



Master in Business Administration (MBA)

Postgraduate Dissertation

Title: The Impact of Geopolitical Tensions and Trade
Restrictions on Import Strategies in the Agricultural and
Livestock Supplies Sector in Greece

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Chapter 1: Introduction

1.1 Background of the study

In recent years, the international business environment has been increasingly influenced by geopolitical tensions, trade disputes, economic sanctions and broader processes of geoeconomic fragmentation. Major events such as the Russia-Ukraine conflict, the US-China trade dispute and the increasing use of tariffs and antidumping measures have already led to considerable disruption in international trade flows and global supply chains. These events have created profound uncertainty in international markets and pose significant challenges to industries which are highly dependent on imports and heavily integrated into global supply chains (Caldara & Iacoviello, 2019; Bekkers & Schroeter, 2020).

The growing influence of geopolitical risk indicates a broader change in the structure of the global economy. While globalization enabled firms to reduce production costs and increase operational efficiency by dispersing supply chains across international markets, it also created exposure to external shocks and systemic disruptions. As supply chains became more complex, geographically dispersed and highly interconnected, firms became increasingly vulnerable to political instability, restrictions on trade and transport, and policy shocks (Christopher, 2016; Ivanov & Dolgui, 2020). Therefore, geopolitical instability has become one of the major factors affecting international business and global supply chains.

Geopolitical risk can be described as the potential economic and operational consequences arising from political instability, international conflicts, diplomatic tensions, terrorism, and policy-related uncertainty. Caldara and Iacoviello (2019), through the development of the Geopolitical Risk (GPR) Index, show that geopolitical risk affects investment activity, trade flows, employment and overall economic performance. Similarly, Pastor and Veronesi (2013) argue that high levels of political uncertainty reduce investment activity and prompt cautious decision-making. More recent evidence further suggests that geopolitical instability leads to volatility in financial markets, disrupts international trade and negatively affects global growth prospects (Salisu et al., 2022).

One of the principal channels through which geopolitical risks affect international business operations is the implementation of trade restrictions. Measures like tariffs, sanctions, export controls and antidumping duties have increasingly been used by governments not only for economic purposes but also as geopolitical instruments. Although such measures are often intended to protect domestic industries or achieve strategic objectives, they simultaneously increase transaction costs, reduce trade efficiency, and create substantial uncertainty for firms operating within global markets (Bekkers & Schroeter, 2020; Auclert et al., 2025). In addition, geopolitical conflicts generate significant disruptions in transport networks and logistics systems, leading to increases in freight costs, insurance rates and shipment delays, thereby generating chain reactions across supply chains (Khan et al., 2021; UNCTAD, 2024).

These developments are particularly significant in the case of Greece's relatively small and import-dependent economy, where firms operating in the agricultural and livestock supplies sector are highly dependent on imported raw materials and internationally integrated supply chains. Agricultural production and livestock activity are dependent on imported inputs such as feeds materials, feed additives, fertilizers, agrochemicals, specialized agricultural products, among others. Thus, disruptions affecting global commodity markets, transportation systems or international trade relations can directly influence production costs, input availability and operational continuity.

In Greece, the vulnerability of the sector is compounded by the specific structural characteristics of the Greek economy. Greece has limited domestic production capacity for certain agricultural and livestock inputs nationally, resulting in high dependence on imports from international suppliers. Simultaneously, many firms operating in the sector are small or medium-sized enterprises (SMEs) that often possess limited bargaining power, limited financial resources and relatively high exposure to supply chain disruptions. Therefore, geopolitical instability and trade-related disruptions create significant operational and strategic challenges for firms attempting to maintain supply continuity, manage procurement costs and preserve their competitive position within an increasingly uncertain international environment.

Increasing geoeconomic instability stresses the critical role of supply chain resilience and strategic flexibility. Purely cost-oriented supply chain models have become increasingly vulnerable under conditions of geopolitical instability and increasingly

required integration with supply chain risk management frameworks, shifting managerial attention from cost minimization toward flexibility, resilience, and supply chain security (Christopher & Peck, 2004; Ivanov, 2020).

1.2 Problem statement

The growing frequency and intensity of geopolitical tensions have created a highly volatile and uncertain environment for international businesses. Geopolitical conflicts, sanctions regimes, trade disputes and the broader trend towards geoeconomic fragmentation have significantly disrupted international trade flows in recent years and the structure of global supply chains. This, in turn, creates significant operational and strategic challenges for businesses heavily reliant on international procurement and imported raw materials.

In an environment characterized by geopolitical instability, firms heavily dependent on imported inputs tend to be particularly exposed to such supply chain disruptions, as operations are largely dependent on the continuity of supply from external markets, relatively stable transport networks, and relatively predictable global market conditions. This is particularly evident in the agricultural and livestock supplies sector, which represents one of the most exposed industries due to its heavy reliance on imported feed materials, fertilizers, agrochemicals, feed additives, and other specialized agricultural inputs. Hence, supply chain disruptions originating from geopolitical events may directly affect procurement conditions, production costs, logistics efficiency, and operational stability.

The magnitude of these challenges can clearly be illustrated by recent geopolitical developments. Economic sanctions imposed on Russia following the Russia-Ukraine conflict have had significant effects on market access and supply stability for some key agricultural products, fertilizers and raw materials, and have significantly altered international commodity markets. Similarly, trade barriers and antidumping duties imposed by the European Union on imports from China have drastically increased procurement costs for many firms relying on both industrial and agricultural Chinese products. Geopolitical instability has also affected global transport systems, with

substantial increases in freight rates, higher insurance premiums, shipping delays and logistics service reductions (UNCTAD, 2024).

These developments create multiple interconnected pressures for firms operating within the agricultural and livestock supplies sector. Firms must simultaneously cope with rising procurement costs, uncertain availability of products, logistics bottlenecks and intensified market volatility while maintaining competitiveness and supply continuity. Consequently, traditional sourcing models focused primarily on cost minimization have become increasingly difficult to sustain under conditions of prolonged geopolitical instability.

These pressures imply that firms need to reevaluate and continuously redesign their sourcing strategies, supplier relationships, inventory policies and overall supply chain structures. Strategic adjustments increasingly include supplier diversification, regional sourcing, inventory buffering, transportation restructuring, and broader risk management practices aimed at improving operational resilience. However, implementing such strategies often involves significant trade-offs between efficiency, flexibility and cost-effectiveness.

Despite its practical relevance to businesses today, the literature on the topic seems relatively sparse on several fronts. Most studies examining geopolitical risk and trade barriers primarily focus on macroeconomic impacts, including economic growth, trade flows, financial markets and international investment patterns (Caldara & Iacoviello, 2019; IMF, 2023). Firm-level responses, particularly within highly import-dependent industries, have received limited scholarly attention.

Empirical research examining the adjustment strategies adopted by agricultural and livestock supplies firms in response to geopolitical instability and trade-related uncertainty remains extremely limited. Studies on supply chain disruption in this context often focus on general adaptation strategies while giving limited attention to the sector-specific characteristics of this industry, such as high import dependence, few substitution opportunities, vulnerability to transportation disruptions and commodity market fluctuations.

This research gap highlights the need for a more focused and sector-specific investigation of how firms adapt to geopolitical instability and trade restrictions in

practice. In particular, there is a need to examine the strategies that firms adopt in order to secure continuity of supply and reduce risks arising from increasing geopolitical uncertainty, and the extent to which these strategies are perceived to be effective in practice. Existing studies have also dealt with the concept of long-term organizational resilience under conditions of prolonged geopolitical instability. By focusing on the agricultural and livestock supplies sector in Greece, the present study seeks to contribute to the existing literature by providing empirical evidence on how firms experience and manage geopolitical disruptions at both the operational and strategic level.

1.3 Research objectives

The objective of this dissertation is to examine the effects of geopolitical instability and trade restrictions on sourcing activities, supply chain operations, and risk management practices within the agricultural and livestock supplies sector in Greece. In particular, the study aims to investigate how firms operate and respond within an import-dependent environment characterized by increasing geopolitical instability and international trade disruption.

More specifically, the study pursues the following objectives:

- To examine the extent to which geopolitical tensions and trade restrictions affect supply chain operations, procurement processes, sourcing decisions, and import costs for firms operating within the agricultural and livestock supplies sector.
- To identify the resilience-oriented strategies and risk management practices adopted by firms in order to manage sourcing risks and maintain supply chain continuity.
- To analyze the role of resilience-oriented strategies such as supplier diversification, inventory buffering, regional sourcing, and supply chain reconfiguration in enhancing operational resilience.
- To evaluate the extent to which risk management capabilities and resilience-oriented practices contribute to operational resilience and perceived firm performance under conditions of geopolitical instability.

- To provide empirical evidence regarding how firms in the Greek agricultural and livestock supplies sector respond and adapt to geopolitical instability and trade-related disruptions.

1.4 Research questions

Based on the objectives of the study and the theoretical issues identified in the literature, this dissertation seeks to examine how geopolitical instability and trade-related uncertainty influence firms operating within the agricultural and livestock supplies sector in Greece. Particular emphasis is placed on the operational challenges created by geopolitical risk and on the strategic responses adopted by firms in order to maintain supply chain continuity, and firm performance.

In this context, the study aims to address the following research questions:

1. How do geopolitical tensions and trade restrictions affect firms operating within the agricultural and livestock supplies sector in Greece?
2. What are the main operational and strategic challenges faced by firms as a result of geopolitical instability and supply chain disruptions?
3. How do firms adapt their sourcing strategies and supply chain structures in response to geopolitical risks and trade-related uncertainty?
4. What resilience-oriented strategies and risk management practices are adopted by firms in order to mitigate supply chain disruptions and improve operational resilience?
5. To what extent are resilience-oriented strategies and risk management capabilities perceived to contribute to operational resilience and firm performance under conditions of geopolitical instability?

These research questions provide the foundation for the empirical investigation conducted in this study and are directly linked to the conceptual framework, questionnaire design, and quantitative data analysis presented in the following chapters.

1.5 Significance of the study

The present study is considered significant both academically and practically, as it addresses an increasingly critical topic in the areas of international business, supply chain management, and geopolitical risk analysis. Given the increasing occurrence of geopolitical disruptions, trade conflicts and supply chain instability, there is an increasing need to better understand how firms respond strategically to external uncertainty and operational risk within increasingly unstable business environments.

From an academic perspective, the study aims to contribute to the existing literature on geopolitical risk, trade restrictions and supply chain resilience by focusing on a specific and relatively underexplored industry context. While a large volume of research has been produced on the impact of geopolitical instability on the macro level (trade flows, investment activity and economic growth), there is still an important gap regarding firm-level strategic responses and adjustments required when exposed to geopolitical and supply chain-related disruptions. In this respect, the study contributes to addressing this research gap by adopting a micro-level perspective to analyze how firms experience, interpret and manage geopolitical disruptions in practice.

The study also contributes to the growing discussion surrounding supply chain resilience, organizational resilience, and strategic adaptation under conditions of geopolitical instability. By examining sourcing strategies, operational adjustments and risk management practices within the agricultural and livestock supplies sector, the research provides empirical insights into how firms balance efficiency, flexibility and resilience in a rapidly changing international environment. Methodologically, the study combines theoretical analysis with empirical evidence based on primary data collected directly from firms operating within the sector. Furthermore, the focus on the Greek market adds contextual value to the literature, since relatively few studies have examined geopolitical risk and supply chain vulnerability within smaller and highly import-dependent economies.

From a practical perspective, the study offers valuable insights for managers, importers, supply chain professionals and decision-makers operating within industries exposed to geopolitical instability and international trade disruptions. The findings of the study may help firms better understand the risks associated with excessive dependence on

specific suppliers, regions or transportation routes, while also highlighting the importance of strategic flexibility and proactive risk management.

Furthermore, the study identifies and evaluates a range of resilience-oriented strategies (e.g. supplier diversification, inventory buffering, regional sourcing, supply chain reconfiguration) that may assist firms to improve operational continuity and reduce vulnerability to external shocks. These insights are particularly relevant for companies operating in the agricultural and livestock supplies sector, where supply disruptions, procurement uncertainty, and cost volatility may directly affect production capacity, profitability and market competitiveness.

Moreover, from a policy perspective, the study may contribute to discussions on supply chain resilience, food security and long-term sustainability of agricultural production systems by highlighting structural vulnerabilities associated with import dependency and geopolitical instability at both the Greek and European Union levels.

Overall, the study seeks to contribute both theoretically and practically to the understanding of how firms operating within highly vulnerable and import-dependent sectors adapt to geopolitical instability and manage supply chain uncertainty within an increasingly unstable and fragmented global economy.

1.6 Structure of the dissertation

This dissertation is structured into seven (7) chapters, each addressing a specific aspect of the research problem and collectively contributing to the overall analysis of geopolitical risk, trade restrictions, and supply chain management within the agricultural and livestock supplies sector in Greece.

Chapter 1 introduces the topic of the research and presents the background of the study, the problem statement, the research objectives and questions, as well as the significance and overall structure of the dissertation. The chapter establishes the rationale for examining the impact of geopolitical instability on import-dependent firms and outlines the overall focus and direction of the study.

Chapter 2 presents the literature review and provides the theoretical foundation of the study. The chapter critically examines the concepts of geopolitical risk, trade

restrictions, supply chain disruptions, and firm-level resilience strategies. It also explores the relationship between geopolitical instability and international business operations, while identifying the main research gap addressed by the dissertation. The chapter concludes with the development of the conceptual framework and the formulation of research hypotheses.

Chapter 3 provides an industry analysis of the agricultural and livestock supplies sector, with particular emphasis on the Greek market. The chapter examines the structure of the industry, its degree of import dependency, sourcing patterns and the role of global supply chains. It also analyzes the impact of recent geopolitical developments on procurement practices, logistics operations, operational costs and strategic decision-making within firms operating in the sector.

Chapter 4 outlines the research methodology adopted in the study. The chapter explains the research design, data collection methods, questionnaire structure, sampling approach and data analysis techniques used to investigate firm-level responses to geopolitical disruptions and supply chain instability. In addition, issues related to research reliability, validity and ethical considerations are discussed.

Chapter 5 presents the empirical findings derived from the questionnaire survey conducted among firms operating within the agricultural and livestock supplies sector in Greece. The chapter examines how participating firms perceive and experience geopolitical risks, trade restrictions and supply chain disruptions, while also analyzing the resilience-oriented strategies and risk management practices adopted by firms in response to these challenges. The findings provide empirical evidence regarding the relationships among geopolitical instability, supply chain disruptions, operational resilience and firm performance within an increasingly unstable and uncertain international business environment.

Chapter 6 discusses and interprets the empirical findings in relation to the existing literature and the conceptual framework of the study. The chapter evaluates the extent to which the findings support previous theoretical arguments and empirical studies, while also identifying key patterns, similarities and divergences emerging from the analysis.

Chapter 7 presents the conclusions of the study and summarizes the main findings of the research. The chapter also discusses the theoretical and managerial implications of the study, acknowledges its main limitations and proposes directions for future research.

Chapter 2: Literature Review

2.1 Introduction

This chapter critically reviews the relevant literature on geopolitical risk, trade restrictions, supply chain disruptions and firm-level strategic responses. Its purpose is not only to summarize previous research, but also to synthesize the main theoretical and empirical linkages between geopolitical instability and business decision-making, particularly within import-dependent sectors.

Growing evidence suggests that although globalization contributes to lower production and sourcing costs, it simultaneously increases firms' exposure to external shocks. As supply chains become geographically dispersed and operationally lean, they also become more vulnerable to disruptions associated with wars, sanctions, trade disputes, transportation bottlenecks and broader geopolitical instability (Christopher, 2016; Ivanov & Dolgui, 2020). Recent findings further demonstrate how trade tensions and disruptions affecting major maritime routes have increased pressure on freight costs, delivery times and overall supply chain reliability (UNCTAD, 2024).

Within this context, geopolitical risk has emerged as an important concept in economics, international business and supply chain management. Caldara and Iacoviello (2022) define and measure geopolitical risk through a news-based index capturing adverse geopolitical events and associated uncertainty. Their findings indicate that increased geopolitical risk is associated with lower investment, reduced employment and higher downside risks for economic activity. This contribution has become highly influential within subsequent research because it provides a systematic framework for connecting geopolitical developments with economic outcomes.

Another important stream of literature emphasizes the role of trade restrictions as a transmission mechanism linking geopolitical tensions with firm performance. Trade disputes, tariff escalation, sanctions and antidumping policies may alter sourcing structures, increase transaction costs and generate persistent uncertainty for firms operating within global markets. Examining the impact of trade conflict between the United States and China, the World Trade Organization (WTO) reported that tariff increases significantly reduced bilateral trade and contributed to trade diversion toward

third countries, demonstrating how international sourcing strategies may be reshaped by geopolitical and trade-related tensions (Bekkers & Schroeter, 2020).

Existing literature additionally suggests that the effects of geopolitical instability are not limited to macroeconomic indicators such as GDP, investment and trade flows, but also extend to firm-level operational decision-making processes, including sourcing strategies, inventory management, logistics coordination, pricing policies and risk management practices. These effects are particularly severe within import-dependent sectors due not only to increased input costs, but also to procurement delays, shortages and transportation uncertainty (Christopher & Peck, 2004; Ivanov, 2020).

These developments are especially relevant for the agricultural and livestock supplies industry. Firms operating within this sector rely heavily on internationally traded inputs such as feed materials, additives, fertilizers, agrochemicals and related raw materials. Consequently, geopolitical tensions and trade restrictions may directly affect sourcing continuity and operational performance, making the agricultural and livestock supplies industry an appropriate empirical context for examining firm-level strategic responses to geopolitical shocks and supply chain uncertainty.

The chapter reviews the theoretical literature related to geopolitical risk, trade restrictions, supply chain disruptions, organizational resilience and firm-level strategic responses, while also presenting the conceptual framework and research hypotheses of the study.

2.2 Geopolitical risk and economic impact

2.2.1 Definition and conceptualization of geopolitical risk

Geopolitical risk relates to uncertainty and potential economic consequences resulting from political instability, international conflict, diplomatic tensions, terrorism, and rivalry among states (Caldara & Iacoviello, 2018).. These risks could affect economic activity, international trade, investment flows and overall business operations.

A commonly accepted conceptualization is proposed by Caldara and Iacoviello (2022), which defines geopolitical risk as “risk related to adverse geopolitical events and associated tensions”. The Geopolitical Risk (GPR) Index they constructed, measuring

frequency of geopolitical-related news coverage, has become one of the most widely-cited measures of geopolitical instability over time and captured events ranging from wars and terrorism to military threats and diplomatic crises to investigate their impact on the economy and financial markets.

The significance of geopolitical risk is mainly because geopolitical events are usually exogenous and highly unpredictable. Contrary to traditional market risks, it is extremely hard to forecast and quantify them, leading to high levels of uncertainty on the part of firms, investors and policymakers (Pastor & Veronesi, 2013). Hence geopolitical risk is often perceived not as a transitory shock, but as a structural feature of the contemporary global economy.

Recent literature also emphasizes the link between geopolitical risk and the broader concept of geoeconomic fragmentation. In line with the International Monetary Fund's observation that "rising political tensions are increasingly reordering trade and investment along geopolitical lines", forming competing economic blocks, regionalized trade systems and politically driven sourcing decisions (IMF, 2023), geopolitical risks seems to influence not only the short-term fluctuations in economic activity, but the long-term structural development of international business and global supply chains as well.

2.2.2 Impact on economic activity

There is extensive evidence suggesting that geopolitical risk has a negative impact on economic activity, leading to lower investment and business confidence, higher financial market volatility and slow economic growth.

It has been shown that periods of heightened geopolitical tensions are correlated with lower industrial production, employment and overall economic growth (Caldara & Iacoviello, 2022). Similar findings are found by Salisu et al. (2022) where geopolitical instability increased stock market volatility while discouraging foreign direct investment, especially for emerging economies.

From a theoretical perspective, these negative effects can be largely attributed to the uncertainty channel. Geopolitical risk heightens ambiguity over future market conditions, trade relations, regulations and business environment, prompting cautious

behavior on the part of firms and investors, such as delaying investments, lowering capital expenditure and postponed strategic decisions (Pastor & Veronesi, 2013).

Geopolitical instability may also negatively affect economy through its transmission channels such as energy market, commodity price, transport and international trade disruption. For example, Khan et al. (2021) find that geopolitical tensions have a significant impact on energy prices, which then cause widespread macroeconomic consequences across sectors.

The recent IMF analysis further confirms that geopolitical fragmentation might lower global GDP growth in the long run as it reduces trade integration, technology spill over and international capital mobility (IMF, 2023). The above research thus suggests that geopolitical risk may lead to persistent structural consequences to global economy, not just transitory shocks.

2.2.3 Impact on international trade

International trade is directly and largely impacted by geopolitical risk. Diplomatic conflicts, trade barriers, export restrictions and sanctions imposed in politically unstable countries can have immediate impacts on trade relations between countries.

One mechanism through which geopolitical risk affects trade is to increase trade-related costs. For example, tariff escalation implemented due to US-China trade conflict significantly decreased bilateral trade flows while encouraging trade diversion to third countries (Bekkers & Schroeter, 2020), indicating how geopolitical tensions are fundamentally reshaping global trade patterns and sourcing structures. Meanwhile, political tensions may increase trade policy uncertainty that prevents firms to anticipate and plan for future policy changes such as tariff adjustments and sanctions. This would discourage firms from making long-term international investments and expanding overseas business operations (Yang & Peng, 2025).

