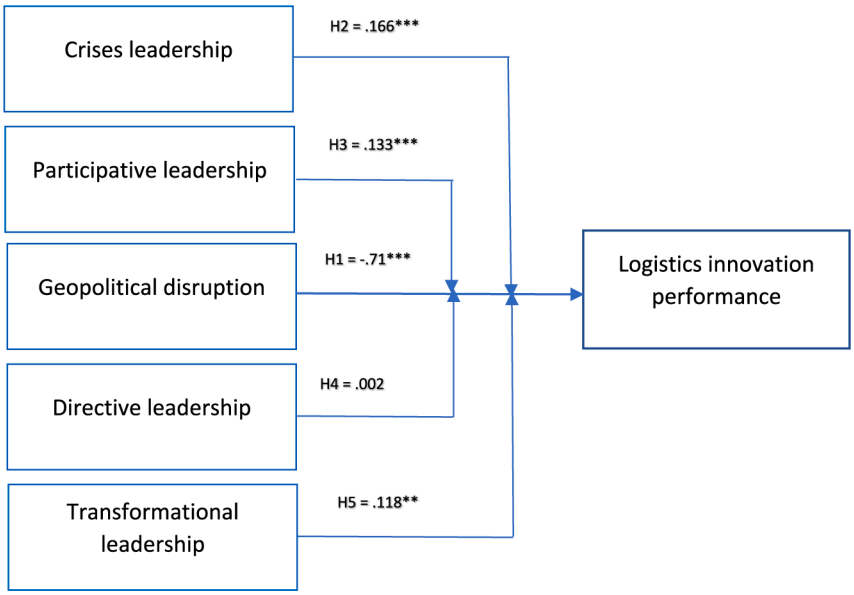


Fig. 1. Statistically validated model.

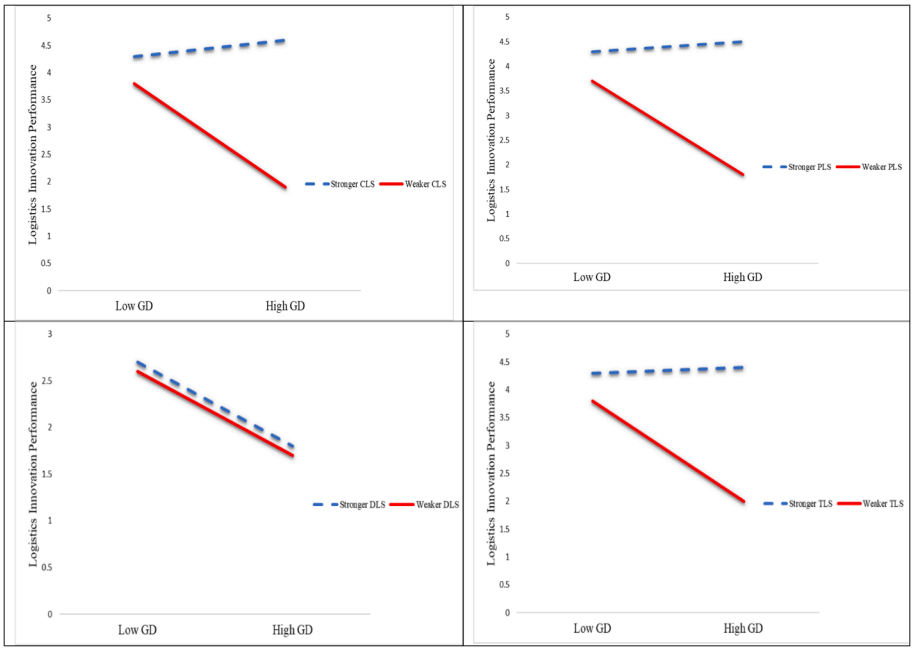


Fig. 2. Interaction plots showing the moderating impact of various leadership styles.

there is a reverse causal relationship (independent variable causes dependent variable and vice versa) or simultaneity. As such, we adopted multiple measures confirming that endogeneity was not an issue with our analysis. First, our hypothesised relationships are grounded in theory – specifically, the SCT – which does not support reverse causality (Antonakis et al., 2014; Damali et al., 2016). That is, the literature does not support that logistics innovation performance causes geopolitical disruption. Second, given the satisfactory values of congeneric reliability (*Pc*) or composite reliability and average variance extracted (AVE), the endogeneity is ruled out from the measurement error perspective (Ketokivi and McIntosh, 2017). Third, we conducted the residual analysis to examine the presence of unobserved factors (also known as omitted variables) that can cause endogeneity (Hill et al., 2021; Sande et al., 2018). In doing so, we tested correlations between independent variables and residuals in our model. Our analysis revealed non-significant ($p > 0.05$) correlations between the independent variables (geopolitical disruption and leadership styles) and residuals (unobserved factors), reducing the chances of endogeneity (Hill et al., 2021). Since the residuals capture unobserved factors such as omitted variables (Hill et al., 2021), a non-significant relationship between residuals and independent variables also suggests a low likelihood of omitted variables in our model. Furthermore, as recommended by Antonakis et al. (2014), we have incorporated some control variables to mitigate the chances of endogeneity due to omitted variables. Together, the residual analysis and control variables ensure that the risk of omitted variables and endogeneity bias in our study is minimal.

4.3. Hypothesis testing

We used SPSS with Amos 28 to test the direct and moderating effects of our model (See Fig. 1) First, we tested the direct relationship between geopolitical disruption and logistics innovation performance, which was found significantly negative ($\beta = -.71$, $p > .001$). Thus, H1 was supported.

For moderation analysis, first, the predictive variable (geopolitical disruption) and moderators (crisis leadership, participative leadership, directive leadership, transformational leadership) were mean-centred to reduce the risk of multicollinearity (Ali et al., 2018; Ambulkar et al., 2015). Next, a product term (predictive variable x moderator) was created for each moderator to test the interactive/moderation effects (Ali et al., 2018; Ambulkar et al., 2015). The analysis, using SEM with SPSS, suggested that crisis leadership, ($\beta = .166$, $p > .001$), participative leadership ($\beta = .133$, $p > .001$), and transformational leadership ($\beta = .118$, $p > .01$) significantly moderate the relationship between geopolitical disruption and logistics innovation performance, such that the organisations with a stronger or higher level of these three leadership styles are better able to maintain their logistics innovation performance in the face of geopolitical disruptions compared to those with a lower or weaker level of crisis leadership style. Thus, H2 to H4 were supported. Nevertheless, no significant moderating effect ($\beta = .002$, $p > .05$) of directive leadership was found on the relationship between geopolitical disruption and logistics innovation performance. Thus, H5 was not supported. The analysis indicated that our model fit indices are within acceptable limits (Bentler and Chou, 1987; Hair et al., 1998; Hair et al., 2014): *CMIN = 2.49, CFI = 0.912, GFI = 0.932, AGFI = 0.911, NFI = 0.914, and RMSEA = 0.038, SRMR = 0.04*.

To provide a more detailed explanation of the moderating impact, we have generated an interaction effect plot (Fig. 2) that vividly illustrates how distinct leadership styles influence the connection between geopolitical disruptions and logistics innovation

Table 1
Reliability and validity of constructs and measures.