Recent studies from IMF and WTO suggest increasing trade fragmentation, where countries are developing trade with politically allied groups rather than on pure efficiency-based networks (IMF, 2023). This may lessen geopolitical risk for firms involved in trade within their own bloc, but could lead to higher cost of production and lower efficiency gains from globalization. These developments are particularly

significant for heavily import-dependent sectors, where access to international trade is crucial to obtain critical inputs and continuous supply.

2.2.4 Impact on commodity prices and input availability

Geopolitical risk has significant impact on global commodity market and availability of inputs. Political unstable regions, especially war-ridden ones where commodity prices have significantly increased due to supply disruption (Khan et al., 2021). For example, geopolitical conflicts and tension in energy-producing nations directly resulted in oil and natural gas price hikes, and had spillover effect to the entire economy; similar price shock could occur in key agricultural inputs and food security when a major exporter faces conflict (FAO, 2022a).

The importance of such factor increases for those heavily import-dependent industries. Price volatility of international commodities contributes to uncertainty on future costs of input and sourcing arrangements. In addition, input shortages might require firms to identify and use alternative sources or stock up greater amounts of raw materials, leading to less efficiency. In agricultural and livestock supply sectors, the problem is exacerbated because these companies are highly dependent on imports of feed additives, fertilizers, agrochemicals and grain-based inputs, and any disturbance of supply due to geopolitical risks can pose a direct threat to operations.

2.2.5 Implications for businesses

Geopolitical risk poses considerable challenges for firms in their strategic planning, operations and supply chain management practices. Firms that are active in the global market have to continuously monitor geopolitical developments and adjust their strategies in response to the uncertainties (Caldara & Iacoviello, 2022).

One important implication is the flexibility in the supply chain. Firms are increasingly required to quickly adjust sourcing strategies and location of production, shift from single sourcing to alternative sources and diversify their logistics networks (Ivanov, 2020). Another important implication concerns the role of risk management practices. Firms need a well-developed risk management practice such as diversifying sources, developing contingency plans and applying strategic flexibility for managing risks effectively (Friberg, 2015), building resilience has becoming a strategic imperative.

Despite considerable evidence on the macroeconomic effects of geopolitical instability, less research has been carried out on the firm-level responses at specific industry sectors, particularly those with high import dependency and limited substitution possibilities. Agricultural and livestock supplies sector is one of these examples, which suffers from price volatility of commodities, transport and trade disruptions, and sourcing uncertainty due to geopolitical risk. However, empirical evidence regarding how firms within this sector respond operationally and strategically remains limited, highlighting an important avenue for further research.

2.3 Trade restrictions: tariffs, sanctions and antidumping measures

Trade restrictions are one of the major instruments by which governments affect international trade, protect their domestic firms and serve their foreign policy and strategic goals (Baron & Kemp, 2003).. In recent years there has been a remarkable proliferation in the use of trade restriction tools: heightened geopolitical competition, economic nationalism and broader trends of geoeconomic fragmentation has caused a surge in the use of tariffs, sanctions and quotas (IMF, 2023). As a result, firms operating within globally integrated supply chains increasingly face an international environment that is characterized by policy uncertainty, barriers to trade and rising volatility.

There are many types of trade restrictions including tariffs, economic sanctions, export controls, quotas and antidumping duties. Although these instruments vary in terms of their targets and implementation mechanisms, they ultimately serve to alter international trading patterns, increase transaction costs and thereby disrupt existing supply and production networks. Therefore, firms in import-dependent industries in particular need to rethink their sourcing strategies, supplier relationships and modes of production.

2.3.1 Tariffs and their economic impact

Tariffs constitute one of the most widely applied forms of trade restriction within international trade policy. They represent taxes imposed on imports, justified either by protecting domestic industry from unfair foreign competition or supporting the

economic development of certain sectors. Beyond these purposes, tariffs are often seen to create greater trading inefficiency, inflate production costs and disrupt markets (Mayer, 1984).

The US-China trade conflict is one of the most obvious contemporary example of tariffs. Beginning in 2018, substantial tariffs have been applied by both countries to a wide range of industrial and agricultural products, resulting in significant declines in bilateral trade. This trend of increasing tariffs between major trading powers has additionally led to the reallocation of trade towards third parties as trade patterns shift due to policy changes (Bekkers & Schroeter, 2020).

For firms, tariffs may represent a significant increase in the cost of procuring inputs if companies are import-dependent for their raw materials or intermediary components. This increase in the procurement costs may lead to reduced profitability, disrupted existing supplier relationships and may force firms to identify alternative sourcing arrangements, often associated with lower efficiency or higher operational complexity (Yu, 2014).

The effect of tariffs goes beyond simple financial costs; it creates policy uncertainty. Firms are frequently unable to anticipate future tariff adjustments, retaliatory measures, or broader trade policy changes, making long-term planning more difficult (Contractor, 2025). This uncertainty is especially problematic for industries characterized by long-term supplier contracts, complex logistics systems and high levels of international integration.

2.3.2 Economic sanctions and market disruptions

Economic sanctions are generally seen as a far more acute form of trade restriction than tariffs, are more targeted in nature and aimed at political or diplomatic goals. They may include trade embargoes, financial blockades, export controls and restricted access to technologies, markets and transportation networks (Diebold et al., 1985). The sanctions imposed on Russia following the Russia–Ukraine conflict illustrate the severity and widespread implications of sanctions, impacting trade in energy and food supplies significantly with wide price volatilities globally (FAO, 2022a).

Sanctions affect firms through both direct and indirect channels. Directly, by blocking access to specific products, suppliers or geographical markets. Indirectly, by generating wider disruptions to global supply networks, increasing uncertainty and inhibiting, reducing market liquidity and intensifying transportation and financing difficulties. In addition to impacting markets, sanctions often pose a complex compliance burden on companies, who may be subject to secondary sanctions and must constantly evaluate the evolving regulatory landscape (Liu et al., 2024).

Importantly, the impact of sanctions extends beyond immediate market disruption. The unpredictability and rapid nature of these restrictions also create increased uncertainty for businesses, discouraging long-term investment and strategic planning. In this respect, sanctions are not viewed simply as temporary policy adjustments, but as persistent shocks within the global trading system.

2.3.3 Antidumping duties and market distortions

Dumping occurs when a firm exports a product to a country at below the normal value of a product, commonly viewed as “unfair” competition, a measure designed to compensate for losses within the domestic industry. However, like tariffs and sanctions, antidumping duties may also impact businesses significantly by increasing the costs of importing key components or intermediates; in some industries substitution may not be easily available thus creating additional procurement costs for the firm or forcing companies to absorb these costs into their price levels (Blonigen, 2002).

Similar to tariffs, antidumping measures may distort market access and reduce supplier choice, thus limiting the efficiency and adaptability of supply chains. Businesses may reconfigure their sourcing patterns to avoid these duties, which will entail new trade-offs relating to cost, quality and transportation efficiency. Consequently, antidumping measures may generate additional complexity across global supply networks.

2.3.4 Trade policy uncertainty

An important aspect of the recent intensification of trade restrictions is an overall rise in trade policy uncertainty, defined as a firm’s inability to predict future government actions regarding tariffs, sanctions, regulations, and international trade agreements.

Empirical studies highlight the negative implications of heightened trade policy uncertainty for investment decisions, firm performance and international trade activity (Caldara et al., 2019). The uncertainty causes companies to adopt a more cautious stance, delaying long-term investments and contracting decisions and often re-directing trade away from affected markets (Li et al., 2021). This trade is closely linked to rising geopolitical risk; heightened tensions translate directly into policy volatility, making operations and planning within globally integrated firms more challenging (Yang & Peng, 2025).

Recent IMF work points to trade policy uncertainty being one of the drivers of geoeconomic fragmentation and trade reorganization toward regionally integrated and politically aligned production networks.(IMF, 2023).

2.3.5 Implications for supply chains and firms

The combined effects of tariffs, sanctions, and antidumping measures have significant implications for supply chains and firm behavior. One of the most important consequences is the increase in supply chain complexity and operational vulnerability (Fund, 2002).

International businesses are now expected to operate in a more uncertain environment where the stability of the supply of materials, goods, transportation links and market access is less certain. This increased complexity means that companies have greater flexibility, adaptability and responsiveness requirements in their sourcing and logistics strategies, with common responses being supply diversification, inventory buffering, transportation redesign and even restructuring of global supply chains. While such strategies may improve resilience and reduce dependency on high-risk regions, they potentially increase operational costs at the expense of the optimization goal identified within the supply chain management literature (Christopher & Peck, 2004).

Increasing integration of geopolitical considerations into business strategy formulation becomes critical with trade relations and political stability becoming significant factors in supplier selection and sourcing decisions, alongside traditional economic factors such as cost and quality.

2.3.6 Critical evaluation

Despite the common economic and political rationale behind trade barriers, a review of literature generally concludes that impact of restrictions is overwhelmingly negative on both international trade flows and business operation globally. Tariffs, sanctions and antidumping measures may offer short-term comfort to domestic producers but result in increased costs of production and lower efficiency, in turn higher volatility on international trade environment.

More structurally, a growing emphasis on protectionism suggests a broader shift toward a segmented and geopolitical international trading order instead of cyclical temporary interruptions. Under this new system, politics is becoming a more dominant factor that influenced trade patterns, sourcing strategy and business investment decisions.

This evolution requires businesses to rethink their strategy beyond only focusing on cost minimization. Firms must embed the notion of resilience, agility and geopolitical risk evaluation into their operations and strategies in order to survive the increasing volatility in the global business and market environment and maintain their supply chains security.

2.4 Supply chain disruptions

Global supply networks have profoundly changed over the last few decades, as they have become more complicated, globally dispersed and extremely interconnected. Such changes made firms more efficient, less prone to production costs and enable firms to acquire specialized resources through international purchasing and integrated global production chains. However, such changes, as they made firms more efficient, make them also more susceptible to external shocks and systemic risks (Craighead et al., 2007).

Thus, supply chain disruptions became one of the biggest problems that international business has to face over the last few years. Geopolitics instabilities, trade restrictions, transport bottle necks, pandemics and price volatility if commodity markets revealed major structural weaknesses in the globally integrated supply networks. Consequently,

supply chain models aimed at increasing efficiency are less frequently applied than models based on supply chain resilience and adaptability (Ivanov & Dolgui, 2020).

2.4.1 Nature and characteristics of global supply chains

An interlinked and geographically dispersed supply chain comprises numerous suppliers, manufacturers, logistics providers, distributors and retailers which work and operate in more than one country. Global supply networks allow for taking advantage of comparative costs in other parts of the world, which leads to lower production costs and enables firms to achieve economies of scale and specialization.

However, according to Christopher (2016) such supply chains driven by efficiency principles may lack the necessary resilience. Wide use of lean management principles and just-in-time (JIT) delivery, have minimized spare capacity and stock level throughout the chain. Thus, firms become critically dependent on the stability of delivery schedules, flows of materials, and on the predictability of the transport services.

Similarly, Ivanov and Dolgui (2020) state that highly optimized global supply networks may become brittle since supply chain disruptions occurring in one point can spread through the entire system rapidly. Such structural brittleness is observed if production chain consists of a small number of suppliers (concentrated structure of sourcing) or depends on only one region/company for a particular supply (geographic concentrations).

Overall, increasing global networks complexity has paradoxically produced global supply networks which offer high levels of efficiency and cost optimization while exposing firms to high level of risks and volatility of operations.

2.4.2 Causes of supply chain disruptions

A supply chain disruption can arise from many external and internal causes, for instance from natural disaster, technological malfunction, financial crisis, labor disputes and public health crises. However, geopolitical factors are among the causes that have increased in significance in the recent few years.

Geopolitical instabilities influence the supply chains through number of combined mechanisms. Armed conflicts and diplomatic tensions may disrupt production and transportation systems, while sanctions, tariffs and trade restrictions may limit access to suppliers and critical inputs. In addition, political instability often leads to higher costs of transportation, delays in customs clearance and general volatility on international trade terms (Hendricks & Singhal, 2005a).

One obvious example of geopolitical cause of supply chain disruptions is the Russia-Ukraine conflict. It heavily impacts world commodity markets such as cereals, fertilizers and fuels, creating shortages and sharp increases of their prices (FAO, 2022b). The US-China trade conflict also significantly altered global purchasing strategies and raised procurement costs for companies which used the trade of intermediate goods internationally (Bekkers & Schroeter, 2020). These examples demonstrate that disruptions are interrelated processes and impact many different industries globally.

Ivanov (2020) proposes a framework that helps categorizing disruption based on the geopolitical factor and identifies four broad groups of the disturbances affecting supply chains: (a) physical disruptions of infrastructure and transportation, (b) policy-related disruptions such as tariffs and sanctions, (c) logistical disruptions, including port congestion and delays of freights, and (d) financial disruptions related to volatility of exchange rates, insurance costs and financing constraints. These dimensions often interact and reinforce one another, amplifying the overall impact of disruptions across supply networks.

2.4.3 The ripple effect in supply chains

One concept central to the supply chain disruption literature is that of “ripple effect”, referring to the propagation of disruptions across the entire supply chain network.

Ivanov (2020) states that the consequences of supply chain disruptions are often propagated both downstream and upstream. Downstream it impacts production schedules, stock levels, logistics operations and customer service performance, while upstream it affects availability of production materials, number of suppliers and the purchasing activities. For example, a supply disruption at the input of a particular

production chain would then affect the supply of a final product and influence the entire customer base which then might start experiencing negative consequences of not receiving desired goods or receiving their deliveries delayed.

The ripple effect is exacerbated in geographically dispersed globally integrated supply chains because due to the strong interconnectivity of those networks. A disruption taking place in one geographic location has an impact on business across entirely different locations and business sectors. Bottlenecks in transportation, scarcity of specific intermediate products and supply interruptions of energy resources are therefore cascaded throughout the broader economic system (Ivanov et al., 2013). The analysis of those systemic risks challenges conventional management strategies for business risk, which often focus on specific operational problems.

2.4.4 Impact on costs, availability and firm performance

Supply chain disruptions have significant consequences for firm performance, particularly in terms of operational continuity, cost structures and input availability.

One of the most immediate effects of disruption is the increase in operational costs, e.g. Higher purchase costs for inputs, transportation costs, insurance premium increase and administrative/compliance costs. Geopolitical impacts on transportation networks can contribute to raising freight rates and decreasing reliability of logistics services (UNCTAD, 2024).

Beyond increased operational costs supply chain disruptions may lead to input shortages, consequently lowering overall production output and decreasing a firm's ability to fulfill customer demand. In severe situations, businesses may be forced to stop operations due to lack of vital inputs and components.

There are numerous studies empirically supporting the negative relationship between the occurrence of supply chain disruptions and firm performance. Hendricks & Singhal (2005b) demonstrated that firms which experience major supply chain disruptions show declining returns, operational efficiency and stock prices. market valuation. Not only performance but also competitiveness of firm, its reputation and the strength of relations with customers may suffer long term from such disruptions. Consequently, supply chain stability has become increasingly important not only for operational performance but also for long-term strategic sustainability.

2.4.5 Supply chain disruptions in the agricultural and livestock sector

The agricultural and livestock supplies sector is extremely sensitive to supply chain disruptions due to a very high reliance on purchased inputs that need to be sourced abroad as well as traded internationally as final goods.

Imported agricultural products that serve as production inputs for local agricultural and livestock industries, for example, feed additives, agrochemicals, fertilizers, grains and seeds, have all been subjected to disruptions from disruptions originating in commodity-exporting countries and/or international supply chains. For example, grain export and fertilizer markets were seriously disrupted by the Russia-Ukraine conflict (FAO, 2022b). Similarly, the trade barriers between US and China led to rising purchasing costs of inputs for agriculture and livestock from chemical products and feed-related supply inputs.

Another significant fact contributing to the vulnerability of this industry are the critical timelines that have to be taken into account by supply chains. Delays in delivery of any inputs may postpone the agricultural or livestock production activities. This is particularly critical in this industry as opposed to other types of production processes that may offer more flexible scheduling (Belhadi et al., 2024).

Moreover, many firms in the agricultural and livestock supplies sectors are Small and Medium Enterprises (SMEs) which do not possess enough financial assets or power in the negotiation with suppliers in order to face severe disturbances in terms of delivery or purchasing price volatility (Gumbi et al., 2023).

2.4.6 Supply chain resilience and adaptation

Due to the increasing frequency of supply chain disruptions, the role of the concept of supply chain resilience has grown in importance in both the academic literature and in business practice. Generally, the term supply chain has been used to describe the capacity of the supply network to anticipate, absorb, adapt to, and recover from disturbances while continuing to support the operations (Christopher & Peck, 2004).

Several strategies that can significantly enhance the resilience have been identified, namely diversification of suppliers that decreases dependency to certain regions or

suppliers, inventory buffers against sudden demand spikes or transportation delays, supply chain reconfiguration, which includes neo-shoring and regionalization aimed at lowering the risks of exposure to geographically remote or politically instable markets (Hu et al., 2023). Besides that, digital technology and business intelligence have played an increasingly important role. Visibility of the whole supply chain enabled by real time information systems will assist firm to predict risk, monitor movements, respond promptly to operation disturbances (Ivanov & Dolgui, 2020).

Nevertheless, many of the resilience-enhancing strategies may involve important trade-offs. Higher inventory levels will entail higher holding costs while diversification of suppliers may increase complexity or decreases economies of scale compared with focusing on single source market or supplier (Tukamuhabwa et al., 2015). Therefore, firms may need to find the appropriate balance between efficiency, resilience and flexibility when formulating supply chain strategies.

2.4.7 Critical evaluation

Despite extensive studies on supply chain disruptions and resilience strategy in the literature, there are several points that can be made about the limitations in these studies.

First, many studies treat supply chain disruptions as singular events rather than systematic or systemic issue in modern supply chains. Normally, disruptions will come up in various domains at the same time: transportation, commodities, regulatory and geopolitics.

Second, much emphasis has been put on the trade-off between efficiency and resilience, however there is less information available on how different firms should reach this balance considering varying industry condition. This would be important in those sectors like highly import dependent where substitution possibility is restricted, the firm would lack the flexibility of switching to an alternative supply or market in order to maintain the supply operation.

Third, existing research has paid a great deal attention to the large multinational corporations, while research has focused less on the SMEs which is vulnerable to supply chain disruptions particularly in the fragile countries or less developed markets. The firms in the agricultural and livestock sector has unique vulnerabilities in

comparison with other industries because they are reliant on external supplier, financial constrain, more vulnerable to the volatility of commodity prices.

Overall, considering the ever-increasing significance of geopolitical unstable factors, supply chain disruptions no longer look like unusual event, but instead, the norm that demands more resilient, adaptive and flexible operation models in our business world.

2.5 Firm strategies and risk management

In an increasingly unstable and geopolitically fragmented global environment, firms need to develop strategies that enable them to manage uncertainty, ensure business continuity and mitigate exposure to exogenous shocks. The traditional supply chains built upon cost minimization, lean operations and dispersed global sourcing are facing serious threats of being broken by trade barriers, transportation bottlenecks and wider supply chain instability caused by the increasing geopolitical risk (GPR) (Saglam et al., 2020).

Risk management has moved from being an operational discipline to a strategic capability, being now an internal element to long-term competitive advantage and organizational robustness. In the international market, firms can no longer be just responsive to disruptions but are expected to “proactively identify, manage and reduce the impact of potential risks, building new operational structures that incorporate new capabilities for resilience and continuity” (Friberg, 2015). This suggests that there is a gradual shift from an efficiency-driven strategy where flexibility, adaptability and risk awareness have become key strategy dimensions.

2.5.1 The role of risk management in international business

Risk management is the process by which refers to the systematic process through which firms identify, assess, monitor and mitigate risks that may negatively affect operational performance and strategic objectives. In international business environments, firms are exposed to multiple forms of risk, including political risk, financial risk, operational risk, transportation risk and supply chain risk (Tang, 2006).

Geopolitical risk presents particularly complex challenges because of its external, unpredictable and often rapidly escalating nature. Political conflicts, sanctions, trade disputes and abrupt regulatory changes may significantly alter market conditions and disrupt established business operations (Caldara & Iacoviello, 2018). As Pastor and Veronesi (2013) argue, heightened uncertainty often leads firms to adopt more cautious investment and operational behavior, reducing risk-taking and delaying strategic commitments.

Similarly, Friberg (2015) emphasizes that effective risk management requires continuous monitoring of external developments and the integration of uncertainty into strategic planning processes. Therefore, risk management goes beyond the response to crises to anticipating vulnerabilities, having contingency plans in place, and implementing systematic approaches for identifying potential failure points.

Recent research is emphasizing the role of dynamic capabilities to cope with uncertainty. Teece (2018) defined dynamic capabilities as a firm's ability to sense environmental changes, seize opportunities, and reconfigure its asset base to address changing market conditions. In an unstable environment with a high degree of geopolitical risk, dynamic capabilities can effectively help firms to manage alternative sourcing strategies, logistics structures and operations design.

2.5.2 Supplier diversification

Supplier diversification is one of the most cited strategies that help to manage supply chain risk and to ensure operational resilience. The strategy implies having multiple suppliers or sourcing locations for products and inputs, thus reducing the over-dependence on one specific source (Golmohammadi & Hassini, 2020).

Indeed, literature highlights diversification as an effective risk management mechanism. Christopher and Peck (2004) argue that an over-reliance on single suppliers or sources of inputs in limited geographic locations greatly increases vulnerability to disruptions. Having several suppliers reduces operational instability during potential disturbances in a single location.