Construct	Measures	Loadings
Geopolitical Disruptions	*α = 0.91, AVE = .81, CR = .94*	
	To what extent (1 = very low to 5 = very high) does your firm experience the following:	
	1. Supply failures due to trade wars or diplomatic conflicts.	.91
	2. Demand failures due to trade wars or diplomatic conflicts.	.92
	3. Delivery delays due to trade wars or diplomatic conflicts.	.89
	4. Loss of key suppliers due to trade war or diplomatic conflicts.	.93
	5. Loss of key buyers due to trade war or diplomatic conflicts.	.88
Crisis leadership style	*α = 0.87, AVE = .75, CR = .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 immediately takes necessary actions to provide relief to those affected"	0.87
	2. "The SC leader maintains composure in stressful situations, setting a stable and reassuring tone for the team".	0.86
	3. "The SC leader encourages mutual support and collaboration".	0.88
	4. "The SC leaders continuously use the media to provide accurate and timely information to prevent panic situations among workers and stakeholders".	0.84
	5. "The SC leader assesses the situation quickly, identifies priorities, and formulates effective response plans".	0.89
Participative leadership style	*α = 0.92, AVE = .78, CR = .95*	
	Please indicate the extent (1 = non-participative to 5 = very directive) to which your SC leader:	
	1. "Encourages subordinates to participate in most decision-making of the SC activities".	.85
	2. "Keeps everyone involved and well-informed about organisational issues that may affect them".	.88
	3. "Holds frequent meetings to share SC information and ideas with subordinates".	.87
	4. "Gives capable subordinates the freedom to make decisions and mistakes without close supervision".	.89
	5. "When making decisions, tries to obtain a great deal of input from subordinates".	.91
Directive leadership style	*α = 0.85, AVE = .55, CR = .79*	
	"Please indicate the extent (1 = non-directive to 5 = very directive) to which your SC leader:	
	1. Expects employees to follow his/her instructions precisely regarding SC activities".	.76
	2. "Requires employees to submit detailed reports of their SC activities".	.74
	3. "Makes most SC decisions for employees".	.72
	4. "Supervises employees very closely to meet SC targets".	.77
	5. "Expects employees to carry out instructions immediately".	.73
Transformational leadership	*α = 0.91, AVE = .82, CR = .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".	.87
	2. "Clarifies the central purpose underlying actions of all SC members."	.94
	3. "Seeks differing perspectives from the company when solving problems."	.88
	4. "Prompts the company to look at problems from many different angles."	.90
	5. "Asks employees for ideas on how to better solve SC problems."	.91
	6. "Challenges employees to develop their SC execution strengths."	.93
	7. "Encourages employees to continually improve their SC skills."	.96
Logistics innovation performance	*α = 0.81, AVE = .79, CR = .92*	
	Compare performance against major competitors (1 = worst in the industry, 5 = best in the industry):	
	1. The speed with which we adopt the latest technologies in logistics	.92
	2. The rate of change in our logistics processes, techniques, and technologies	.91
	3. The number of logistics innovative technologies that our firm has adopted.	.87
	4. The number of new logistics products/services that our firm introduced in the market.	.85
	5. The speed of adoption of the latest logistics technological innovations	.89

Table 2
Convergent and discriminant validity of the variables.

Parameters	GD	CL	PL	DL	TL	LIP
1. GD	**.81**					
2. CL	0.02	**.75**				
3. PL	0.03	0.69	**.78**			
4. DL	0.19	0.06	0.057	**.55**		
5. TL	0.01	0.01	0.018	.205	**.82**	
6. LIP	0.29	0.11	0.16	0.21	0.24	**.79**

AVE = Diagonal values in bold.

performance. In terms of crises, participative and transformation leadership styles, as the levels of these leadership styles increase negative impact of geopolitical disruptions on logistics innovation performance decreases. Conversely, our analysis reveals a non-significant moderating effect of directive leadership style in the relationship between geopolitical disruptions and logistics innovation performance. In essence, the directive leadership approach does not significantly alter the negative influence of geopolitical disruptions on the logistics innovation performance.

4.4. Control variables

Given that data come from heterogeneous sources, we controlled some factors such as firm size, industry sub-sectors, and managerial experience, which could potentially confound the main results of the model. As such, we have controlled the influence of these variables on the main results. In doing so, we created dummy codes for the firm size (1 = Small, 2 = Medium, 3 = Large), industry sectors (1 = Beverage Manufacturing, 2 = Pharmaceutical, 3 = Machinery and Equipment, 4 = Metal Products, Logistics = 5) and managerial experience (1 = < 5 years, 2 = 5–10 years, 3 = > 10 years). All three variables were regressed on the dependent variable (logistics innovation performance) in our main model. The results suggested a non-significant ($p > 0.05$) effect of all three control variables on the dependent variable. In addition, the inclusion of the control variables didn't change the original results for the hypothesised relationships in our model. As such, the control variables have no confounding impact on our model.

5. Discussion and implications

Global SCs and logistics operations have been significantly disrupted by geopolitical tensions like the UK's Brexit, the US-China trade war, conflicts in the Middle East and Russia's invasion of Ukraine. While firms' logistics operations are sensitive to geopolitical disruption (Kotcharin and Maneenop, 2020; Roscoe et al., 2022), how logistics innovation is affected by geopolitical innovations is not well understood. It is essential to acquire a deeper comprehension of how such events influence the performance of logistics innovation considering the rising frequency and magnitude of geopolitical disruptions (World Economic Forum, 2020). With such insights, firms' managers have guidance regarding how to plan for their global positioning and the allocation of their logistics capabilities in light of the development of geopolitical events. In this regard, we investigated how geopolitical disruption affects logistics innovation performance. To provide firms' managers and scholars with further insights into the examined relationship, we explored the moderating role of SC leaders' various leadership styles (crisis, participative, directive, and transformation leadership styles).

5.1. Theoretical contributions

By integrating relevant theoretical frameworks and empirical evidence, this research enriches the literature by providing fresh insights into the relationship between geopolitical events and logistics innovation and moderating the influence of SC leaders' leadership styles. First, our research contributes to the existing literature on logistics innovation (Gligor et al., 2022; Holl and Mariotti, 2022), which provides a solid foundation for understanding the factors that drive logistics innovation; however, it leaves the gap in insights into the potential consequences of ongoing geopolitical disruptions. Our study advances this stream of literature by extending our understanding of the impact of geopolitical disruption on firms' logistics innovation performance.

Second, our study cross-pollinates the logistics management and leadership (organisational behaviour) literature to examine whether and how various leadership styles influence the relationship between geopolitical disruptions and logistics innovation performance. The findings contribute to SCT (Hickson et al., 1971; Drazin and Van de Van, 1985; Donaldson, 1999; Wong et al., 2011) by revealing how fit or alignment between SC leaders' crisis, participative, and transformational leadership styles and geopolitical disruptions alleviate the negative influence of the disruptions on logistics innovation performance. That is, the negative impact of geopolitical disruption on firms' logistics innovation performance is lower for firms with SC leaders exhibiting a higher level of crisis, participative, or transformation leadership styles than firms with a lower level of crisis, participative, geopolitical, or transformation leadership styles. These results suggest that SC leaders, who continuously interact with their workers to understand problems, keep everyone involved and well-informed about organisational issues that may affect them or seek different perspectives from the organisation when solving problems, are better able to maintain their logistics innovation performance in the face of geopolitical disruptions. These findings are in line with the SCT literature confirming that in decentralised, less formalised organisations participation and communication among employees and managers/leaders are encouraged resulting in high innovation rates (Donaldson, 1999; Hage, 1965). In congruence, we add that the SC leadership styles alleviate the negative impact of contingencies – geopolitical disruptions – on logistics innovation performance, which could be thought of as an indirect way of innovation rate increase.

Third, contrary to our initial expectations, our findings reveal that SC leaders' directive leadership style has no discernible effect on mitigating the negative impact of geopolitical disruptions on firms' logistics innovation performance. To illustrate, in the face of geopolitical disruption, companies with SC leaders who demand immediate execution of instructions, require employees to submit detailed reports of their SC activities, or expect employees to follow their exact instructions are not better at maintaining their logistics innovation performance. This unexpected finding could be explained in part by the core assumption of SCT, such that high uncertainty tasks like a geopolitical disruption are most effectively performed by a decentralised hierarchy since the hierarchy needs to relinquish some authority and be replaced by frameworks that encourage participation and communication (Donaldson, 1999). That is, Hage's (1965) study indicates that organisations that are centralised and formalised have high efficiency but poor innovation rates, whereas organisations that are decentralised and less formalised have low efficiency but high innovation rates. A directive leadership style could work more effectively in a centralised organisation where participation and communication among subunits are not encouraged,

which could explain why geopolitical disruptions' negative impact on logistics innovation performance is not positively affected by SC leaders' directive leadership style in the proposed direction.

Another explanation for the unexpected finding could be partly clarified by leaders' power distribution willingness. According to Hikson et al. (1971), "the lower the substitutability of the activities of a subunit, the greater its power within the organisation" (p.221). This suggests that if leaders allow their subordinates to participate in a decision-making process, communicate with them, and get their thoughts in the face of uncertain tasks such as geopolitical disruptions, they may feel that their power is under threat because of the probability of their leadership roles being taken over by subordinates. Participative or transformative leaders may not have such concern when collaborating with their subordinates to cope with uncertain tasks, but directive leaders may have since these leaders accentuate their position of power, make the leader the focus of decision-making authority, and place little emphasis on followers' initiatives and autonomy (Arnold and Loughlin, 2013). Thus, they could prefer to hold on to power in exchange for less logistics performance innovation when facing a geological disruption.