The relevance of this strategy has increased considerably in the context of geopolitical instability. Firms dependent on suppliers located in politically unstable regions may

experience disruptions related to sanctions, tariffs, transportation interruptions, or broader regulatory uncertainty. By establishing relationships with suppliers across different regions, firms may reduce exposure to localized geopolitical disturbances (Tang & Kouvelis, 2011).

Supplier diversification poses a higher operational complexity in managing more supplier relationships, increased monitoring and coordination efforts as well as quality control. It might also reduce economies of scale in operations as well as increased transaction costs. So, supplier diversification increases supply chain resilience but negatively impacts operational efficiency (Babich et al., 2007).

This trade-off between operational efficiency and supply chain resilience is even more complicated for SMEs, due to their often-limited managerial and financial resources necessary to maintain complex international sourcing networks.

2.5.3 Strategic sourcing and supplier switching

Strategic sourcing deals with suppliers based on strategic, rather than purely economic (short-term cost), considerations: reliability, quality, adaptability, and geopolitical risk of the supply chain. In increasingly unstable international markets, incorporate political and regulatory considerations should be taken into account by firms during sourcing decisions. Although a certain country might be very cost efficient for sourcing, a strong political risk, potential sanctions and/or tariffs might bring forth some negative impact on operations, therefore creating higher overall cost in the long term (Lee et al., 2008).

Accordingly, many firms practice supplier switching as a consequence of events related to geopolitical developments (Sami, 2018). Companies that are negatively affected by new tariffs, trade wars or transportation restrictions look for alternative suppliers which may offer equivalent products under less volatile economic and political conditions. The result is a tendency towards a more stable and less geopolitical risk exposed sourcing structure.

As Ivanov and Dolgui (2020) stated, flexible sourcing policies can enable firms to adapt to unpredictable environments and disruptions, however, supplier switching is costly. New relationships need time and resources to be set up, quality has to be confirmed,

and a new logistical infrastructure may need to be established; especially if specialized or tightly regulated products are being sought.

Additionally, a new supplier might not offer same levels of product quality, competitive pricing, or transportation efficiency. Firms have to continuously balance the cost factors against the operational resilience and geopolitical risk exposures.

2.5.4 Inventory management and buffer strategies

Inventory management is another crucial element that helps to reduce vulnerability. Companies have been increasing inventory holdings, sometimes referred to as safety stocks or buffer inventory, to offset supply chain disruptions resulting from transportation delays, shortages and procurement uncertainty (Zipkin, 2000).

This strategy reflects a general move away from hyper-lean supply operations. While lean/just-in-time (JIT) operations offer improved efficiency by minimizing holdings but also reduce responsiveness to disruptions in the supply flow (Christopher, 2016).

Buffer strategies are used to increase resilience by giving organizations more time to react to disruptions and make arrangements for alternative supply routes. For industries with supply volatilities or long supply lead times holding reserves of inventory can significantly reduce operational vulnerability. However, inventory buffering comes with high financial and operational costs; increasing the holding of inventory results in higher storage costs, higher working capital requirements, higher risks of product obsolescence and deterioration (Singh et al., 2019). Firms therefore need to strike a careful balance between inventory efficiency and operational security.

The Trade-offs are important for agricultural and livestock supplies where seasonal demand and price fluctuations further challenge the decision about holdings (Bandiera et al., 2017).

2.5.5 Pricing and cost management strategies

With geopolitical events impacting trade, increasing procurement, logistics and operating costs may have to be factored into companies' pricing and cost management strategies. One obvious choice is to pass costs on to customers by increasing prices but

this can potentially impact customer demand and market competitiveness, especially if demand is highly elastic. Alternatively, companies could decide to absorb part of the rising costs to maintain market share and relationships with their customer base, but this is obviously not sustainable and impacts profit margins (Dubey et al., 2023).

According to Pastor and Veronesi (2013), uncertainty drives demand for risk premium, impacting firms' overall decisions. Under unstable environments, companies tend to apply more conservative pricing strategies, aimed at maintaining profitability over the longer term, with respect to market position. Aside from pricing, firms try to offset the rising costs via better efficiency, supplier contract negotiation, transportation optimization and overall cost reduction techniques. However, it may be that with persistent instability there is only so much that can be done on costs alone.

2.5.6 Supply chain reconfiguration and regionalization

To decrease vulnerability to high risk regions and enhance operational robustness, many companies are reconfiguring their supply chains. Supply chain reconfiguration can be nearshoring, reshoring or regionalization. Nearshoring occurs when firms move their supply and manufacturing activities closer to their home market, while regionalization applies when firms group their supply chain within regions or political areas that share common traits (Fratocchi et al., 2016).

Strategies such as these are adopted to reduce supply chain transportation risks and lead- times, as well as to achieve better coordination and quicker responses. These types of reconfigured supply chains may result in increased labor and production costs, but supply operations will likely become more stable and predictable under conditions of geopolitical uncertainty.

Ivanov (2020) argues that supply chain adaptability has become an important factor for organizational resilience in the contemporary global economy. Similarly, IMF (2023) analyses suggest that geopolitical fragmentation is accelerating the restructuring of global production networks along political and regional lines.

However, reconfiguration of the supply chain involves a costly and complicated process. Firms may face substantial transition costs, contractual challenges and operational disruptions during restructuring processes. Consequently, the feasibility and

effectiveness of regionalization strategies may vary significantly depending on firm size, industry characteristics and available resources.

2.5.7 Risk monitoring and strategic flexibility

Apart from structural changes in operations, firms need systems to monitor geopolitical events and swiftly adjust strategies to changing markets. The concept of monitoring requires keeping track of political developments, trade agreements and other relevant factors, enabling firms to identify emerging threats and vulnerabilities. This heightened level of awareness allow firms to take preventative action or to react quicker to the impacts of these events (Quelin & Duhamel, 2003).

Strategic flexibility, as discussed, allow companies to change relationships and operational processes quickly. Digital technologies support this requirement. Data analytics, real-time monitoring systems and digital platforms facilitate improved improve supply chain visibility, enabling organizations to identify disruptions earlier and coordinate responses more effectively across different operational functions (Ivanov & Dolgui, 2020). However, implementation of advanced monitoring systems may prove costly in terms of both investment and expertise, which may hinder smaller companies from participating in the adoption of such systems.

2.5.8 Critical evaluation

While numerous strategies for dealing with geopolitical and supply chain risk exist, not one of them can remove vulnerability to shocks completely. All these strategies involve compromises among efficiency, cost, flexibility and resilience. Diversification of the supply base enhances resilience but may prove problematic due to coordination challenges. Increasing the size of inventory provides a greater level of continuous operation, however increases costs considerably. Supply chain regionalization increases security due to a decreased exposure to geopolitical issues, but will often decrease efficiency and increase costs due to global sourced goods. Extensive monitoring can increase preparedness but will again require significant resources and knowledge acquisition, potentially being a problem for SMEs.

Other scholars have suggested that a focus solely on building resilience may undermine competitiveness. For many SMEs, the additional security provided by diversifying the supply base, building stock or regionalizing supply operations is likely offset by increased efficiency losses and costs incurred as result, particularly when facing restricted financial resources. This suggests that a combined, and balanced, approach toward risk management is necessary; security cannot simply be viewed as an isolated business imperative, it depends on and is an integral part of firm's organizational capacity, ability to strategically maneuver and adapt to geopolitical and other market changes.

These challenges are particularly pronounced within the agricultural and livestock supplies sector, where supply chains are highly specialized, import dependency is substantial, and substitution possibilities are often limited. This reinforces the importance of examining empirically how firms operating within this sector respond to geopolitical instability and evaluate the effectiveness of their strategic adaptations in practice.

2.6 Research gap and conceptual framework

2.6.1 Research gap

In spite of the existing, rapidly expanding literature on the topic of geopolitical risk, trade restrictions, and supply chain disruptions, there remain a number of important gaps in the existing literature that warrant additional empirical investigation.

Firstly, most of the existing studies deal with aggregate macroeconomic consequences, i.e., the impact of geopolitical instability on economic growth, financial markets, international investment, trade flows etc. (Caldara & Iacoviello, 2022; IMF, 2023). While these studies have given us significant insights into the overall dynamics, they provide comparable few answers regarding operational and strategic adjustments if individual firms at the micro level.

Secondly, existing research on geopolitical risk tend to focus on macro-scale political events such as the US-China trade conflict, sanctions regime or global financial crisis, and largely fails to investigate the sectoral specifics of geopolitical risk, i.e. industry-specific differences that are attributed to trade dependency of raw materials, supply chain complexity, input sourcing concentration or substitutability of inputs. The supply sector of agricultural and livestock inputs provides a good setting to empirically explore such dynamics as it is highly dependent on raw material inputs that are mostly secured internationally.

Thirdly, a substantial portion of existing literature focuses on secondary macroeconomic data analysis and econometric methods. While this is useful to study the general economic impact and trends, it hardly explains firm behavior and decision making processes concerning geopolitical risk management. Moreover, it doesn't allow insight into how companies assess geopolitical risk and which strategic choices firm actors deem more suitable and practical. In supply chain management research, this is a key question as firm-level choices shape the overall supply chain resilience (Ivanov, 2020).

Fourthly, through various resilience-oriented supply chain strategies (supplier diversification, inventory buffering, regional sourcing, supply chain reconfiguration etc.) are reported, there is limited empirical evidence on their actual effectiveness under conditions of protracted geopolitical instability. In most existing literature these

measures are presented more as abstract strategies than real world solutions that firms consider and implement.

Fifthly, relatively few studies examine geopolitical risk, trade restrictions, supply chain disruptions and strategic firm-level response using an integrated approach combining these concepts with a unified conceptual framework. Often, these dimensions are studied independently and their interplay through which geopolitical instability affects firm performance remains underexplored.

In order to address these limitations, the research undertaken adopts a firm-level and sector-specific perspective. By focusing on the agricultural and livestock supplies sector in Greece, the present study seeks to contribute to the literature by examining how import-dependent firms experience geopolitical disruptions, adapt their sourcing and supply chain strategies, and evaluate the effectiveness of resilience-oriented practices under conditions of heightened uncertainty.

2.6.2 Conceptual framework

Based on the presented literature review, this study proposes a conceptual framework illustrating how geopolitical tensions and trade restrictions influence firm performance through supply chain disruptions and firm-level resilience strategies.

The proposed framework illustrates the relationships between geopolitical instability, supply chain disruptions, resilience-oriented strategies, risk management capabilities, and firm performance. More specifically, geopolitical risk and trade restrictions are conceptualized as external shocks that affect supply chain operations and may consequently influence firm-level outcomes. At the same time, firm-level strategies and risk management capabilities are considered important organizational responses that may reduce operational vulnerability and support resilience under conditions of uncertainty.

At the first level, geopolitical tensions and trade restrictions represent exogenous environmental pressures. These include wars, diplomatic disputes, sanctions, tariffs, antidumping duties, and broader policy-related disruptions. Such developments are largely outside the direct control of firms but significantly shape the operational

conditions under which firms conduct international business (Caldara & Iacoviello, 2022).

At the second level, these external pressures generate supply chain disruptions that may negatively affect operational performance. Such disruptions include increased procurement costs, supply delays, shortages of critical inputs, reduced supplier reliability, higher logistics expenses, and broader sourcing uncertainty (Ivanov, 2020).

At the third level, firms respond through resilience-oriented strategies and risk management practices. These include supplier diversification, inventory buffering, strategic sourcing, regionalization of sourcing activities, supply chain reconfiguration, contingency planning, supply chain monitoring, and broader operational adjustments. Such practices may help firms reduce vulnerability, improve adaptability, and maintain operational continuity under conditions of geopolitical and supply chain-related uncertainty (Christopher & Peck, 2004; Teece, 2018).

At the final level, firm performance can be viewed as the main outcome variable. The concept of firm performance is treated broadly in this study and includes operational continuity, cost efficiency, supply chain stability, profitability, ability to meet customer demand, and overall business performance.

In the present study, risk management capabilities are operationalized through firms' adoption of resilience-oriented practices, including supplier diversification, inventory buffering, contingency planning, supply chain monitoring, digital monitoring tools, and sourcing flexibility. This clarification ensures consistency between the conceptual framework, the questionnaire, and the empirical analysis.

2.6.3 Conceptual model

The developed conceptual framework of the study is presented in *Figure 1*. The framework illustrates the proposed relationships among geopolitical risk, trade restrictions, supply chain disruptions, resilience-oriented strategies, risk management capabilities and operational resilience and firm performance within the agricultural and livestock supplies sector. More specifically, the framework proposes that geopolitical instability and trade-related uncertainty influence firm performance primarily through their impact on supply chain operations, sourcing activities, logistics systems and

procurement conditions. Increased geopolitical instability is expected to generate higher levels of operational uncertainty and supply chain disruptions, which may negatively affect operational resilience and perceived firm performance.

At the same time, firms are expected to adopt resilience-oriented strategies and risk management capabilities in order to improve operational adaptability and reduce vulnerability to external disruptions. Such practices include supplier diversification, inventory buffering, sourcing flexibility, contingency planning and supply chain monitoring.



Figure 1: Conceptual Framework of the Study

The framework therefore provides an analytical perspective on how firms operating within import-dependent sectors respond to geopolitical instability and supply chain disruptions through resilience-oriented operational and strategic adjustments.

2.6.4 Research hypotheses

Based on the conceptual framework and the reviewed literature, the following research hypotheses are proposed:

H1: Geopolitical risk and trade restrictions will be positively related to supply chain disruptions experienced by firms.

H2: Increased supply chain disruptions will be negatively related to operational resilience and firm performance.

H3: The adoption of resilience-oriented strategies will be positively related to higher levels of operational resilience and improved firm performance.

H4: Risk management capabilities will be positively related to operational resilience and perceived firm performance under conditions of geopolitical instability.

The above hypotheses will be empirically tested through quantitative statistical analysis based on questionnaire data collected from firms operating within the agricultural and livestock supplies sector in Greece.

2.6.5 Link to the present study

The presented conceptual framework provides the theoretical foundation for the empirical part of the present study. The questionnaire was designed on the basis of the principal constructs identified within the framework, including geopolitical risk exposure, supply chain disruptions, resilience-oriented strategies, risk management capabilities, and perceived firm performance.

More specifically, the empirical analysis examines firms' exposure to geopolitical and trade-related risks, the impact of supply chain disruptions on operational resilience and firm performance, and the strategies adopted by firms in response to external uncertainty. The study additionally examines firms' perceptions of the effectiveness of resilience-oriented practices and risk management capabilities in maintaining operational continuity and adaptability under conditions of geopolitical instability.

Furthermore, the industry analysis presented in the following chapter provides additional contextual understanding regarding how these relationships develop within the agricultural and livestock supplies sector in Greece.

Overall, the conceptual model integrates theoretical perspectives related to geopolitical risk, supply chain disruptions, organizational resilience, and strategic adaptation. It therefore provides the theoretical basis for examining how import-dependent firms respond to geopolitical instability and supply chain uncertainty within the contemporary global business environment.

The following chapter builds upon this theoretical foundation by examining the structural characteristics of the agricultural and livestock supplies sector in Greece, with particular emphasis on import dependency, sourcing patterns, and the operational implications of geopolitical instability and supply chain disruptions.

Chapter 3: Industry analysis

3.1 Introduction

The agricultural and livestock supplies sector constitutes an important upstream component of the broader agri-food system, providing the primary inputs for the agricultural production and animal farming activities. Products such as animal feed, feed additives, fertilizers, agrochemical products, seeds, vitamins and agricultural intermediates directly affect productivity, production efficiency and food supply continuity. Even though the sector does not produce final food products itself, its operations significantly affect the performance and stability of agricultural and livestock activities (FAO, 2022b).

In Greece, the sector has a particular strategic importance because of its role in supporting agricultural and livestock production, national economic activity, and regional development. The agricultural activity remains relevant in a large part of the Greek territory, while the livestock sector supplies key segments of the domestic food industry, namely dairy, poultry and meat production (European Commission, 2023a). Therefore, food supply chains, production costs and the competitiveness of domestic producers are directly affected by the availability and affordability of agricultural inputs.

Furthermore, the sector is heavily exposed to increasing global uncertainty reinforced by geopolitical tensions, fragmentation of international trade and disruptions in global supply chains. Recent events such as the Russia-Ukraine conflict, economic sanctions, antidumping measures, increases in transportation costs and instability in maritime logistics, have led to disruptions in availability, reliability and pricing of agricultural inputs within the international market (IMF, 2023; UNCTAD, 2024).

The agricultural and livestock supplies sector is particularly vulnerable to this uncertainty because it strongly depends on imported raw materials and on internationally integrated sourcing networks. This is the case in Greece where imports of feed materials, fertilizers, feed additives, agrochemicals and other specialized agricultural inputs constitute a substantial part of the sector's sourcing structure due to limited domestic production. As a consequence, firms are directly exposed to

commodity price volatility, transportation disruptions and political developments affecting supplier countries and international trade routes (OECD, 2023a).

In response to these pressures, firms operating within the sector implement a range of resilience-oriented strategies aimed at reducing operational vulnerability and improving supply chain flexibility. Supplier diversification, regional sourcing, inventory buffering, logistics adjustments, and enhanced risk management practices have become increasingly important within the contemporary business environment (Ivanov & Dolgui, 2020).

Given the strategic importance of the sector and the impact of the changing global environment, the chapter analyzes the Greek agriculture and livestock supplies sector at the industry level. The chapter explores the structure and characteristics of the sector, its reliance on imported inputs and the impact of current geopolitical developments on supply chains and sourcing activities. Moreover, it identifies the main challenges faced by firms operating within the sector and the strategic adjustments adopted in response to increasing geopolitical uncertainty and supply chain instability.

The chapter provides a contextual framework for the empirical investigation conducted throughout this dissertation. By identifying the principal structural vulnerabilities and operational challenges affecting the sector, this chapter offers the appropriate analysis needed to support and interpret the findings presented in the forthcoming chapters.

3.2 Overview of the agricultural and livestock supplies sector

3.2.1 Definition and scope of the sector

Agricultural and livestock supplies refer to the range of products and intermediate inputs required to support the operations of agricultural production and livestock husbandry ensuring operational continuity and production efficiency. The sector functions as a vital upstream component in the agri-food value chain by supplying producers with feed materials, feed additives, fertilizers, agrochemical products, seeds, vitamins, amino acids and other agricultural intermediates necessary for ensuring business continuity and high productivity in agriculture (FAO, 2022b).

The sector also encompasses a network of activities and supply relationships within the agricultural input industry in which the supplied agricultural inputs are closely related to the crop yield, livestock productivity, production quality and the overall stability of food supply systems. Especially in the livestock production sector, feed-related inputs account for the largest share of operating costs, and significantly affect production efficiency and profitability in production sectors such as dairy, poultry and meat industries (OECD, 2023a). For crop production, fertilizers and agrochemical products have a strong impact on the total yield and stability of production.

The sector also involves a variety of economic actors operating across different stages of the supply chain. These include importing firms, feed manufacturers, distributors, wholesalers, agricultural cooperatives, logistics providers and retail suppliers. Collectively, these actors facilitate the sourcing, transportation, storage, processing and distribution of agricultural inputs from international suppliers to domestic agricultural producers.

The structure of the sector in Greece is characterized by strong integration into international trade networks. Domestic production capacity remains insufficient for several key agricultural inputs, resulting in substantial dependence on imports of feed materials, fertilizers, agrochemicals and specialized feed additives originating from countries such as China, Brazil, Argentina, and various European Union member states (European Commission, 2023a). Consequently, the sector is highly exposed to international commodity price fluctuations, transportation disruptions, and geopolitical developments affecting global supply chains.

Another important dimension of the sector concerns its contribution to food security and agricultural sustainability. Reliable access to agricultural inputs is essential for maintaining production continuity and supporting the resilience of food production systems (FAO, 2022b). Disruptions affecting the availability or affordability of critical agricultural inputs may therefore generate broader economic and social consequences throughout the agri-food supply chain.

Furthermore, the sector increasingly operates within a changing regulatory and environmental framework. European policy towards sustainability, environmental protection and reduced chemical dependency is gradually reshaping operational

requirements and sourcing strategies across agricultural supply chains (European Commission, 2023b). As a result, firms within the sector must continuously balance cost efficiency, regulatory compliance, operational resilience, and environmental adaptation within an increasingly complex international environment.

3.2.2 Importance of the sector in Greek economy

The agricultural and livestock supplies sector is considered strategically important within the Greek agri-food economy due to its role in supporting agricultural production, livestock activity and ensuring food supply continuity. Even though the sector does not directly produce any final food product, it represents a critical upstream sector, as it ensures the availability of essential production inputs required for farms, livestock units and food processing activities.

Agriculture is still of paramount economic and social importance to Greece, in particular in rural and semi-rural regions. According to ELSTAT (2025), the total cultivated agricultural land in Greece amounted to approximately 28.9 million stremmas in 2023, of which 56.2% consisted of arable land and 36.5% of permanent crops. These figures highlight the extensive scale of agricultural activity and the sustained demand for agricultural inputs such as fertilizers, feed products, agrochemicals, and irrigation-related equipment.

The livestock sector also demonstrates substantial productive capacity and strong dependence on stable supply chains. In 2023, Greece recorded approximately 9.0 million sheep, 3.5 million goats, and 38.5 million hens, while total milk production exceeded 1.86 million tonnes (ELSTAT, 2025). These figures underline the strategic importance of feed supply, veterinary products, and livestock-related agricultural inputs for maintaining production continuity and supporting national food production.

The sector also contributes indirectly to broader economic stability and regional cohesion. Agricultural suppliers, distributors, cooperatives, and feed manufacturers support commercial activity and employment across important agricultural regions such as Central Macedonia, Thessaly, Epirus, and Western Greece. Many small and medium-sized enterprises (SMEs) operating within the sector maintain stable commercial relationships with local producers and play a significant role in sustaining rural economic networks (European Commission, 2023a).

At the same time, the sector exhibits a high degree of dependence on imported agricultural inputs, particularly feed additives, fertilizers, vitamins, and agrochemical products. Consequently, fluctuations in international commodity prices, freight costs,

exchange rates, and geopolitical conditions directly affect production costs within the domestic agricultural economy (OECD, 2023a).

Recent geopolitical developments, including the Russia-Ukraine conflict and instability in global transportation networks, highlighted the strategic vulnerability of the sector. Increases in feed prices, fertilizer costs, and transportation expenses generated substantial financial pressure across the agri-food supply chain and intensified operational uncertainty for firms operating within import-dependent markets.

As a result, the agricultural and livestock supplies sector represents not only an economic support mechanism for agricultural production but also a strategically important sector closely linked to food security, supply chain resilience, and regional economic stability.

Table 1: Indicative importance of the agricultural and livestock sector in Greece (2023)

Indicator	Data
Total cultivated agricultural land	28.88 million stremmas
Arable land	56.2% of total agricultural land
Permanent crops	36.5% of total agricultural land
Sheep population	9.01 million heads
Goat population	3.51 million heads
Hens	38.5 million heads
Total milk production	1.87 million tonnes
Poultry meat production	258.4 thousand tonnes

Source: ELSTAT, 2025

3.2.3 Key characteristics of the sector

The agricultural and livestock supplies sector in Greece exhibits several structural characteristics that have a strong impact on its operation and enhance its susceptibility to external economic and geopolitical risks.

The high dependence on imports is one of the most defining features of the sector. Many critical agricultural inputs like feed additives, fertilizers, vitamins, amino acids and agrochemicals are imported due to limited domestic production capability. The reliance on imports is thus a determining factor affecting firms' sensitivity to commodity prices, transportation costs, exchange rates and geopolitical developments (OECD, 2023b).

Another significant element of the sector's structure refers to the high degree of integration into international supply chains and commodity markets. The pricing of agricultural inputs is closely linked with global supply and demand conditions, especially in relation to grain markets, fertilizers and energy costs. Consequently, international disruptions rapidly influence procurement costs and product availability within the Greek market.

High cost sensitivity is another crucial element that is particularly relevant in the context of livestock production. Feed-related expenses constitute one of the largest components of livestock production costs. As a result, increases in feed prices or disruptions in supply continuity can significantly affect profitability and operational sustainability for both suppliers and producers.

The sector also exhibits strong dependence on logistics and transportation infrastructure. Greece has significant maritime imports and as such, shipping costs, freight availability and transportation reliability play a critical role in the supply chain performance. Recent geopolitical tensions and disruptions in international shipping routes further highlighted the vulnerability of import-dependent sectors to logistics-related risks (UNCTAD, 2024).

Another defining characteristic of the Greek market is the dominance of small and medium-sized enterprises (SMEs). Numerous agricultural supply, feed distribution and agricultural trade companies operate with limited financial and operational resources compared to larger multinational firms. SMEs often possess limited purchasing power and operational flexibility, so they may be more sensitive to sudden market fluctuations and cost increases (European Commission, 2023c).

The sector additionally exhibits seasonal demand patterns associated with agricultural production cycles. Demand for fertilizers, feed products, seeds and agrochemical inputs is greatly dependent on planting, harvest and livestock production cycles. This

seasonality makes efficient inventory management, procurement planning and logistics coordination crucial.

Finally, the sector operates in an progressively uncertain environment that is shaped by international sanctions, trade fragmentation, unstable transportation systems, and volatile commodity markets. Consequently, these conditions have gradually shifted managerial priorities from purely cost-oriented approaches toward more resilience-focused supply chain strategies emphasizing diversification, flexibility and operational adaptability (Ivanov & Dolgui, 2020).

Table 2: Main characteristics of the agricultural and livestock supplies sector in Greece

Characteristic	Implications
High import dependency	Exposure to external market risks
Integration into global commodity markets	Sensitivity to price volatility
Strong logistics dependence	Vulnerability to freight and shipping disruptions
Dominance of SMEs	Limited operational resilience and financial flexibility
Seasonal demand patterns	Increased importance of inventory planning
High cost sensitivity	Strong impact on profitability
Geopolitical exposure	Need for resilience-oriented strategies

3.3 Structure of the sector in Greece

The structure of the agricultural and livestock supplies market in Greece is characterized by a fragmented yet strongly interconnected market structure involving importers, feed manufacturers, distributors, cooperatives, wholesalers, and retail outlets. The design of the sector reflects the structural features of the Greek agricultural economy, but also the country's high integration in global supply chains.

At the upstream level, importing firms occupy a strategically important position because Greece depends heavily on foreign suppliers for critical agricultural inputs such as feed materials, fertilizers, vitamins, amino acids, agrochemical products, and industrial feed additives. These firms are responsible not only for procurement activities

but also for transportation coordination, customs procedures, warehousing, and inventory management.

Feed manufacturing companies also represent a large segment of the sector, especially due to their role in livestock production. These firms produce feed for livestock in dairy, poultry and meat production, using a combination of imported and domestic raw materials. Their involvement is significant because feed accounts for a large share of costs in livestock production throughout the broader agri-food chain.

At the downstream level, distributors, wholesalers, agricultural cooperatives, and local suppliers distribute products to agricultural producers across a wide geographical range in Greece. Agricultural cooperatives continue to be important for smaller producers as they improve access to essential inputs, strengthen procurement coordination, and bolster bargaining power within fragmented agricultural markets.

A defining characteristic of the Greek market is the dominance of small and medium-sized enterprises (SMEs). According to the European Commission (2023c), SMEs form the backbone of the Greek agri-food economy and play a key role in generating regional employment and business activity. However, smaller companies face limitations regarding capital, warehousing capacity, supplier diversification and operational flexibility, and consequently exposed to external vulnerabilities.

The sector additionally exhibits relatively limited vertical integration compared to larger international agribusiness markets. While some larger firms combine importing, processing, warehousing, and distribution activities, many companies specialize in specific stages of the supply chain. This fragmented structure increases dependence on intermediaries and may reduce operational coordination during periods of disruption.

Geographically, sectoral activity is concentrated in regions characterized by strong agricultural and livestock production, namely Central Macedonia, Thessaly, Epirus and Western Greece. Despite providing better market accessibility, this spatial configuration increases transportation costs due to long distances and complex logistics particularly in remote or rural areas.

Another important structural characteristic concerns the sector's dependence on maritime logistics. Since a substantial proportion of agricultural inputs are imported, ports and shipping routes constitute critical components of supply chain operations.

Consequently, disruptions in maritime transportation, freight markets, or international shipping corridors can rapidly affect procurement costs, delivery reliability, and inventory availability (UNCTAD, 2024).

Overall, the structure of the sector generates operational interdependence among actors, while simultaneously increasing vulnerability due to dependence on international supplies, fragmented market structure, dependence on maritime logistics and limited domestic productive capacity that collectively increase sectoral vulnerability to geopolitical disturbances and international supply chain disruptions. These conditions reinforce the growing need for supply chain resilience strategies, including supplier diversification, buffer inventories and broader supply chain reconfiguration.

Table 3: Main structural characteristics of the sector in Greece

Structural characteristic	Implications
Strong role of importers	High dependence on international suppliers
Dominance of SMEs	Limited operational resilience
Fragmented supply chain structure	Increased coordination complexity
Limited vertical integration	Dependence on intermediaries
Regional geographic dispersion	Higher logistics and transportation costs
Heavy maritime transport dependence	Exposure to shipping disruptions
Strong interdependence among actors	Rapid transmission of supply chain shocks

3.4 Import dependency and sourcing patterns

One of the main structural features of the Greek agricultural and livestock supplies sector is its strong reliance on imported agricultural inputs and raw materials. Domestic production capacities are not sufficient to cover demand for several key products, such as protein-rich feed materials, fertilizers, feed additives, vitamins, amino acids, agrochemical products and industrial agricultural intermediates. This contributes to the sector's high dependence on international suppliers and globally integrated supply chains.

High import dependency is particularly apparent in livestock production. Greece imports considerable quantities of soybean meal and other protein-based feed materials as domestic cultivation of protein crops is limited. Similarly, high import dependency is present regarding feed additives, enzymes, vitamins and chemical products used in animal nutrition and agricultural production. A European Commission report (2023a) highlights the dependence of European Union member states on imported protein feed materials, primarily soybean products from South America.

The structure of sourcing in the sector is geographically diverse with certain regions playing a more important role in the procurement networks. China appears as a major supplier regarding the supply of feed additives, vitamins, amino acids and agrochemical products because of its large industrial capacity and cost-competitiveness. Similarly, Russia and Ukraine had traditionally played a significant role in the supply of grains, fertilizers and agricultural commodities prior to the outbreak of the conflict (FAO, 2022b).

European Union member states also act as significant sourcing partners with regard to specialized agricultural products and regulated inputs. Suppliers from EU member states generally involve lower regulatory and institutional risk but a higher procurement cost than those operating from low-cost manufacturing countries.

The high level of import dependency increases exposure to a broad range of external risks and market volatility. Fluctuations in global prices of commodities, exchange rates, freight costs, and energy prices directly affect procurement expenses and operational planning in the Greek market. OECD (2023b) points out that the growing global integration of agricultural supply chains makes them more susceptible to geopolitical shocks, transportation disruptions and price volatility on global markets.

Recent geopolitical developments exacerbated the structural vulnerabilities arising from international sourcing dependence. The COVID-19 pandemic, the Russia-Ukraine conflict and trade tensions between China and other countries caused considerable disruptions to transportation systems, product availability and procurement costs. In some instances, shortages in raw materials were observed along with delivery delays and greater uncertainty regarding future supply conditions.

These developments prompted shifts in the sourcing structure of the sector. Firms increasingly aim to reduce reliance on individual countries or suppliers by distributing procurement activities across geographically diversified regions. Greater priority is increasingly given to suppliers with reliable transportation links, suppliers operating with more geopolitically stable environments, and supply continuity rather than exclusively focusing on cost advantages.

The increasing emphasis on the resilience of the supply chain and on alternative sourcing options mirrors general trends. According to Christopher (2016), the traditionally efficiency-focused supply chain models were extremely vulnerable during periods of geopolitical or systemic disruption. Thus, the use of alternative sourcing models is increasingly viewed as a strategy for more flexible responses and reduced operational risks.

In spite of the efforts toward greater flexibility and diversification, high import dependency remains the most important structural characteristic of the sector and a major source of operational risk. The combination of global commodity exposure, transportation dependence, and geopolitical uncertainty creates a highly complex procurement environment requiring continuous monitoring and strategic adaptation.

Table 4: Main imported agricultural inputs and sourcing regions

Product category	Main sourcing regions
Soybean meal and feed materials	Brazil, Argentina, USA
Feed additives and vitamins	China, EU countries
Fertilizers	EU, Russia, Middle East
Agrochemical products	China, EU countries
Amino acids and industrial intermediates	China, Southeast Asia

3.5 Impact of geopolitical developments

The impact of geopolitical events is steadily increasing, becoming one of the major causes of disruptions for globally integrated businesses, especially those relying on import-dependent sectors and global supply chains. The agricultural and livestock supply sector in Greece has been particularly affected by recent geopolitical instability

as it heavily relies on import dependency, maritime transportation, and global commodity markets.

One of the major events influencing the sector was the Russia-Ukraine conflict. Before the war began, the two countries held a strategically important position in the global exports of grains, fertilizers, vegetable oils and energy-related commodities. Export interruptions from the Black Sea region caused severe increases in global prices and sharp decreases in availability within the international agricultural markets (FAO, 2022b).

For businesses operating in Greece, the effects were immediate and multidimensional. Companies that rely on imports from Russia or Ukraine experienced shortages of raw materials, increased procurement costs, delivery delays, and greater uncertainty regarding future supply. Import dependence was particularly concentrated on feed related products, as livestock require substantial quantities of grains and protein-based feed materials from international suppliers.

Simultaneously, sanctions against Russia by the European Union and other Western economies presented additional challenges to organizational operations. In several cases, firms were compelled to terminate existing supplier relationships and rapidly identify alternative sourcing arrangements, mostly increasing logistics and procurement costs as well as decreasing flexibility and predictability in the sector (OECD, 2023b).

Trade tensions involving China also affected sourcing conditions within the sector. Antidumping measures and broader trade restrictions on selected Chinese imports increased costs for feed additives, vitamins, and agrochemical products. Firms relying on Chinese suppliers due to lower production costs have experienced reduced sourcing flexibility and increased difficulties in business operations.

Another major consequence of geopolitical uncertainty is the disruptions in transport and logistics systems. Freight costs have increased following the COVID-19 crisis and have been additionally exacerbated due to geopolitical tension and instability in maritime routes. UNCTAD (2024) states that transportation disruptions have been a major cause of higher shipping costs and lower transportation reliability throughout global supply chains.

For Greece, this issue is particularly severe, since the country depends highly on maritime imports of agricultural inputs and raw materials. Increased insurance premiums, freight volatility, port congestion, and transportation delays significantly affected procurement planning and inventory management within the agricultural and livestock supplies sector.

Geopolitical instability caused additional economic consequences including increased production costs and uncertainty. Businesses have to cope with high costs of procurement, increased energy prices, transportation costs, and administrative burdens associated with sanctions compliance and trade monitoring. These developments intensified pressure on profit margins and complicated long-term strategic planning.

Consequently, geopolitical developments not only affect the broader macroeconomic environment but also influence day-to-day operations. Procurement planning, sourcing decisions, pricing policies, inventory management, and logistics coordination are all increasingly shaped by geopolitical risk considerations.

The result of the increased geopolitical instability is the ongoing transition from supply chains aimed at efficiency to more resilience-oriented supply chains emphasizing the need for flexibility, diversification, and effective risk management. Geopolitical events are therefore becoming part of a structured landscape that organizations must adapt to rather than a short-lived shock (Ivanov & Dolgui, 2020).

Table 5: Main geopolitical impacts in the sector

Geopolitical development	Main consequences
Russia-Ukraine conflict	Grain and fertilizer shortages, higher prices
Sanctions on Russia	Supply disruptions and sourcing adjustments
Trade tensions with China	Increased procurement costs
Maritime transport instability	Higher freight costs and delivery delays
Commodity market volatility	Increased operational uncertainty
Geopolitical fragmentation	Shift toward resilience-oriented sourcing

3.6 Challenges faced by firms

Companies operating within the agricultural and livestock supplies sector in Greece face a wide range of operating, financial and strategic challenges, which have intensified considerably in recent years. Such issues are strongly related to the sector's structural reliance on imported inputs, dependence on international commodity markets and use of global transportation systems.

Cost volatility represents one of the major issues faced by such companies. Prices of feedstuffs, fertilizers, agrochemical products and transportation costs are heavily affected by geopolitics, global commodity market volatility and increasing energy prices. Indeed, agricultural input markets have been subject to exceptional volatility in recent years according to OECD (2023b), increasing uncertainty for import-dependent companies.

This volatility places serious pressure on profit margins, particularly for firms that are operating in highly competitive markets with limited price negotiation power. In a lot of cases, companies are unable to fully transfer increased procurement costs to customers, forcing them to absorb part of the additional expense thus reducing profitability.

Supply uncertainty and product availability disturbances are also a major issue, considering the impact that geopolitical conflicts, sanctions, trade restrictions and logistics disruptions has had recently, leading to supply shortages for critical inputs and transportation delays. This creates additional difficulties in planning, procurement, inventory management and service delivery.

Transportation and logistics issues are also becoming increasingly important. Given that Greece is dependent on imports for inputs and raw materials by means of maritime transportation, freight cost increases and shipping delays represent major operational challenges affecting efficiency. The international shipping networks have been heavily affected by geopolitical tensions, according to UNCTAD (2024).

In addition, firms face increasing operational complexity due to continuously changing trade regulations, sanctions frameworks, customs procedures, and compliance requirements. Companies must constantly monitor geopolitical developments and

regulatory changes in order to ensure uninterrupted sourcing and legal compliance. This process requires extensive administrative resources and increases operating costs.

The strong dependence on external markets further increases the sector's vulnerability to international developments beyond firms' direct control. Changes in commodity prices, exchange rates, transportation costs, and geopolitical conditions can rapidly alter procurement conditions and significantly affect operational performance.

Strategic and managerial challenges have also intensified under conditions of heightened uncertainty. Managers are required to make strategic decisions regarding sourcing, pricing, inventory management, and supplier selection while operating within a highly unstable international environment. Long-term planning becomes particularly difficult when geopolitical developments, transportation conditions, and commodity markets change rapidly and unpredictably.

Furthermore, firms increasingly face trade-offs between efficiency and resilience. Strategies such as supplier diversification, inventory buffering, and regional sourcing improve operational security but often increase procurement costs and managerial complexity. Consequently, companies must continuously balance cost efficiency with supply continuity and operational flexibility.

Despite these challenges, firms operating in the sector acknowledge the importance of resilience-oriented business practices and adaptive supply chain management. The current geopolitical conditions have transformed risk management into a crucial business issue from a secondary managerial function to a central strategic priority for maintaining operational continuity and organizational resilience.

Table 6: Main challenges faced by firms

Challenge	Main operational effects
Cost volatility	Reduced profitability and pricing uncertainty
Supply disruptions	Product shortages and delivery delays
Logistics instability	Increased freight costs and longer lead times
Regulatory complexity	Higher compliance and administrative costs
Import dependency	Exposure to external market shocks
Strategic uncertainty	Difficulties in long-term planning

3.7 Trends and strategic adjustments

The increasing volatility of the global markets and frequent geopolitical disturbances have significantly influenced strategic actions of firms within the agricultural and livestock supplies industry. Companies are increasingly moving away from supply chain models, primarily focused on cost minimization and turning towards practices emphasizing the development of flexibility, diversified supply and continuity.

Supplier diversification is one of the most significant strategic changes implemented in a number of companies. Companies strive to lessen their dependence on a single supplier or a certain geographic region, while expanding their networks of procurement across different countries, thereby enhancing supply flexibility, and increasing protection from regional disturbances (Christopher & Peck, 2004).

At the same time, companies are increasingly turning toward European or neighboring sources with the aim of reducing risks of transportation and ensuring timely deliveries. Although sourcing from geographically closer suppliers results in increased purchasing costs, these practices provide greater supply security and predictability in circumstances of geopolitical uncertainty and trade fragmentation.

Inventory management practices have also evolved. Companies have shifted their practices away from the minimum inventory systems toward larger safety stock levels for critical agricultural inputs. Higher levels of buffer inventory increase supply continuity in case of temporary shortages or transport disruptions, although such an approach tends to raise warehousing costs and finance expenditures (Christopher, 2016).

In addition, firms have also reconfigured their supply chains. Companies increasingly reorganize their procurement methods, transportation networks and logistics arrangements to increase adaptability and avoid supply chain vulnerabilities through establishing alternative supplier relationships, modifying transportation routes and sourcing arrangements.

Risk management strategies have also become much more critical. Companies are paying more attention to monitoring political situations, world commodity prices,

transportation conditions and sanctions regimes to avoid supply chain disruption. Geopolitical risk is increasingly incorporated into their procurement and strategic plans.

Digitalization and IT systems also support operational adaptation in the sector. Companies tend to apply such IT tools for shipment tracking, inventory monitoring, supplier coordination and market research. Digital technologies can improve supply chain visibility and responsiveness to disruptions (Ivanov & Dolgui, 2020).

Rising procurement and operational costs have resulted in changes of pricing strategy in many companies. Some companies transfer higher costs to customers through price adjustments, while some absorb the additional costs in order to sustain competition and maintain long-term commercial ties with their partners.

However, important trade-offs remain. Supplier diversification, inventory buffering, and regional sourcing improve resilience but often increase operational complexity and reduce cost efficiency. Larger firms have greater capacity to implement of flexible supply chain strategies because of the stronger financial and organizational potential compared to SMEs, who face numerous obstacles due to limited investment capacity and limited supply chain flexibility.

Overall, current supply chain trends demonstrate that companies operating within import-dependent sectors increasingly prioritize supply chain resilience and risk mitigation rather than focusing exclusively on cost-efficiency.

Table 7: Main strategic adjustments adopted by firms

Strategic adjustment	Main objective
Supplier diversification	Reduction of sourcing risk
Regional sourcing	Improved supply reliability
Inventory buffering	Protection against shortages
Supply chain reconfiguration	Greater operational flexibility
Risk management practices	Better anticipation of disruptions
Digitalization	Improved supply chain visibility

3.8 Summary

The analysis developed in this chapter has identified and assessed the structure, characteristics, and operating environment of the Greek agricultural and livestock supplies sector, highlighting its vital strategic role within the broader agri-food system and its heightened vulnerability to geopolitical and supply chain risks.

As discussed above, the analysis demonstrated that the sector represents a critical upstream component of agriculture and livestock farming, supplying vital raw inputs (feeds, fertilizers, agrochemical products, additives and other agricultural intermediates) to agricultural producers and livestock operators. Because of a lack of adequate domestic production capacity, the sector exhibits high dependence on imported supplies and globalized supply chains.

A key finding of the analysis concerns the sector's structural vulnerability resulting from dependence on suppliers, maritime transport networks and commodity markets. In the recent past, the outbreak of geopolitical events such as the Russia-Ukraine conflict, sanctions, trade tensions and logistical bottlenecks caused significant changes in sourcing conditions, transportation reliability and operational costs.