This result suggests that in the face of geopolitical disruption, firms should avoid working with SC leaders exhibiting a directive leadership style since it does not positively contribute to logistics innovation performance. This specific finding contributes to the debate in the literature on the effect of directive leadership, where some previous studies suggest that directive leadership positively affects innovation (Kesting et al., 2015; Somech, 2006). Somech (2006), for instance, argues that directive leaders are highly efficient in establishing clear rules, positively impacting innovation. Directive leadership is highly effective, especially when the problem is critical (Sims et al., 2009).

Overall, the results emphasise how important it is for SC leaders to communicate with their subordinates and employees to understand the issues, keep them up to date on organisational issues, and solicit their feedback to boost logistics innovation performance in the face of geopolitical disruption. In addition, it demonstrates that when geopolitical disruption occurs, SC leaders should not compel their subordinates and employees to follow their exact instructions because this does not foster logistics innovation performance.

5.2. Managerial implications

This study offers useful managerial takeaways that can help SC executives and managers navigate the challenges of geopolitical shocks and ensure the success of logistics innovation. First, our study informs managers about the widespread effects of geopolitical shocks (e.g., loss of key suppliers and customers or failure of demand and supply) on logistics innovation performance. We argue that SC leaders can lay down the foundation for building strategic measures that effectively offset geopolitical events' effects by recognising the challenges presented by geopolitical turmoil and preserving logistics performance.

Second, amid geopolitical upheavals, our study discovers a promising role of leadership styles in maintaining logistics innovation. Specifically, our study suggests that SC leaders' crisis, participative, and transformation leadership styles play an integral role in alleviating the negative impact of geopolitical disruption on logistics innovation performance. For instance, when dealing with geopolitical events, SC leaders exhibiting crisis leadership interact with workers to understand and address problems, take immediate action to provide relief during disruptions, handle crises promptly and promote digital technologies for transparency. Additionally, SC leaders exhibiting participative leadership effectively deal with the situation by involving subordinates in decision-making, promoting transparency and communication, facilitating information sharing, granting decision-making autonomy, and seeking input. These practices foster collaboration, empowerment, and agility within the SC for improved performance and innovation. When SC leaders engage in transformational leadership, they establish a strong vision, define the main goal, look for different viewpoints, promote multidimensional problem-solving, push skill development, and promote a culture of continual improvement.

Third, it is worth noting that the study uncovers an intriguing finding regarding SC leaders: a directive leadership style proves ineffective in mitigating the adverse effects of geopolitical disruptions on logistics innovation performance. Therefore, we advise SC leaders to avoid micromanaging or unduly directing their workers during periods of geopolitical unrest since this may impede innovation, agility, and the capacity to successfully handle disruptions.

Overall, we argue that SC leaders and managers need to be aware of the wide-ranging effects that geopolitical disturbances have on the effectiveness of logistics innovation. They can alleviate negative effects and promote resilient and innovative logistics systems by adopting crisis, participatory, and transformation leadership styles while avoiding directive leadership.

6. Limitations and direction for future research

Our study is not free from limitations, but they have potential avenues for future research. First, we used a survey instrument to measure the construct of interest; future researchers should consider using secondary data to enhance the perspective provided by the current study. Second, our unit of analysis is at the firm level, including the Australian manufacturing and logistics industries. To generalise the findings, future researchers should collect the data from a different country with a different unit of analysis. Third, we took into account four leadership styles as moderators, but these are not the only ones discussed in the literature. More specifically, according to the previous study, other types of leadership styles affect organisational innovation (Alblooshi et al., 2021). Therefore, future research should explore other leadership styles (e.g., ambidextrous, authentic, complexity, charismatic)' moderating role in the relationship between geopolitical disruption and logistics innovation performance. Finally, we used leadership styles as moderators in this paper; other factors such as firms' agility and reputation, employees' agility, and firm-related other factors could negatively or positively affect the negative impact of geopolitical disruption on logistics innovation performance. Thus, future researchers should use these factors as moderators to explore whether the link between geopolitical disruption and logistics innovation performance

depends on any of these factors. Another interesting future research direction could involve examining the exporting orientation of Australian manufacturing and logistics firms in the sample, focusing on all export destinations including geopolitical and non-geopolitical tension areas. Including this information as control variables in subsequent studies would help understand the variation (if any) in results.

CRediT authorship contribution statement

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

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

Appendix 1. demographic information

Job Role	Supply Chain Assistant	61
	Assistant Procurement Manager	47
	Logistics Coordinator	43
	Deputy Supply Chain Manager	41
	Logistics 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

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