In essence, the major challenges encountered by firms operating within the Greek market relate to volatility, lack of supply reliability, logistical problems, operational complexity and increased strategic uncertainty, resulting in pressure on margins and increased complexity of purchasing and supply chain management.

Against this background, firms increasingly adopt resilience-oriented strategies, and these are designed to ensure continuity and reduce the risks to the operational performance posed by external shocks. Diversification of suppliers, regional sourcing, inventory stockpiling, rearrangement of supply chains and increased use of IT technologies signal the overall shift from efficiency-oriented to more resilience-oriented supply chain models.

Overall, the key finding that emerges from this chapter is that geopolitical instability and supply chain disruptions are likely to become permanent features of the international business landscape, rather than temporary disruptions, requiring continuous adaptation of firm-level purchasing strategies, operations and risk management.

Chapter 4: Research Methodology

4.1 Introduction

This chapter presents the research methodology adopted for examining the effects of geopolitical tensions, trade restrictions, and supply chain disruptions on sourcing strategies, operational resilience and firm performance within the agricultural and livestock supplies sector in Greece. The chapter outlines the methodological framework of the study, including the research design, data collection process, sampling procedure, questionnaire structure and statistical techniques used for data analysis.

Research methodology refers to the systematic approach used in a project to collect, organize, analyze and interpret data in order to produce reliable and valid research findings (Bryman, 2016; Saunders et al., 2019). In business and management research, the appropriate selection of methodology is paramount as it can directly influence the credibility, validity and scholarly merit of empirical research (Cohen et al., 2018).

The present study adopts a quantitative research design based on primary data collected through a structured questionnaire survey. This approach is appropriate as the research objectives aim to examine measurable relationships between geopolitical uncertainties, supply chain disruptions, strategic responses and perceived performance using statistical techniques (Creswell, 2014; Hair et al., 2019).

The questionnaire was addressed to firms operating in importing, distribution, feed production, agricultural inputs, livestock supplies and related supply chain activities within Greece. It was designed to capture firms' perceptions and experiences regarding geopolitical risk exposure, trade-related uncertainty, logistics disruptions, sourcing challenges, resilience-oriented strategies, and perceived operational performance.

The empirical investigation is based on a final sample of 88 firms operating within the agricultural and livestock supplies sector. Data were collected electronically through online questionnaire distribution from the beginning of April until 10 May 2026. The respondents included owners, managers, procurement officers, logistics coordinators, and other organizational representatives involved in sourcing, transportation, inventory management, and strategic decision-making processes.

4.2 Research philosophy and research approach

The present study adopts a positivist research philosophy. Positivism is based on the assumption that observable, measurable and objective evidence can be used to examine organizational and social phenomena. It is based on systematic data collection, standardized measurement, empirical observation, and statistical analysis so as to establish relationships between variables and provide conclusive research findings (Creswell, 2014; Saunders et al., 2019). This philosophical approach is appropriate because the study examines measurable relationships between geopolitical instability, supply chain disruptions and the adoption of resilience-oriented strategies and perceived firm performance. These concepts were operationalized through structured questionnaire items and quantitatively analyzed using statistical techniques.

Furthermore, the study follows a deductive research approach. Deduction starts with theoretical knowledge and looks to verify its assumptions using empirical data (Bryman, 2016). The deductive approach adopted in this study builds on established knowledge about geopolitical risk, trade restrictions, supply chain disruptions, sourcing strategies and organizational resilience. These theories become the basis of the research framework and hypotheses testing.

In this context, the study examines whether firms experiencing higher levels of geopolitical and trade-related uncertainty also experience greater supply chain disruptions and operational difficulties. The study additionally examines whether resilience-oriented strategies such as supplier diversification, inventory buffering, and risk monitoring contribute to improved operational resilience and perceived performance.

The deductive research approach is thus suitable as it allows theoretical concepts identified in earlier works to be measured and empirically tested through statistical analysis (Creswell, 2014; Pallant, 2020).

4.3 Research design

The study adopts a quantitative cross-sectional survey design. A quantitative research design is appropriate because the study seeks to examine measurable relationships

between geopolitical instability, trade restrictions, supply chain disruptions, sourcing strategies, and perceived organizational performance within firms operating in the agricultural and livestock supplies sector. Quantitative methods are frequently used in business and management research when the aim is to identify statistical patterns and relationships among organizations through systematic data collection and analysis (Hair et al., 2019).

The research adopts a cross-sectional design as it attempts to collect data from respondents at a single point in time. In particular, the questionnaire survey was conducted electronically from early April until 10 May 2026. Cross-sectional research is suitable when the objective is to capture current perceptions, experiences and operational conditions at a specific time period rather than examine developments longitudinally over time (Saunders et al., 2019).

The study is also survey-based, relying on a structured questionnaire as the primary research instrument. Survey research enables the collection of standardized data from multiple respondents efficiently, facilitate comparability between responses, and statistically analyze data (Cohen et al., 2018). The electronic survey also allowed for the inclusion of firms located throughout the entire geographical regions of Greece.

The research design combines descriptive and explanatory elements. It is descriptive as it will explore the dominant operational challenges that firms face, including exposure to geopolitical risk, sourcing problems, logistics disturbances, cost volatility and the adoption of mitigation measures. It is explanatory since the study is investigating relationships between geopolitical instability, supply chain disruptions, strategic responses, and perceived organizational performance.

4.4 Data collection method

The study is based on primary data collected directly from firms within the agricultural and livestock supplies sector operating in Greece. Primary data represent original sources of information gathered for the specific purpose of the research study and are particularly relevant when addressing organizational perspectives, operational practices, and strategic behaviors which are not captured sufficiently by secondary data sources (Bryman, 2016).

Secondary sources, while providing useful theoretical and contextual information, provide limited evidence of how firms themselves experience and manage geopolitical and supply chain-related challenges in practice. Therefore, the collection of primary empirical data was considered in order to address the research objectives of the study.

Data were collected through an electronically distributed structured questionnaire. Electronic distribution was selected because it facilitated participation from firms located across different regions of Greece, and enabled efficient organization and coding of responses for statistical analysis (Saunders et al., 2019).

The data collection process took place from the beginning of April until 10th May 2026. During this period, questionnaires were distributed via email, professional networks, industry contacts, web business directories, and relevant communication channels.

The participants of the study were owners, managers, procurement officers, logistics managers and other organizational representatives that are involved with sourcing and operational decisions. This group was considered appropriate as they are likely to possess direct knowledge of procurement conditions, supplier relationships, logistics disruptions, pricing pressures, inventory management and strategic responses to external uncertainty.

The structured questionnaire primarily consisted of closed-ended questions using five-point Likert scales related to geopolitical risks, supply chain disruptions, resilience strategies, and firm performance. By the end of the data collection period, 88 completed questionnaires were returned, coded and imported into SPSS for statistical analysis.

4.5 Questionnaire structure

The questionnaire constituted the primary data collection instrument of the present study. In business and management research, questionnaires are widely used to collect systematic and standardized information from multiple respondents in an efficient and organized manner (Bryman, 2016). They are particularly suitable for examining organizational perceptions, management attitudes, operational processes and strategic responses through measurable variables and structured response scales (Oppenheim, 1992).

The questionnaire was designed in accordance with the objectives of the study and the conceptual framework developed through the literature review. It is divided into five main sections. Section A gathered general firm profile information, such as main business activity, years of operation, company size, degree of dependence on imported products, sourcing regions and annual turnover.

Section B focused on geopolitical risk, trade restrictions, transportation uncertainty and sourcing-related disruptions. Section C examined supply chain disruptions and operational challenges, with emphasis on delivery delays, product shortages, freight cost increases, procurement uncertainty, inventory pressures and operational continuity. Section D explored resilience-oriented practices and risk management capabilities, including supplier diversification, inventory buffering, alternative sourcing strategies, contingency planning, supply chain monitoring and digital monitoring tools. Finally, section E examined perceived organizational outcomes and firm performance, particularly in relation to profitability, operational efficiency, organizational preparedness, adaptability and the perceived effectiveness of the strategies adopted by firms.

All attitudinal variables were measured using a five-point Likert scale ranging from “Strongly disagree” to “Strongly agree”. Likert-scale measurement is widely used in organizational and management research because it enables the quantitative assessment of attitudes and levels of agreement through standardized numerical coding (Field, 2018; Pallant, 2020).

Prior to the final distribution of the questionnaire, a pilot study was conducted with a small number of individuals possessing industry knowledge and managerial experience related to agricultural supplies and supply chain operations. Pilot testing helped identify ambiguities, unclear wording and structural weaknesses, thereby improving the clarity and reliability of the final questionnaire (Creswell, 2014). Overall, the questionnaire structure was considered consistent with the constructs and relationships examined in the empirical model.

4.6 Sampling and target population

The target population of the study consisted of firms operating within the agricultural and livestock supplies sector in Greece. More specifically, the research focused on companies engaged in the importation, production, distribution and supply of agricultural and livestock inputs, including feed materials, feed additives, fertilizers, agrochemical products, vitamins, amino acids, seeds and related agricultural intermediates.

The industry was selected due to its strong dependence on imported products and internationally integrated supply chains. Firms operating within this field are particularly exposed to geopolitical instability, trade restrictions, transportation disruptions, commodity price volatility and broader supply chain uncertainty.

The study adopted a non-probability purposive sampling approach. Purposive sampling is considered appropriate when respondents are selected based on their knowledge, expertise or direct involvement in the phenomenon under investigation (Saunders et al., 2019). In the present study, participants were selected because they possessed practical experience related to procurement procedures, importing activities, supplier management, logistics coordination, transportation planning, inventory management and strategic decision-making.

Elements of convenience sampling were also incorporated due to practical limitations associated with access to companies and respondent availability. Participants were approached through professional contacts, business directories, industry networks, email communication, and online communication channels relevant to the agricultural and livestock supplies sector. Although non-probability sampling does not permit complete statistical generalization, it is considered appropriate in sector-focused management research where access to specialized managerial respondents is often limited (Cohen et al., 2018).

The final sample consisted of 88 firms operating within the agricultural and livestock supplies sector in Greece. Although the sample size may be considered moderate, it was regarded as adequate for descriptive and inferential statistical procedures examining relationships among the principal variables included in the conceptual framework of the study.

4.7 Data analysis method

The questionnaire data were processed and statistically examined using SPSS software. SPSS was selected because it provides effective tools for managing survey data, performing quantitative statistical procedures and assessing the reliability and internal consistency of measurement scales (Pallant, 2020).

Prior to the statistical procedures, the dataset was checked for completeness, consistency, coding accuracy and potential data entry errors in order to ensure the suitability of the data for further processing.

The study employed both descriptive and inferential statistical techniques. Descriptive statistics were used to present the main characteristics of the sample and identify general patterns within the collected data. Frequencies, percentages, means and standard deviations were calculated in order to describe firm characteristics, import dependency, geopolitical risk exposure, operational challenges and the adoption of resilience-oriented practices.

Inferential statistical procedures were applied in order to examine the relationships among the principal variables included in the conceptual framework and test the proposed research hypotheses. Pearson correlation analysis was conducted to evaluate the strength and direction of the relationships between geopolitical risk exposure, supply chain disruptions, resilience-oriented strategies, risk management capabilities and perceived organizational performance (Field, 2018).

In addition, four simple linear regression models were performed in order to examine whether statistically significant associations exist between geopolitical risk and trade restrictions, supply chain disruptions, resilience-oriented strategies, risk management capabilities and operational resilience and perceived firm performance (Hair et al., 2019).

Reliability analysis was also conducted using Cronbach's Alpha coefficient in order to assess the internal consistency of multi-item scales included in the questionnaire. According to the literature, Cronbach's Alpha values above 0.70 are generally considered indicative of satisfactory internal consistency among scale items (Field, 2018).

4.8 Reliability and validity

Reliability and validity constitute two fundamental criteria for evaluating the quality and credibility of quantitative research. Reliability refers to the consistency and stability of a measurement instrument, whereas validity concerns the extent to which the instrument accurately measures the concept it is intended to assess (Bryman, 2016).

Several procedures were adopted in order to strengthen the reliability of the study. Initially, the questionnaire was designed in a clear, standardized and unambiguous manner so as to minimize misunderstandings and ensure greater consistency among respondents. The measurement items were developed on the basis of the principal concepts identified through the literature review, including geopolitical risk, trade restrictions, supply chain disruptions, resilience-oriented strategies, operational resilience and firm performance.

In addition, a pilot study was conducted prior to the main data collection process. The pilot participants possessed industry knowledge and managerial experience related to agricultural supplies and supply chain operations. The pilot process contributed to the identification of unclear wording, structural weaknesses and potential ambiguities, thereby improving the clarity and comprehensibility of the final questionnaire (Creswell, 2014).

Internal consistency was further evaluated using Cronbach's Alpha coefficient, which is widely applied in quantitative research for assessing the reliability of multi-item measurement scales (Field, 2018). The use of this indicator allowed the examination of the degree to which questionnaire items measuring the same construct produced consistent results.

In terms of validity, both content validity and construct validity were considered. Content validity was strengthened by ensuring that all major dimensions of the research problem were adequately represented within the questionnaire structure. Construct validity was supported through the alignment of questionnaire items with the theoretical concepts and relationships included in the conceptual framework of the study (Hair et al., 2019).

Despite the procedures adopted to strengthen research quality, certain limitations should be acknowledged. Since the study relied on self-reported questionnaire responses, the

findings may have been influenced by subjective perceptions, managerial interpretation and potential response bias. Nevertheless, the use of standardized measurement procedures, theoretically grounded constructs, pilot testing and reliability assessment contributed to strengthening the overall credibility and consistency of the empirical investigation.

4.9 Ethical considerations and limitations

The study followed standard ethical principles related to voluntary participation, informed consent, confidentiality, anonymity and responsible data handling. Prior to completing the questionnaire, all participants were informed about the academic purpose of the research and the general objectives of the study. Participation was entirely voluntary and respondents had the right to refuse participation or withdraw from the research process at any stage without any negative consequences.

Particular emphasis was placed on protecting the confidentiality and anonymity of respondents throughout the study. The questionnaire avoided the collection of unnecessary confidential personal or business information in order to prevent the direct identification of firms or individuals participating in the research. In addition, all findings are presented in aggregated form, ensuring that no specific company, manager or organization can be identified.

Data collected through the electronic questionnaire were stored securely and used exclusively for academic purposes. Furthermore, questionnaire items were formulated using neutral wording in order to minimize response bias and avoid influencing participants' responses.

Despite the methodological procedures adopted, certain limitations of the study should be acknowledged. The research focused exclusively on firms operating within the agricultural and livestock supplies sector in Greece; therefore, the findings cannot be generalized to organizations operating in different industries or national contexts.

In addition, the study employed purposive and convenience sampling techniques, meaning that the representativeness of the sample cannot be fully guaranteed. Although the selected participants possessed substantial industry knowledge and managerial

experience, the use of non-probability sampling limits the possibility of broader statistical generalization.

Another limitation concerns the use of self-reported questionnaire data. Respondents' answers may have been influenced by subjective perceptions, managerial interpretations or social desirability bias. Furthermore, perceptions regarding geopolitical risk and operational challenges may differ according to firm size, managerial position and previous organizational experience.

The cross-sectional nature of the study also constitutes an important limitation. Since data were collected during a specific time period (April–May 2026), the findings capture organizational perceptions and operational conditions only within that particular context. Future geopolitical developments and changes in international market conditions may subsequently influence sourcing strategies, operational priorities and organizational responses.

Finally, the relatively moderate sample size may limit the complexity of inferential statistical procedures and the broader generalizability of the findings. Nevertheless, the sample was considered adequate for conducting descriptive and inferential quantitative analysis within a sector-focused organizational study.

Chapter 5: Empirical Findings and Data Analysis

5.1 Introduction

This chapter presents the empirical findings of the study based on the questionnaire survey conducted among firms operating within the agricultural and livestock supplies sector in Greece. The purpose of the analysis is to examine how geopolitical instability, trade restrictions and supply chain disruptions are associated with firm operations, sourcing activities, operational resilience and perceived organizational performance within an import-dependent business environment.

The chapter includes descriptive statistical analysis, reliability analysis, correlation analysis and simple linear regression analyses in order to investigate the relationships between geopolitical risk, supply chain disruptions, resilience-oriented strategies, risk management capabilities, operational resilience and firm performance. The empirical analysis is based on quantitative data collected from 88 firms operating within the sector through a structured questionnaire using Likert-scale measurements.

More specifically, the chapter first presents the descriptive characteristics of the participating firms and the main research variables. Subsequently, reliability analysis is conducted in order to evaluate the internal consistency of the research scales, followed by correlation analysis examining the relationships among the principal variables of the study. Finally, simple linear regression analyses are employed in order to statistically examine the proposed research hypotheses and evaluate the relationships between geopolitical risk, supply chain disruptions, resilience-oriented strategies, risk management capabilities and operational resilience and firm performance. The overall analytical approach is directly aligned with the conceptual framework and research hypotheses presented in the previous chapters.

5.2 Descriptive statistical analysis

5.2.1 Firm profile characteristics

The final sample consisted of 88 firms operating within the agricultural and livestock supplies sector in Greece. The firm profile characteristics of the participating firms included in the study are presented in *Table 8*.

Table 8: Firm profile characteristics of participating firms (N=88)

Variable	Category	N	%
Firm size	Micro enterprise (1-9 employees)	16	18.2
	Small enterprise (10-49)	52	59.1
	Medium enterprise (50-249)	18	20.5
	Large enterprise (250+)	2	2.3
Main business activity	Importing	17	19.3
	Distribution	22	25.0
	Feed production	10	11.4
	Agricultural inputs	12	13.6
	Livestock supplies	14	15.9
	Mixed activities	9	10.2
	Other	4	4.5
Years of operation	Less than 5 years	16	18.2
	5-10 years	17	19.3
	11-20 years	19	21.6
	More than 20 years	36	40.9
Degree of dependence on imported products	Low	2	2.3
	Moderate	15	17.0
	High	50	56.8
	Very high	21	23.9
Annual turnover	Less than €500,000	29	33.0
	€500,001-€2 million	35	39.8
	€2-10 million	22	25.0
	More than €10 million	2	2.3

Regarding firm size, the majority of participating firms were small enterprises employing between 10 and 49 employees (59.1%, $n = 52$). Medium-sized enterprises employing between 50 and 249 employees represented 20.5% of the sample ($n = 18$), while micro enterprises accounted for 18.2% ($n = 16$). Only a limited number of firms were classified as large enterprises with more than 250 employees (2.3%, $n = 2$). The findings indicate that the sector is primarily dominated by small and medium-sized enterprises (SMEs), which is consistent with the general structure of the Greek agricultural and livestock supplies market.

With regard to the main business activity of the firms, distribution activities represented the largest category within the sample (25.0%, $n = 22$). Importing activities accounted for 19.3% of firms ($n = 17$), while livestock supplies represented 15.9% ($n = 14$). Agricultural inputs accounted for 13.6% ($n = 12$), feed production for 11.4% ($n = 10$), and mixed activities for 10.2% ($n = 9$). A smaller proportion of firms reported other business activities (4.5%, $n = 4$). The findings demonstrate the operational diversity of the sector and indicate that many firms combine importing, distribution and broader supply chain-related activities.

Regarding years of operation, a substantial proportion of firms reported long-term market presence. More specifically, 40.9% of firms ($n = 36$) had operated for more than 20 years, indicating significant industry experience and established business networks. Firms operating for 11–20 years represented 21.6% of the sample ($n = 19$), while firms operating for 5–10 years accounted for 19.3% ($n = 17$). Newer firms with less than 5 years of operation represented 18.2% of the sample ($n = 16$). Overall, the findings suggest that the sample includes both highly experienced and relatively newer firms, allowing the examination of different levels of organizational maturity and strategic adaptation.

Concerning the degree of dependence on imported products, most firms reported high or very high dependence on imported goods and international sourcing networks. More specifically, 56.8% of firms ($n = 50$) reported a high level of dependence on imported products, while 23.9% ($n = 21$) reported a very high degree of dependence. Only 17.0% of firms ($n = 15$) reported moderate dependence, whereas very few firms reported low dependence on imports (2.3%, $n = 2$). These findings confirm the highly import-

dependent nature of the agricultural and livestock supplies sector in Greece and highlight its vulnerability to geopolitical instability and international trade disruptions.

Regarding annual turnover, the largest proportion of firms reported annual revenues between €500,001 and €2 million (39.8%, $n = 35$). Firms with annual turnover below €500,000 represented 33.0% of the sample ($n = 29$), while firms with revenues between €2 million and €10 million accounted for 25.0% ($n = 22$). Only a small proportion of firms reported annual turnover exceeding €10 million (2.3%, $n = 2$). These findings further support the dominance of small and medium-sized firms within the sector.

In addition to the general firm profile characteristics, firms were also asked to identify their main sourcing regions through a multiple-response question. The results are presented separately in *Table 9*.

Table 9: Main sourcing regions of participating firms

Main sourcing regions	N	% of firms
China	55	62.5
European Union	72	81.8
Russia/Ukraine	27	30.7
South America	29	33.0
Middle East	22	25.0
Other	4	4.5

Note: Multiple responses were allowed; therefore, percentages do not sum to 100%.

The main sourcing regions of participating firms are presented separately in Table 9 due to the multiple-response nature of the question. The European Union represented the most frequently reported sourcing region, selected by 81.8% of firms ($n = 72$), followed by China with 62.5% ($n = 55$). South America was reported by 33.0% of firms ($n = 29$), while Russia/Ukraine accounted for 30.7% ($n = 27$). In addition, 25.0% of firms ($n = 22$) reported sourcing activities from the Middle East, whereas a small proportion selected other sourcing regions (4.5%, $n = 4$).

Overall, the findings indicate that firms operating within the agricultural and livestock supplies sector in Greece are highly integrated into international sourcing networks and

remain strongly dependent on imported products and internationally interconnected supply chains. Consequently, the sector appears particularly vulnerable to geopolitical instability, transportation uncertainty and international trade disruptions, further highlighting the importance of resilience-oriented strategies and effective risk management practices.

5.2.2 Geopolitical risk and trade restrictions

The descriptive statistical analysis regarding geopolitical risk and trade restrictions is presented in *Table 10* and *Figure 2*. Overall, the findings indicate that participating firms perceive geopolitical instability and trade-related uncertainty as significant factors affecting their operational environment and supply chain activities.

Table 10: Descriptive statistics for geopolitical risk and trade restrictions

Statement	Mean	SD
1. Geopolitical tensions have increased uncertainty in our business environment	4.16	0.68
2. Trade restrictions have negatively affected our sourcing activities	3.98	0.79
3. Sanctions and tariffs have increased procurement costs	4.00	0.63
4. Geopolitical instability has reduced supply chain predictability	4.06	0.65
5. Recent geopolitical developments have negatively affected supplier reliability	3.81	0.77
6. Transportation disruptions caused by geopolitical events have negatively affected our operations	4.09	0.75
7. Trade policy uncertainty complicates long-term business planning	4.17	0.75

Table 10 demonstrates relatively high mean scores across all variables associated with geopolitical instability and trade-related uncertainty. The findings indicate that participating firms perceive geopolitical developments, transportation disruptions, sanctions and trade policy uncertainty as important operational and strategic challenges

affecting sourcing activities, supply chain predictability and long-term business planning.



Figure 2: Geopolitical risk and trade restrictions – Mean scores

More specifically, the highest mean score was observed for the statement “Trade policy uncertainty complicates long-term business planning” ($M = 4.17$, $SD = 0.75$), indicating that firms experience substantial difficulty in long-term strategic planning under conditions of geopolitical and trade-related uncertainty. Similarly, respondents strongly agreed that geopolitical tensions have increased uncertainty within their business environment ($M = 4.16$, $SD = 0.68$).

High mean values were also recorded for the statements related to transportation disruptions caused by geopolitical events ($M = 4.09$, $SD = 0.75$) and reduced supply chain predictability resulting from geopolitical instability ($M = 4.06$, $SD = 0.65$). These findings suggest that firms perceive geopolitical developments as directly affecting supply chain reliability, transportation coordination and operational continuity.

Furthermore, respondents agreed that sanctions and tariffs have increased procurement costs ($M = 4.00$, $SD = 0.63$), while trade restrictions were also perceived to negatively affect sourcing activities ($M = 3.98$, $SD = 0.79$). The relatively high scores of these variables further confirm the operational and financial pressures created by international trade disruptions and geopolitical fragmentation.

The lowest mean score within this section was recorded for the statement “Recent geopolitical developments have negatively affected supplier reliability” ($M = 3.81$, $SD = 0.77$). Although comparatively lower than the other variables, the finding still indicates a relatively high level of agreement among firms regarding the negative impact of geopolitical instability on supplier consistency and reliability.

Overall, the Geopolitical Risk & Trade Restrictions scale demonstrated a relatively high mean score ($M = 4.04$, $SD = 0.51$), indicating that participating firms perceive geopolitical instability and trade-related uncertainty as major sources of operational and strategic pressure.

5.2.3 Supply chain disruptions

The descriptive statistical analysis regarding supply chain disruptions is presented in *Table 11* and *Figure 3*. Overall, the findings indicate that participating firms have experienced substantial operational and logistical disruptions associated with geopolitical instability and international market uncertainty.

Table 11: Descriptive statistics for supply chain disruptions

Statement	Mean	SD
1. Our firm has experienced delivery delays due to geopolitical disruptions	4.22	0.70
2. Input availability has become more uncertain in recent years	4.11	0.72
3. Freight and logistics costs have significantly increased	4.38	0.68
4. Our firm has experienced shortages of important imported products	4.03	0.72
5. Supply chain disruptions have negatively affected operational continuity	4.23	0.64
6. Geopolitical instability has increased inventory management difficulties	4.25	0.75
7. Our firm has become more vulnerable to external supply chain shocks	4.18	0.65

Table 11 demonstrates consistently high mean scores across all variables associated with supply chain disruptions. The findings indicate that participating firms perceive geopolitical instability and international trade uncertainty as major sources of operational disruption affecting logistics coordination, inventory management, procurement stability and overall supply chain continuity.

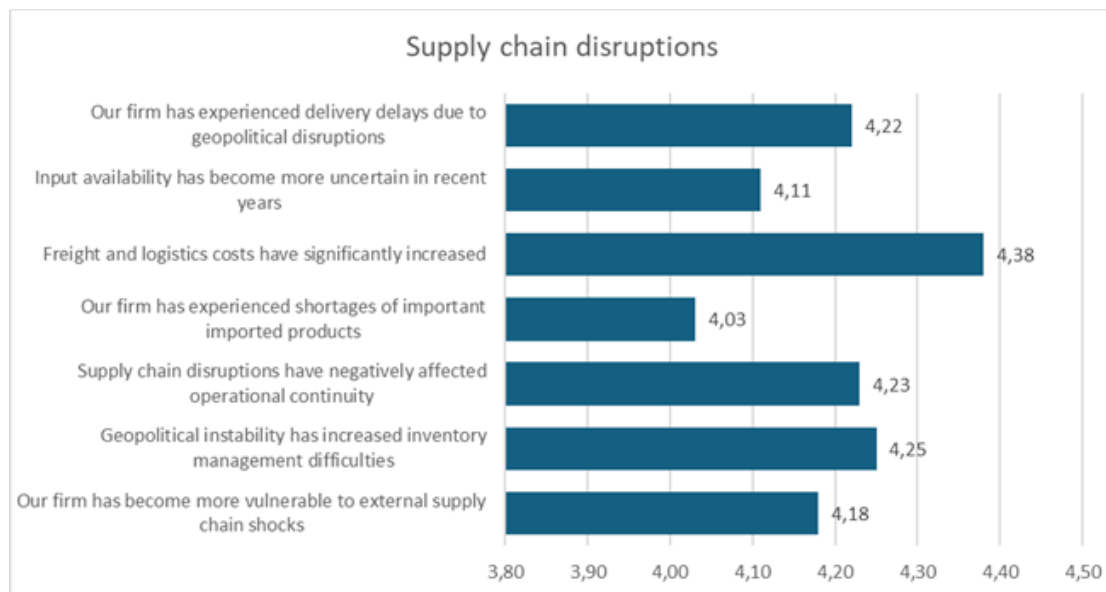


Figure 3: Supply chain disruptions – Mean scores

More specifically, the highest mean score was observed for the statement “Freight and logistics costs have significantly increased” ($M = 4.38$, $SD = 0.68$), indicating that firms strongly perceive transportation and logistics costs as one of the most significant consequences of geopolitical instability and international market disruptions.

High mean values were also recorded for the statements “Geopolitical instability has increased inventory management difficulties” ($M = 4.25$, $SD = 0.75$) and “Supply chain disruptions have negatively affected operational continuity” ($M = 4.23$, $SD = 0.64$). These findings suggest that firms experience substantial operational pressure related to inventory planning, supply continuity and day-to-day business operations.

Similarly, respondents reported relatively high agreement regarding delivery delays caused by geopolitical disruptions ($M = 4.22$, $SD = 0.70$) and increased organizational vulnerability to external supply chain shocks ($M = 4.18$, $SD = 0.65$). The findings

indicate that firms perceive their supply chains as increasingly exposed to international uncertainty and external disruptions.

In addition, respondents agreed that input availability has become more uncertain in recent years ($M = 4.11$, $SD = 0.72$), while shortages of important imported products were also reported at relatively high levels ($M = 4.03$, $SD = 0.72$). These findings further confirm the vulnerability of the agricultural and livestock supplies sector to disruptions affecting global sourcing networks and international procurement activities.

Overall, the Supply Chain Disruptions scale demonstrated a relatively high mean score ($M = 4.20$, $SD = 0.52$), indicating that firms operating within the agricultural and livestock supplies sector in Greece have experienced substantial operational and logistical challenges associated with geopolitical instability and international supply chain disruptions.

5.2.4 Resilience-oriented strategies

The descriptive statistical analysis regarding resilience-oriented strategies is presented in *Table 12* and *Figure 4*. Overall, the findings indicate that participating firms have adopted several strategic adjustments aimed at improving operational flexibility and reducing vulnerability to geopolitical instability and supply chain disruptions.

Table 12: Descriptive statistics for resilience-oriented strategies

Statement	Mean	SD
1. Our firm has diversified its supplier base in response to geopolitical risks	3.97	0.78
2. We increasingly prioritize supplier reliability over low procurement costs	3.95	0.69
3. Our firm maintains higher inventory levels than in previous years	3.93	0.74
4. We have explored alternative sourcing regions due to geopolitical uncertainty	3.97	0.65

Table 12 demonstrates relatively high mean scores across all variables associated with resilience-oriented strategies. The findings suggest that firms increasingly adopt

strategic adjustments designed to improve supply chain flexibility, sourcing stability and operational preparedness under conditions of geopolitical uncertainty.



Figure 4: Resilience-oriented strategies – Mean scores

More specifically, the highest mean scores were observed for the statements “Our firm has diversified its supplier base in response to geopolitical risks” and “We have explored alternative sourcing regions due to geopolitical uncertainty” ($M = 3.97$). These findings indicate that firms increasingly attempt to reduce dependence on individual suppliers and geographically concentrated sourcing structures in order to improve resilience and reduce exposure to external disruptions.

Similarly, respondents reported relatively high agreement regarding the prioritization of supplier reliability over low procurement costs ($M = 3.95$, $SD = 0.69$). This finding suggests that firms are increasingly emphasizing supply continuity and supplier stability rather than focusing exclusively on cost minimization.

In addition, firms reported maintaining higher inventory levels compared to previous years ($M = 3.93$, $SD = 0.74$), indicating the adoption of inventory buffering practices aimed at improving preparedness against future disruptions and procurement uncertainty.

Overall, the Resilience-Oriented Strategies scale demonstrated a relatively high mean score ($M = 3.96$, $SD = 0.55$), indicating that firms operating within the agricultural and

livestock supplies sector in Greece have increasingly adopted strategic and operational adjustments in order to improve supply chain resilience and reduce vulnerability to geopolitical and trade-related disruptions.

5.2.5 Risk management capabilities

The descriptive statistical analysis regarding risk management capabilities is presented in *Table 13* and *Figure 5*. Overall, the findings indicate that participating firms have increasingly strengthened their risk management practices and monitoring mechanisms in response to geopolitical instability and supply chain uncertainty.

Table 13: Descriptive statistics for risk management capabilities

Statement	Mean	SD
1. Our firm has strengthened its risk management capabilities in response to geopolitical instability	4.09	0.67
2. Our firm continuously monitors geopolitical developments affecting supply chains	3.95	0.76
3. Our firm has improved contingency planning for supply disruptions	4.02	0.69
4. Digital tools and information systems support supply chain risk management	3.86	0.75

Table 13 demonstrates relatively high mean scores across all variables associated with risk management capabilities. The findings suggest that firms increasingly recognize the importance of proactive monitoring, contingency planning and broader risk management practices in order to improve operational preparedness and reduce vulnerability to geopolitical and supply chain-related disruptions.

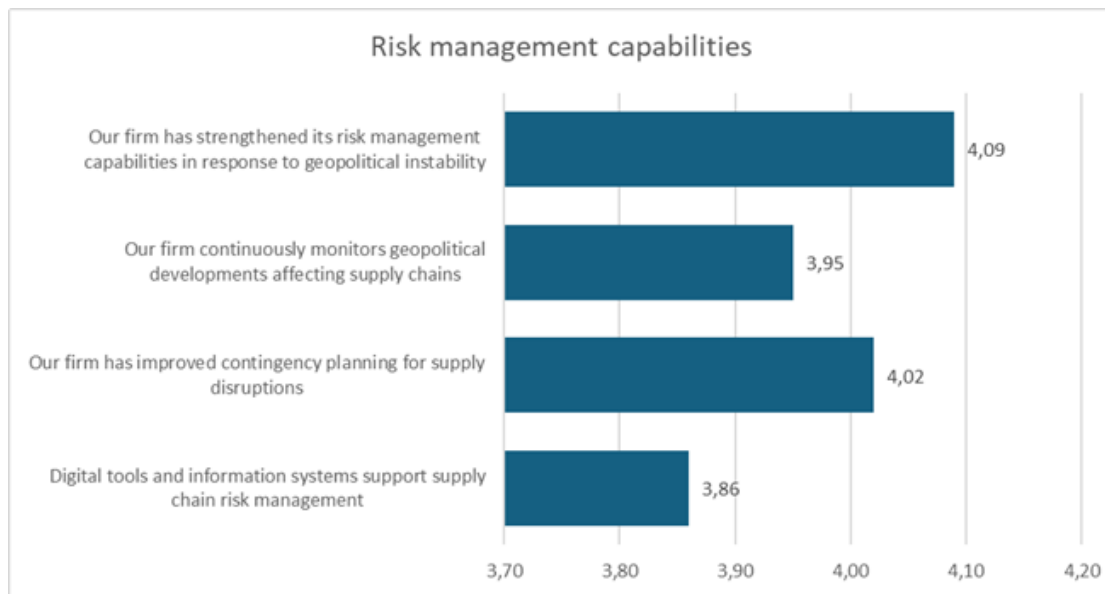


Figure 5: Risk management capabilities – Mean scores

More specifically, the highest mean score was observed for the statement “Our firm has strengthened its risk management capabilities in response to geopolitical instability” ($M = 4.09$, $SD = 0.67$). This finding indicates that firms perceive geopolitical instability as an important factor motivating the development of more systematic risk management practices and organizational preparedness mechanisms.

Similarly, respondents reported relatively high agreement regarding improved contingency planning for supply disruptions ($M = 4.02$, $SD = 0.69$), suggesting that firms increasingly attempt to prepare for operational disruptions through strategic planning and preventive operational adjustments.

In addition, firms reported continuously monitoring geopolitical developments affecting supply chains ($M = 3.95$, $SD = 0.76$), highlighting the growing importance of geopolitical awareness and environmental scanning within contemporary supply chain management.

The lowest mean score within this section was observed for the statement “Digital tools and information systems support supply chain risk management” ($M = 3.86$, $SD = 0.75$). Although comparatively lower than the other variables, the finding still indicates a relatively positive evaluation regarding the contribution of digital systems and technological tools to supply chain risk monitoring and operational decision-making.

Overall, the Risk Management Capabilities scale demonstrated a relatively high mean score ($M = 3.98$, $SD = 0.54$), indicating that firms operating within the agricultural and livestock supplies sector in Greece have increasingly strengthened their risk management practices and preparedness mechanisms in response to geopolitical instability and supply chain uncertainty.

5.2.6 Negative operational impact

The descriptive statistical analysis regarding the negative operational impact of geopolitical instability and supply chain disruptions is presented in *Table 14* and *Figure 6*. Overall, the findings indicate that participating firms perceive geopolitical and supply chain-related disruptions as having a strongly negative effect on profitability and operational efficiency.

Table 14: Descriptive statistics for negative operational impact

Statement	Mean	SD
1. Geopolitical disruptions have negatively affected firm profitability	4.50	0.64
2. Supply chain instability has reduced operational efficiency	4.43	0.64

Table 14 demonstrates very high mean scores across both variables associated with negative operational impact. The findings suggest that firms perceive geopolitical instability and supply chain disruptions as major operational and financial pressures affecting business performance and organizational efficiency.

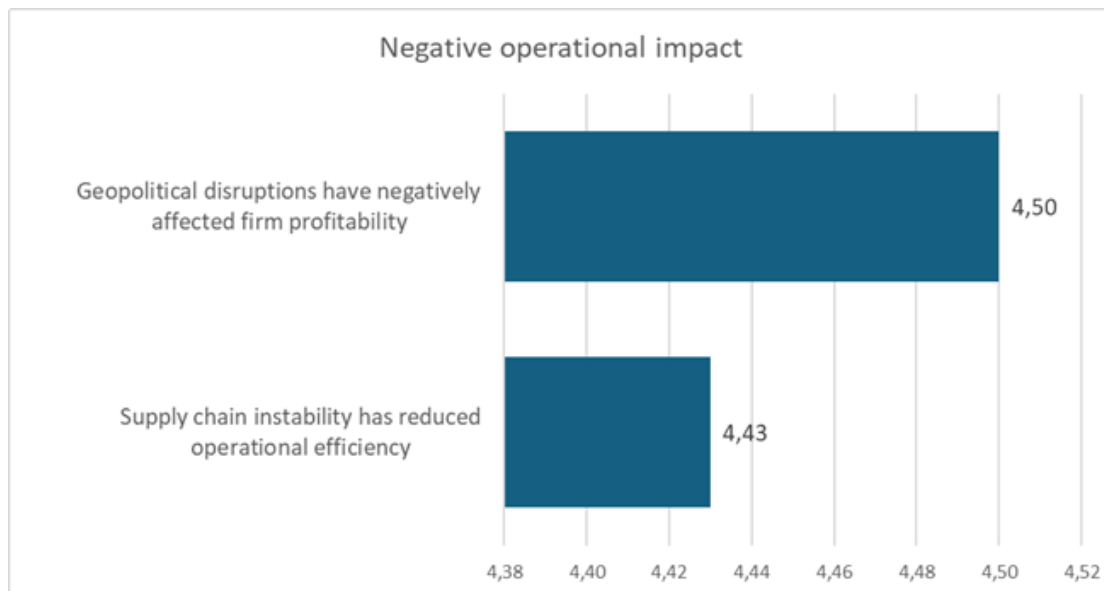


Figure 6: Negative operational impact – Mean scores

More specifically, the highest mean score was observed for the statement “Geopolitical disruptions have negatively affected firm profitability” ($M = 4.50$, $SD = 0.64$), indicating a very high level of agreement among participating firms regarding the negative financial consequences of geopolitical instability and international trade disruptions.

Similarly, respondents strongly agreed that supply chain instability has reduced operational efficiency ($M = 4.43$, $SD = 0.64$). This finding suggests that firms

experience substantial operational difficulties associated with logistics disruptions, procurement uncertainty, transportation delays and broader supply chain instability.

Overall, the Negative Operational Impact scale demonstrated a particularly high mean score ($M = 4.47$, $SD = 0.55$), indicating that firms operating within the agricultural and livestock supplies sector in Greece perceive geopolitical instability and supply chain disruptions as having a substantial negative effect on both profitability and operational efficiency.

5.2.7 Operational resilience & firm performance

The descriptive statistical analysis regarding operational resilience and firm performance is presented in *Table 15* and *Figure 7*. Overall, the findings indicate that participating firms perceive resilience-oriented strategies and operational adjustments as relatively effective mechanisms for improving preparedness, adaptability and supply continuity under conditions of geopolitical instability and supply chain uncertainty.

Table 15: Descriptive statistics for operational resilience and firm performance

Statement	Mean	SD
1. Our firm has successfully adapted to geopolitical disruptions	4.07	0.71
2. The strategies adopted by our firm have improved operational resilience	4.25	0.70
3. Supplier diversification has reduced our exposure to supply disruptions	4.19	0.81
4. Inventory buffering has improved supply continuity	4.09	0.72
5. Our firm is better prepared for future geopolitical disruptions	4.12	0.76

Table 15 demonstrates relatively high mean scores across all variables associated with operational resilience and firm performance. The findings suggest that firms perceive resilience-oriented strategies and risk management practices as positively contributing to operational continuity, preparedness and organizational adaptability under conditions of geopolitical uncertainty.



Figure 7: Operational resilience and firm performance – Mean scores

More specifically, the highest mean score was observed for the statement “The strategies adopted by our firm have improved operational resilience” ($M = 4.25$, $SD = 0.70$), indicating that firms strongly perceive their strategic adjustments as effective mechanisms for improving organizational resilience and operational continuity.

Similarly, respondents reported relatively high agreement regarding the statement “Supplier diversification has reduced our exposure to supply disruptions” ($M = 4.19$, $SD = 0.81$). This finding suggests that diversification practices are perceived as important tools for reducing operational vulnerability and improving sourcing stability.

In addition, firms reported improved preparedness for future geopolitical disruptions ($M = 4.12$, $SD = 0.76$) and positive effects of inventory buffering on supply continuity ($M = 4.09$, $SD = 0.72$). These findings indicate that firms increasingly adopt preventive operational practices aimed at improving supply chain resilience and reducing the consequences of external disruptions.

The statement “Our firm has successfully adapted to geopolitical disruptions” also demonstrated a relatively high mean score ($M = 4.07$, $SD = 0.71$), suggesting that many firms perceive themselves as relatively capable of adapting to geopolitical instability and maintaining operational performance under uncertain market conditions.

Overall, the Operational Resilience & Firm Performance scale demonstrated a relatively high mean score ($M = 4.15$, $SD = 0.60$), indicating that firms operating within the agricultural and livestock supplies sector in Greece perceive resilience-oriented strategies and risk management practices as positively contributing to operational resilience, preparedness and organizational performance under conditions of geopolitical instability and supply chain uncertainty.

5.3 Reliability analysis

Reliability analysis was conducted in order to evaluate the internal consistency of the research scales included in the questionnaire. Cronbach's Alpha coefficient was used as the primary reliability indicator, as it is one of the most commonly applied measures for assessing internal consistency in quantitative research using Likert-scale variables (Field, 2018; Pallant, 2020).

The analysis examined the reliability of the principal constructs included in the conceptual framework of the study, namely Geopolitical Risk and Trade Restrictions, Supply Chain Disruptions, Resilience-Oriented Strategies, Risk Management Capabilities, Negative Operational Impact and Operational Resilience and Firm Performance.

According to the literature, Cronbach's Alpha values above 0.70 are generally considered acceptable, while values above 0.80 indicate high reliability and strong internal consistency among scale items (Hair et al., 2019).

Table 16: Reliability analysis of the research scales

Scale	Number of items	Cronbach's Alpha
Geopolitical Risk and Trade Restrictions	7	0.836
Supply Chain Disruptions	7	0.863
Resilience-Oriented Strategies	4	0.774
Risk Management Capabilities	4	0.752
Negative Operational Impact	2	0.618

Scale	Number of items	Cronbach's Alpha
Operational Resilience and Firm Performance	5	0.871

The findings presented in *Table 16* indicate acceptable to high levels of internal consistency across the majority of the research scales. More specifically, the Operational Resilience and Firm Performance scale demonstrated the highest reliability coefficient ($\alpha = 0.871$), followed by the Supply Chain Disruptions scale ($\alpha = 0.863$) and the Geopolitical Risk and Trade Restrictions scale ($\alpha = 0.836$). These findings indicate strong internal consistency among the variables included within these constructs.

Similarly, the Resilience-Oriented Strategies scale ($\alpha = 0.774$) and the Risk Management Capabilities scale ($\alpha = 0.752$) demonstrated satisfactory levels of reliability, indicating acceptable internal consistency among their respective variables.

The Negative Operational Impact scale demonstrated the lowest Cronbach's Alpha value ($\alpha = 0.618$). However, this finding should be interpreted cautiously, particularly given that the scale consisted of only two variables. Previous methodological literature suggests that lower alpha values may occur in scales containing a limited number of items, particularly in exploratory research contexts (Pallant, 2020).

Taken together, the reliability analysis suggests that the questionnaire instrument demonstrates generally acceptable levels of internal consistency and is therefore considered suitable for further inferential statistical analysis, including correlation and regression analysis. However, the findings should be interpreted with caution, particularly regarding the Negative Operational Impact scale, which demonstrated a relatively lower Cronbach's Alpha value.

In addition, the study did not employ exploratory or confirmatory factor analysis procedures to further examine construct validity, which should be acknowledged as a methodological limitation of the study. Future research using larger samples may apply more advanced validation techniques in order to further strengthen construct measurement and scale validation.

5.4 Correlation analysis

Correlation analysis was conducted in order to examine the relationships among the principal variables included in the conceptual framework of the study. Pearson's correlation coefficient (Pearson's r) was used to evaluate the strength and direction of the relationships between geopolitical risk and trade restrictions, supply chain disruptions, resilience-oriented strategies, risk management capabilities, negative operational impact and operational resilience and firm performance. The correlation analysis additionally provides preliminary evidence regarding the proposed research hypotheses (H1–H4) presented in the conceptual framework of the study.

According to the literature, positive correlation coefficients indicate positive relationships between variables, whereas negative coefficients indicate inverse relationships. In addition, statistically significant correlations suggest potentially meaningful associations between the examined constructs (Field, 2018).

Table 17: Pearson correlation matrix of the main research variables

		Correlations					
		Geopolitical Risk and Trade Restrictions	Supply Chain Disruptions	Resilience-Oriented Strategies	Risk Management Capabilities	Negative Operational Impact	Operational Resilience and Firm Performance
Geopolitical Risk and Trade Restrictions	Pearson Correlation	1	,346**	,067	,204	,439**	,019
	Sig. (2-tailed)		,001	,534	,057	,000	,864
	N	88	88	88	88	88	88
Supply Chain Disruptions	Pearson Correlation	,346**	1	,104	,134	,568**	-,217*
	Sig. (2-tailed)	,001		,334	,213	,000	,042
	N	88	88	88	88	88	88
Resilience-Oriented Strategies	Pearson Correlation	,067	,104	1	,529**	,114	,482**
	Sig. (2-tailed)	,534	,334		,000	,292	,000
	N	88	88	88	88	88	88
Risk Management Capabilities	Pearson Correlation	,204	,134	,529**	1	,085	,549**
	Sig. (2-tailed)	,057	,213	,000		,430	,000
	N	88	88	88	88	88	88
Negative Operational Impact	Pearson Correlation	,439**	,568**	,114	,085	1	-,181
	Sig. (2-tailed)	,000	,000	,292	,430		,092
	N	88	88	88	88	88	88
Operational Resilience and Firm Performance	Pearson Correlation	,019	-,217*	,482**	,549**	-,181	1
	Sig. (2-tailed)	,864	,042	,000	,000	,092	
	N	88	88	88	88	88	88

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The findings presented in *Table 17* indicate several statistically significant relationships among the principal research variables. More specifically, Geopolitical Risk and Trade Restrictions demonstrated a statistically significant positive correlation with Supply Chain Disruptions ($r = 0.346$, $p = 0.001$), indicating that increased geopolitical

instability and trade-related uncertainty are associated with higher levels of supply chain-related disruptions. This finding provides preliminary support for Hypothesis H1.

Similarly, Geopolitical Risk and Trade Restrictions demonstrated a statistically significant positive correlation with Negative Operational Impact ($r = 0.439$, $p < 0.001$), suggesting that increased geopolitical instability is associated with stronger negative effects on operational efficiency and firm profitability.

Supply Chain Disruptions also demonstrated a statistically significant positive correlation with Negative Operational Impact ($r = 0.568$, $p < 0.001$), indicating that firms experiencing higher levels of supply chain instability also report greater operational and financial difficulties. In contrast, Supply Chain Disruptions demonstrated a weak negative correlation with Operational Resilience and Firm Performance ($r = -0.217$, $p = 0.042$), suggesting a weak inverse association between operational disruptions and perceived organizational resilience and operational performance. This finding provides preliminary support for Hypothesis H2.

Resilience-Oriented Strategies demonstrated a statistically significant positive correlation with Operational Resilience and Firm Performance ($r = 0.482$, $p < 0.001$). This finding suggests that firms adopting resilience-oriented practices, such as supplier diversification, inventory buffering and alternative sourcing strategies, tend to report higher levels of operational preparedness and organizational adaptability. Therefore, the findings provide preliminary support for Hypothesis H3.

Similarly, Risk Management Capabilities demonstrated a moderately strong positive correlation with Operational Resilience and Firm Performance ($r = 0.549$, $p < 0.001$), indicating that firms demonstrating stronger contingency planning and monitoring practices also reported higher levels of operational resilience and organizational preparedness under conditions of geopolitical instability. This finding provides preliminary support for Hypothesis H4.

In addition, Resilience-Oriented Strategies and Risk Management Capabilities demonstrated a moderately strong positive correlation with each other ($r = 0.529$, $p < 0.001$), suggesting that firms adopting resilience-oriented operational strategies also tend to develop more systematic risk management practices.

Taken together, the correlation analysis indicates statistically significant associations among the principal constructs of the study and suggests the potential importance of resilience-oriented strategies and risk management capabilities in supporting organizational resilience and operational continuity within the agricultural and livestock supplies sector in Greece.

5.5 Regression analysis

Regression analysis was conducted in order to further examine the statistical relationships among the principal variables included in the conceptual framework of the study and to empirically test the proposed research hypotheses. More specifically, separate simple linear regression analyses were employed in order to examine whether statistically significant relationships exist between geopolitical risk, supply chain disruptions, resilience-oriented strategies, risk management capabilities and operational resilience and firm performance.

Regression analysis is considered an appropriate statistical technique for examining associations between independent and dependent variables and for evaluating the explanatory contribution of specific organizational and operational factors to firm-level outcomes (Field, 2018). The analysis additionally allows a more robust examination of the proposed research hypotheses beyond simple correlational relationships.

The regression models developed in the present study were aligned with the conceptual framework and hypotheses presented in Chapter 2. More specifically, separate regression analyses were conducted in order to examine:

- the relationship between geopolitical risk and supply chain disruptions (H1),
- the relationship between supply chain disruptions and operational resilience and firm performance (H2),
- the relationship between resilience-oriented strategies and operational resilience and firm performance (H3),
- and the relationship between risk management capabilities and operational resilience and firm performance (H4).

The following sections present the results of the regression analyses conducted for each research hypothesis, including the regression coefficients, significance levels and explanatory power of the models.

5.5.1 Regression analysis for H1

In order to examine Hypothesis H1, a simple linear regression analysis was conducted with Geopolitical Risk and Trade Restrictions as the independent variable and Supply Chain Disruptions as the dependent variable. The purpose of the analysis was to examine whether increased geopolitical instability and trade-related uncertainty are statistically associated with higher levels of supply chain disruptions experienced by firms operating within the agricultural and livestock supplies sector in Greece.

Table 18: Regression analysis for H1

Model	R	R ²	Adjusted R ²	Std. Error	F	Sig.
H1 Regression Model	0.346	0.120	0.109	0.48565	11.698	0.001

The findings presented in *Table 18* indicate that the regression model was statistically significant ($F = 11.698$, $p = 0.001$). The results demonstrate that Geopolitical Risk and Trade Restrictions were significantly associated with Supply Chain Disruptions among participating firms.

More specifically, the regression model produced a multiple correlation coefficient of $R = 0.346$, indicating a positive relationship between geopolitical instability and supply chain disruptions. In addition, the model explained approximately 12.0% of the variance in Supply Chain Disruptions ($R^2 = 0.120$), suggesting that geopolitical and trade-related uncertainty appears statistically associated with supply chain disruptions within the sector.

The regression coefficient analysis further showed that Geopolitical Risk and Trade Restrictions demonstrated a positive statistical association with Supply Chain Disruptions ($\beta = 0.346$, $t = 3.420$, $p = 0.001$). The positive direction of the relationship indicates that increased geopolitical instability, trade restrictions and transportation

uncertainty are associated with higher levels of delivery delays, procurement uncertainty, inventory management difficulties and broader operational disruptions.

Taken together, the regression findings provide additional statistical evidence consistent with Hypothesis H1, which proposed that geopolitical risk and trade restrictions would be positively related to supply chain disruptions experienced by firms.

5.5.2 Regression analysis for H2

In order to examine Hypothesis H2, a linear regression analysis was conducted with Supply Chain Disruptions as the independent variable and Operational Resilience and Firm Performance as the dependent variable. The purpose of the analysis was to examine whether increased supply chain disruptions are associated with lower levels of operational resilience and firm performance among firms operating within the agricultural and livestock supplies sector in Greece.

Table 19: Regression analysis for H2

Model	R	R ²	Adjusted R ²	Std. Error	F	Sig.
H2 Regression Model	0.217	0.047	0.036	0.59079	4.243	0.042

The findings presented in *Table 19* indicate that the regression model was statistically significant ($F = 4.243$, $p = 0.042$). Supply Chain Disruptions demonstrated a statistically significant negative association with Operational Resilience and Firm Performance among participating firms.

More specifically, the regression model produced a multiple correlation coefficient of $R = 0.217$, indicating a relatively weak negative relationship between supply chain disruptions and operational resilience and firm performance. In addition, the model explained approximately 4.7% of the variance in Operational Resilience and Firm Performance ($R^2 = 0.047$), suggesting relatively limited explanatory power.

The regression coefficient analysis further indicated that higher levels of delivery delays, procurement uncertainty, inventory management difficulties and broader supply

chain instability were associated with lower levels of operational resilience, preparedness and perceived organizational performance ($\beta = -0.217$, $t = -2.060$, $p = 0.042$).

Although the relationship was statistically significant, the relatively low explanatory power of the model suggests that supply chain disruptions alone may not sufficiently explain variations in operational resilience and firm performance. Additional organizational, financial and market-related factors may also influence firm outcomes within the sector.

Consequently, the findings provide only partial and cautious empirical support for Hypothesis H2.

5.5.3 Regression analysis for H3

In order to examine Hypothesis H3, a linear regression analysis was conducted with Resilience-Oriented Strategies as the independent variable and Operational Resilience and Firm Performance as the dependent variable. The purpose of the analysis was to examine whether the adoption of resilience-oriented strategies is associated with higher levels of operational resilience and firm performance among firms operating within the agricultural and livestock supplies sector in Greece.

Table 20: Regression analysis for H3

Model	R	R ²	Adjusted R ²	Std. Error	F	Sig.
H3 Regression Model	0.482	0.233	0.224	0.53019	26.054	<0.001

The findings presented in *Table 20* indicate that the regression model was statistically significant ($F = 26.054$, $p < 0.001$). The results demonstrate that Resilience-Oriented Strategies were significantly associated with Operational Resilience and Firm Performance among participating firms.

More specifically, the regression model produced a multiple correlation coefficient of $R = 0.482$, indicating a moderate positive relationship between resilience-oriented

strategies and operational resilience and firm performance. In addition, the model explained approximately 23.3% of the variance in Operational Resilience and Firm Performance ($R^2 = 0.233$), suggesting that resilience-oriented strategies appeared associated with organizational adaptability and operational continuity within the sector.

The regression coefficient analysis further showed that Resilience-Oriented Strategies demonstrated a positive statistical association with Operational Resilience and Firm Performance ($\beta = 0.482$, $t = 5.104$, $p < 0.001$). The positive direction of the relationship indicates that firms adopting practices such as supplier diversification, alternative sourcing strategies and inventory buffering tend to report higher levels of operational preparedness, supply continuity and organizational resilience under conditions of geopolitical instability.

Taken together, the findings provide additional evidence consistent with Hypothesis H3, which proposed that the adoption of resilience-oriented strategies would be positively related to higher levels of operational resilience and improved firm performance.

5.5.4 Regression analysis for H4

In order to examine Hypothesis H4, a linear regression analysis was conducted with Risk Management Capabilities as the independent variable and Operational Resilience and Firm Performance as the dependent variable. The purpose of the analysis was to examine whether stronger risk management capabilities are associated with higher levels of operational resilience and firm performance among firms operating within the agricultural and livestock supplies sector in Greece.

Table 21: Regression analysis for H4

Model	R	R ²	Adjusted R ²	Std. Error	F	Sig.
H4 Regression Model	0.549	0.301	0.293	0.50596	37.041	<0.001

The findings presented in *Table 21* indicate that the regression model was statistically significant ($F = 37.041$, $p < 0.001$). The results demonstrate that Risk Management Capabilities were significantly associated with Operational Resilience and Firm Performance among participating firms.

More specifically, the regression model produced a multiple correlation coefficient of $R = 0.549$, indicating a moderately strong positive relationship between risk management capabilities and operational resilience and firm performance. In addition, the model explained approximately 30.1% of the variance in Operational Resilience and Firm Performance ($R^2 = 0.301$), suggesting that risk management capabilities appear positively associated with organizational preparedness, adaptability and operational continuity within the sector.

The regression coefficient analysis further showed that Risk Management Capabilities demonstrated a positive statistical association with Operational Resilience and Firm Performance ($\beta = 0.549$, $t = 6.086$, $p < 0.001$). The positive direction of the relationship indicates that firms with stronger contingency planning, geopolitical monitoring mechanisms, digital support systems and broader risk management practices tend to report higher levels of operational preparedness and organizational resilience under conditions of geopolitical instability and supply chain uncertainty.

Taken together, the findings provide additional statistical evidence consistent with Hypothesis H4, which proposed that risk management capabilities would be positively related to operational resilience and perceived firm performance under conditions of geopolitical instability.

Chapter 6: Discussion

6.1 Introduction

This chapter discusses and interprets the empirical findings presented in Chapter 5 in relation to the existing literature, the conceptual framework of the study, and the proposed research hypotheses. More specifically, the discussion focuses on how firms operating within the agricultural and livestock supplies sector in Greece perceive and experience geopolitical instability, trade restrictions and supply chain disruptions, as well as the strategic responses adopted in order to maintain operational continuity and organizational resilience.

The findings of the study provide important empirical evidence regarding the growing operational and strategic challenges generated by geopolitical instability within highly import-dependent sectors. The results indicate that geopolitical tensions, trade restrictions, transportation disruptions and sourcing uncertainty constitute major pressures affecting procurement activities, supply chain predictability, operational efficiency and firm performance. These findings are generally consistent with the existing literature emphasizing that geopolitical instability has increasingly become a structural factor influencing international business operations and global supply chain management (Ivanov & Dolgui, 2020; Caldara & Iacoviello, 2022).

At the same time, the empirical findings demonstrate that firms increasingly adopt resilience-oriented strategies and risk management practices in response to geopolitical uncertainty and supply chain instability. Practices such as supplier diversification, inventory buffering, contingency planning and supply chain monitoring were positively associated with higher levels of operational resilience and improved firm performance. These findings support the growing literature suggesting that organizational resilience, strategic flexibility and proactive risk management have become critical capabilities within the contemporary international business environment (Christopher & Peck, 2004; Teece, 2018).

Furthermore, the discussion contributes to the broader theoretical debate regarding the transition from efficiency-oriented supply chain models toward resilience-oriented operational structures. While globalization and lean supply chain systems historically prioritized cost minimization and operational efficiency, increasing geopolitical

fragmentation and international uncertainty have highlighted the limitations and vulnerabilities of highly optimized global supply networks (Ivanov, 2020; IMF, 2023). The findings of the present study suggest that firms operating within vulnerable and import-dependent sectors increasingly prioritize flexibility, supply continuity and operational preparedness alongside traditional efficiency objectives.

The discussion that follows interprets the empirical findings through the lens of the proposed conceptual framework and existing literature, focusing on the operational consequences of geopolitical instability and the strategic responses adopted by firms operating within highly import-dependent environments.

6.2 Geopolitical risk and supply chain vulnerability

The empirical analysis revealed that geopolitical instability and trade-related uncertainty were positively associated with supply chain instability within the agricultural and livestock supplies sector in Greece. The positive relationship identified between geopolitical risk and supply chain disruptions confirms that firms operating within highly import-dependent environments are increasingly exposed to supply chain instability generated by external geopolitical developments. In this respect, Hypothesis H1 received empirical support.

This finding aligns with the broader literature emphasizing that geopolitical tensions, sanctions, tariffs and transportation disruptions increasingly function as major destabilizing forces within international supply chains (Ivanov & Dolgui, 2020; Caldara & Iacoviello, 2022). Contemporary global supply networks are highly interconnected and geographically dispersed, meaning that political instability in one region may rapidly influence sourcing conditions, logistics operations and procurement reliability across multiple markets simultaneously.

The findings of the study suggest that firms no longer perceive geopolitical instability as an isolated or temporary disruption. Instead, geopolitical uncertainty appears to be increasingly integrated into firms' everyday operational reality and strategic planning processes. The relatively high levels of agreement associated with trade policy uncertainty, procurement instability and reduced supply chain predictability indicate

that participating firms experience persistent concerns regarding the stability of international sourcing networks and long-term operational continuity.

Particular importance should be given to the role of transportation disruptions and rising procurement costs, which emerged as major operational pressures within the empirical analysis. Recent geopolitical developments, including the Russia–Ukraine conflict, sanctions regimes and broader trade fragmentation, have substantially affected international logistics systems and commodity markets, generating significant increases in freight costs, insurance premiums and delivery delays (IMF, 2023; UNCTAD, 2022). The results of the present study strongly reflect these broader international developments and their direct operational consequences for firms dependent on imported agricultural and livestock inputs.

The Greek agricultural and livestock supplies sector appears especially vulnerable to such disruptions due to its structural dependence on international sourcing networks. Many firms operating within the sector rely heavily on imported feed materials, fertilizers, agrochemicals and specialized agricultural products originating from foreign suppliers. Consequently, disruptions affecting international transportation routes, supplier regions or trade relations may directly influence operational continuity, inventory availability and procurement efficiency. This observation reinforces previous literature suggesting that smaller and highly import-dependent economies are particularly exposed to geopolitical shocks and supply chain volatility (Christopher, 2016).

The results also support the theoretical perspective of the “ripple effect” within supply chain management literature (Ivanov, 2020). According to this approach, disruptions rarely remain isolated at a single operational point; instead, they propagate throughout interconnected supply chain systems, affecting logistics coordination, supplier reliability, inventory management and overall operational stability. The findings of the present study indicate that firms increasingly experience this interconnected vulnerability within the contemporary geopolitical environment.

From a broader strategic perspective, the findings indicate that geopolitical fragmentation and trade-related uncertainty are gradually reshaping strategic priorities within internationally exposed sectors. Supply chain stability, sourcing flexibility and

organizational preparedness appear to be gaining strategic importance alongside traditional efficiency and cost-minimization objectives. This transition reflects a broader transformation within global supply chain management, where resilience and adaptability increasingly emerge as critical organizational capabilities under conditions of prolonged geopolitical uncertainty.

6.3 Operational consequences of supply chain disruptions

The empirical findings showed that supply chain disruptions demonstrated a negative association with operational resilience and firm performance within the agricultural and livestock supplies sector in Greece. The statistical analysis revealed a significant inverse relationship between supply chain disruptions and operational resilience, indicating that firms experiencing higher levels of procurement instability, transportation difficulties and supply uncertainty tend to report lower levels of operational preparedness and organizational adaptability. Consequently, Hypothesis H2 received partial empirical support, although the relatively low explanatory power of the regression model suggests that additional organizational and market-related factors may also influence operational resilience and firm performance.

The results are closely aligned with previous studies emphasizing that supply chain instability generates substantial operational and financial pressure on firms operating within globally interconnected markets (Hendricks & Singhal, 2005). Disruptions affecting logistics systems, supplier reliability and inventory availability may significantly weaken firms' ability to maintain operational continuity, satisfy customer demand and preserve stable business performance under uncertain market conditions.

A particularly important observation emerging from the empirical analysis concerns the strong operational pressure associated with rising logistics and transportation costs. Participating firms reported high levels of concern regarding freight cost increases, delivery delays and broader transportation instability. This finding reflects the growing vulnerability of international logistics systems to geopolitical conflict, trade fragmentation and disruptions affecting critical transportation routes (UNCTAD, 2022). Within highly import-dependent sectors, transportation instability may rapidly generate

cascading operational consequences extending beyond logistics functions and directly affecting procurement planning, inventory management and production continuity.

The analysis additionally suggests that supply chain disruptions increasingly affect broader organizational stability rather than merely generating temporary operational inconvenience. Firms facing higher levels of supply instability appear more exposed to reduced operational efficiency, lower adaptability and increased strategic uncertainty. In this respect, the findings support Christopher and Peck's (2004) argument that operational resilience is strongly dependent on supply chain predictability, coordination and continuity.

Although the relationship between supply chain disruptions and operational resilience was statistically significant, the relatively limited explanatory power of the regression model suggests that operational resilience may additionally depend on broader financial, managerial and organizational capabilities not fully captured in the present study. Consequently, the findings should be interpreted cautiously, particularly given the complexity of organizational resilience within highly uncertain and internationally exposed business environments.

Another important dimension concerns the relationship between supply chain instability and negative operational impact. Increased procurement costs, shortages of imported products and delays in supply deliveries may collectively reduce operational flexibility and intensify financial pressure on firms operating within the sector. Similar patterns have been identified within recent studies examining the consequences of the COVID-19 pandemic and geopolitical conflict on global supply chains, where operational disruptions were associated with inventory shortages, increased costs and declining organizational efficiency (Ivanov, 2020).

The findings are particularly significant within the agricultural and livestock supplies sector due to the time-sensitive and operationally critical nature of agricultural inputs and feed-related products. Unlike sectors where delays may be partially absorbed through operational flexibility, disruptions affecting agricultural inputs may immediately influence production schedules, livestock feeding processes and broader supply continuity throughout the agri-food chain. As a result, firms operating within

this sector appear especially vulnerable to prolonged supply instability and international sourcing disruptions.

At a broader level, the findings indicate that supply chain disruptions increasingly represent a strategic organizational challenge rather than a purely logistical issue. The ability to maintain stable procurement flows, transportation coordination and inventory availability appears closely connected to organizational resilience, operational continuity and long-term competitiveness. Under conditions of persistent geopolitical instability, supply chain stability therefore emerges as a fundamental prerequisite for sustaining effective business operations within internationally exposed and import-dependent sectors.

6.4 Strategic adaptation and resilience-oriented practices

The empirical analysis demonstrated that resilience-oriented strategies are positively associated with operational resilience and firm performance among firms operating within the agricultural and livestock supplies sector in Greece. The positive relationship identified between resilience-oriented strategies and organizational resilience indicates that firms adopting more adaptive sourcing and operational practices appear better positioned to manage external disruptions and maintain operational continuity under conditions of geopolitical instability. Therefore, Hypothesis H3 received empirical support.

The findings suggest that firms increasingly recognize the limitations of highly centralized and efficiency-oriented supply chain models within unstable international environments. Supplier diversification, inventory buffering and the exploration of alternative sourcing regions emerged as key strategic responses aimed at reducing operational vulnerability and improving supply continuity. This observation reflects the broader transformation identified within supply chain management literature, where resilience and flexibility increasingly complement, and in some cases partially replace, traditional cost-minimization priorities (Ivanov & Dolgui, 2020).

Supplier diversification appears to play a critically important role within the sector. Firms relying heavily on a limited number of suppliers or geographically concentrated sourcing regions may become highly exposed to geopolitical instability, transportation

disruptions and regulatory uncertainty. By contrast, firms developing broader supplier networks and more flexible sourcing arrangements appear more capable of maintaining procurement continuity and reducing dependency on high-risk markets. Similar conclusions have been emphasized by Christopher and Peck (2004) and Tang and Tomlin (2008), who argue that diversified sourcing structures enhance organizational resilience by reducing exposure to localized disruptions.

At the same time, the findings indicate that firms increasingly prioritize supplier reliability and operational stability over purely short-term cost advantages. This shift is central to the context of geopolitical fragmentation and prolonged international uncertainty. While globalization historically encouraged lean and highly optimized sourcing structures, the current international environment appears to encourage more cautious and resilience-oriented operational approaches emphasizing flexibility, redundancy and preparedness.

Inventory buffering also emerged as an important adaptation mechanism within the empirical analysis. Maintaining higher inventory levels may provide firms with greater operational security during periods of transportation disruption, procurement instability or shortages of imported products. Although such strategies may increase operational costs and inventory holding expenses, they may simultaneously reduce vulnerability to sudden supply interruptions and improve firms' ability to sustain operational continuity under unstable market conditions (Christopher, 2016).

At the same time, the effectiveness of resilience-oriented practices may vary according to firm size, available financial resources and organizational capabilities. Smaller firms operating under financial and operational constraints may face greater difficulty implementing extensive supplier diversification strategies, maintaining higher inventory levels or investing in alternative sourcing arrangements.

The findings additionally indicate that resilience-oriented practices contribute not only to operational continuity, but also to broader organizational preparedness and long-term strategic adaptability. Firms capable of developing flexible sourcing structures and adaptive operational processes appear better positioned to respond to changing geopolitical conditions and external market instability. In this respect, resilience-oriented strategies increasingly function as long-term strategic investments supporting

organizational sustainability rather than merely temporary defensive responses to isolated disruptions (Ponomarov & Holcomb, 2009).

An important implication emerging from the analysis concerns the growing strategic transition from efficiency-centered supply chain management toward resilience-centered operational thinking. The results suggest that firms operating within vulnerable and internationally exposed sectors increasingly attempt to balance operational efficiency with supply security, sourcing flexibility and strategic adaptability. Under conditions of persistent geopolitical instability, resilience-oriented operational practices therefore appear to constitute an increasingly important source of organizational stability and long-term competitiveness.

6.5 Risk management capabilities and organizational resilience

The empirical findings revealed that risk management capabilities are positively associated with operational resilience and firm performance within the agricultural and livestock supplies sector in Greece. Firms demonstrating stronger contingency planning, monitoring mechanisms and broader risk management practices appeared more capable of maintaining operational continuity and adapting to external disruptions generated by geopolitical instability and supply chain uncertainty. As a result, Hypothesis H4 received empirical support.

The findings reflect the increasing importance of proactive risk management within the contemporary international business environment. In highly interconnected and import-dependent sectors, firms are no longer required merely to react to disruptions after they occur, but increasingly need to anticipate vulnerabilities, continuously monitor external developments and prepare adaptive operational responses in advance. This observation is consistent with the broader literature emphasizing that effective risk management has evolved from a supporting operational activity into a core strategic capability within modern supply chain management (Tang, 2006; Friberg, 2015).

Particular importance appears to be associated with contingency planning and the continuous monitoring of geopolitical developments affecting international supply chains. Firms capable of systematically evaluating geopolitical uncertainty, transportation instability and sourcing risks seem better prepared to maintain

operational stability during periods of disruption. The findings therefore support previous theoretical arguments suggesting that organizational preparedness and strategic flexibility significantly improve firms' ability to absorb external shocks and sustain business continuity under unstable market conditions (Ivanov & Dolgui, 2020).

The positive relationship identified between risk management capabilities and operational resilience also aligns closely with the dynamic capabilities perspective proposed by Teece (2018). According to this theoretical approach, firms capable of sensing environmental changes, adapting operational processes and reconfiguring strategic resources demonstrate higher levels of organizational resilience and long-term competitiveness. Within the context of the present study, firms with stronger monitoring systems and more developed preparedness mechanisms appeared more capable of responding effectively to geopolitical instability and supply chain disruptions.

Another important dimension concerns the growing role of digital support systems and information visibility within supply chain risk management. Real-time monitoring systems, information-sharing mechanisms and broader digital coordination tools may improve firms' ability to identify disruptions earlier, evaluate operational risks and coordinate adaptive responses more effectively across supply chain networks (Quelin & Duhamel, 2003). Although the empirical findings suggest that firms increasingly recognize the strategic importance of such technologies, the comparatively lower agreement associated with digital support systems may additionally indicate that certain firms, particularly SMEs, continue to face financial, technological and organizational limitations regarding the implementation of advanced monitoring infrastructure.

This observation may partly explain why certain firms remain more vulnerable to operational disruption despite recognizing the importance of proactive risk management and supply chain visibility within unstable geopolitical environments.

The findings further suggest that organizational resilience depends not solely on operational adjustments such as supplier diversification or inventory buffering, but also on the existence of broader managerial capabilities supporting strategic adaptation and proactive decision-making. Firms capable of integrating systematic monitoring, preparedness mechanisms and continuous risk evaluation into their operational

structures appear more capable of reducing uncertainty, preserving operational stability and maintaining organizational flexibility under conditions of geopolitical volatility.

From a broader managerial perspective, the results indicate that proactive risk management increasingly functions as a strategic prerequisite for operational sustainability within internationally exposed sectors. As geopolitical instability and supply chain uncertainty become more persistent characteristics of the global business environment, firms capable of developing adaptive organizational structures and systematic risk management mechanisms are likely to achieve higher levels of operational resilience and long-term strategic stability.

6.6 Synthesis of findings

The findings of the present study illustrate the increasingly complex challenges faced by firms operating within highly import-dependent sectors under conditions of geopolitical instability and international supply chain uncertainty. The empirical analysis demonstrated that geopolitical tensions, trade restrictions and broader supply chain disruptions were associated with increase operational pressure affecting procurement activities, logistics coordination, operational continuity and organizational resilience within the agricultural and livestock supplies sector in Greece.

One of the central conclusions emerging from the study is that geopolitical instability is increasingly perceived as a structural characteristic of the contemporary international business environment rather than a temporary or isolated external disturbance. Firms operating within internationally integrated supply chains appear continuously exposed to operational uncertainty associated with transportation disruptions, sourcing instability, rising procurement costs and trade-related fragmentation. This observation reflects broader international developments associated with the restructuring of global trade relations, geopolitical fragmentation and the growing use of protectionist trade policies within international markets (IMF, 2023).

The findings additionally highlight the particular vulnerability of smaller and highly import-dependent economies such as Greece. Firms operating within the agricultural and livestock supplies sector remain strongly dependent on imported agricultural inputs, feed products, fertilizers and internationally sourced raw materials.

Consequently, geopolitical disruptions affecting supplier regions, transportation systems or international trade flows may rapidly generate operational instability throughout the sector. The results therefore reinforce previous theoretical arguments suggesting that global supply chain integration may simultaneously improve operational efficiency while increasing exposure to external geopolitical and logistical shocks (Christopher, 2016).

At the same time, the study revealed a clear strategic transition toward resilience-oriented operational approaches. Firms increasingly adopt supplier diversification, sourcing flexibility, inventory buffering, contingency planning and broader monitoring mechanisms in order to strengthen operational preparedness and reduce vulnerability to supply instability. These findings support the growing academic perspective that resilience and adaptability have become increasingly important strategic priorities within contemporary supply chain management (Ivanov & Dolgui, 2020).

An equally important observation concerns the role of proactive risk management and organizational flexibility in supporting operational resilience. Firms capable of continuously monitoring geopolitical developments, evaluating operational vulnerabilities and adapting sourcing structures appear better positioned to maintain organizational stability and operational continuity under uncertain market conditions. In this respect, the findings closely align with the dynamic capabilities perspective, according to which long-term organizational resilience depends on firms' ability to sense environmental change, reconfigure resources and adapt strategically to evolving external conditions (Teece, 2018).

The empirical results also indicate that contemporary supply chain management increasingly requires a balance between efficiency, resilience and strategic flexibility. While highly optimized global supply chains historically enabled firms to reduce costs and improve productivity, recent geopolitical developments have exposed significant structural vulnerabilities associated with excessive concentration of suppliers, lean inventory systems and dependence on unstable international sourcing networks. As a result, firms appear increasingly willing to accept higher operational costs in exchange for greater supply continuity, operational security and long-term strategic stability.

Nevertheless, the findings should be interpreted with caution due to the cross-sectional nature of the study, the moderate sample size and the use of self-reported questionnaire data collected from a single respondent per firm. These methodological limitations may influence the generalizability of the findings and the interpretation of the statistical relationships identified in the analysis.

Taken together, the findings contribute to the existing literature by providing firm-level empirical evidence regarding how geopolitical instability affects operational decision-making, sourcing structures and organizational resilience within a vulnerable and internationally exposed sector. The findings additionally reinforce the conceptual framework of the study by supporting the interconnected relationships proposed among geopolitical risk, supply chain disruptions, resilience-oriented strategies, risk management capabilities and firm performance within the contemporary global business environment.

Chapter 7: Conclusions

7.1 Conclusions

The present study examined the impact of geopolitical instability, trade restrictions and supply chain disruptions on firms operating within the agricultural and livestock supplies sector in Greece. Particular emphasis was placed on the operational challenges generated by geopolitical uncertainty, as well as on the resilience-oriented strategies and risk management practices adopted by firms in order to maintain operational continuity and organizational resilience.

The empirical findings demonstrated that geopolitical risk and trade-related uncertainty were significantly associated with supply chain operations, procurement activities and broader organizational stability within the sector. Firms participating in the study reported high levels of concern regarding transportation disruptions, sourcing instability, increased procurement costs and reduced supply chain predictability. The findings suggest that firms operating within highly import-dependent sectors are increasingly exposed to operational vulnerability generated by geopolitical developments and international market instability.

The study additionally demonstrated that supply chain disruptions were negatively associated with operational resilience and perceived firm performance. Increased logistics costs, delivery delays, procurement uncertainty and shortages of imported products were associated with greater operational pressure and reduced organizational adaptability. These findings highlight the strategic importance of supply chain stability for maintaining operational continuity and long-term business sustainability within internationally exposed sectors.

At the same time, the findings revealed that resilience-oriented strategies and proactive risk management capabilities were positively associated with organizational resilience and perceived firm performance. Practices such as supplier diversification, inventory buffering, contingency planning, sourcing flexibility and supply chain monitoring were associated with improved preparedness and stronger organizational adaptability under conditions of geopolitical instability.

The study further demonstrated that firms increasingly recognize the importance of balancing operational efficiency with resilience and strategic flexibility. While traditional supply chain models often emphasized cost minimization and lean operational structures, the current geopolitical environment appears to encourage more adaptive and resilience-oriented approaches focused on supply continuity, preparedness and operational security.

The statistical analysis provided empirical support for H1, H3 and H4, while H2 received partial empirical support due to the relatively limited explanatory power of the corresponding regression model. More specifically, geopolitical risk and trade restrictions were positively associated with supply chain disruptions, while supply chain disruptions were negatively associated with operational resilience and firm performance. In contrast, resilience-oriented strategies and risk management capabilities demonstrated positive relationships with organizational resilience and perceived firm performance.

Collectively, the findings suggest that geopolitical instability has become an increasingly important strategic and operational challenge for firms operating within globally interconnected and import-dependent industries. Under conditions of persistent international uncertainty, organizational resilience, adaptive sourcing structures and proactive risk management practices appear to constitute critical factors supporting operational continuity and long-term organizational sustainability.

7.2 Theoretical implications

The findings of the present study contribute to the growing literature examining the relationship between geopolitical instability, supply chain vulnerability and organizational resilience within internationally interconnected business environments. More specifically, the study provides empirical evidence regarding how geopolitical tensions, trade restrictions and supply chain disruptions are associated with operational decision-making and organizational adaptation within a highly import-dependent sector.

An important theoretical contribution of the study concerns the growing recognition of geopolitical instability as a structural determinant of supply chain uncertainty rather

than a temporary external disruption. The findings reinforce recent theoretical perspectives suggesting that geopolitical fragmentation, trade policy uncertainty and international conflict increasingly reshape global supply chain structures and operational priorities (Ivanov & Dolgui, 2020; Caldara & Iacoviello, 2022). In this respect, the study extends existing literature by demonstrating how these dynamics influence firms operating within the agricultural and livestock supplies sector in Greece.

The study additionally contributes to supply chain resilience literature by supporting the argument that resilience-oriented operational practices constitute critical organizational capabilities within unstable international environments. Supplier diversification, sourcing flexibility, inventory buffering and contingency planning were positively associated with organizational resilience and perceived firm performance, reinforcing theoretical approaches emphasizing the strategic importance of flexibility, redundancy and adaptability within supply chain management (Christopher & Peck, 2004).

Another important contribution relates to the dynamic capabilities perspective. The positive relationship identified between risk management capabilities and operational resilience supports the theoretical assumption that firms capable of monitoring environmental changes, evaluating external risks and adapting operational structures are better positioned to maintain long-term organizational stability under conditions of uncertainty (Teece, 2018). The findings therefore strengthen the argument that proactive adaptation and strategic flexibility increasingly function as essential organizational capabilities within volatile international markets.

The study also contributes to the broader discussion concerning the transition from efficiency-oriented toward resilience-oriented supply chain management models. Traditional operational approaches historically emphasized lean inventory systems, supplier concentration and cost minimization. However, the findings indicate that firms increasingly prioritize supply continuity, sourcing flexibility and operational preparedness in response to geopolitical instability and international market volatility. This observation supports recent literature arguing that resilience has become a central strategic dimension of contemporary supply chain management.

In addition, the study enriches the limited empirical literature examining geopolitical risk and organizational resilience within the agricultural and livestock supplies sector. Much of the existing literature focuses on manufacturing, large multinational corporations or global logistics systems, whereas fewer studies examine how smaller and highly import-dependent sectors respond to geopolitical disruption and supply instability. The present findings therefore provide additional empirical insight into the operational realities and strategic responses of firms operating within a particularly vulnerable sector of the Greek economy.

Taken together, the theoretical implications of the study reinforce the importance of integrating geopolitical risk, supply chain resilience and organizational adaptability within contemporary business and management research. The findings suggest that resilience-oriented capabilities and proactive risk management increasingly represent central theoretical dimensions for understanding firm behavior and operational sustainability within uncertain international environments.

7.3 Managerial implications

The findings of the present study generate several important managerial implications for firms operating within highly import-dependent and internationally exposed sectors. The increasing impact of geopolitical instability, trade restrictions and supply chain disruptions highlights the necessity for firms to reconsider traditional operational models that rely heavily on efficiency, supplier concentration and lean inventory structures.

A central managerial implication emerging from the findings relates to supplier diversification and sourcing flexibility. Firms relying excessively on a limited number of suppliers or geographically concentrated sourcing regions appear more vulnerable to geopolitical disruptions, transportation instability and procurement uncertainty. Consequently, managers operating within the agricultural and livestock supplies sector should increasingly prioritize the development of broader supplier networks and alternative sourcing arrangements in order to reduce dependency on high-risk markets and improve supply continuity.

The findings also emphasize the strategic importance of contingency planning and proactive risk management. Firms capable of continuously monitoring geopolitical developments, evaluating operational vulnerabilities and preparing alternative response strategies appear better positioned to maintain organizational stability during periods of uncertainty. In this respect, risk management should no longer be viewed as a purely defensive or reactive process, but rather as a central component of strategic decision-making and long-term operational planning.

Another important implication concerns inventory management practices. Although maintaining higher inventory levels may increase storage and operational costs, the findings suggest that inventory buffering may significantly reduce vulnerability to sudden supply interruptions and transportation disruptions. Managers may therefore need to balance efficiency-oriented inventory policies with broader resilience considerations, particularly in sectors where operational continuity depends heavily on imported products and stable procurement flows.

The study additionally highlights the growing importance of digital monitoring systems and information visibility within supply chain management. Technologies supporting real-time monitoring, supply chain coordination and risk assessment may improve firms' ability to identify disruptions earlier and respond more effectively to operational uncertainty. However, the findings also suggest that smaller firms may face financial and technological limitations regarding the implementation of advanced digital infrastructure. As a result, investments in technological capabilities and digital supply chain visibility may increasingly become important strategic priorities for firms seeking to strengthen organizational resilience.

From a broader strategic perspective, the findings indicate that firms operating within unstable international environments may need to adopt more resilience-oriented operational models emphasizing adaptability, preparedness and flexibility alongside traditional cost-efficiency objectives. Geopolitical instability and international market uncertainty are no longer isolated or temporary phenomena; instead, they increasingly represent persistent characteristics of the global business environment. Under these conditions, organizational resilience appears to function as a critical determinant of long-term competitiveness and operational sustainability.

The findings may also provide useful insights for industry stakeholders and policymakers. Given the strong dependence of the agricultural and livestock supplies sector on imported products and international logistics systems, policies supporting supply chain diversification, transportation stability, digital transformation and organizational preparedness may contribute to strengthening the resilience of strategically important sectors within the Greek economy.

7.4 Limitations of the study

Despite the contributions of the present study, several limitations should be acknowledged when interpreting the findings. These limitations mainly relate to the sampling approach, the sectoral focus of the research, the nature of the collected data and the overall research design.

Firstly, the study focused exclusively on firms operating within the agricultural and livestock supplies sector in Greece. Although this sector represents an important and highly import-dependent component of the Greek economy, the findings may not be directly generalizable to firms operating in other industries or different national contexts. Operational structures, sourcing practices and exposure to geopolitical instability may vary substantially across sectors and countries.

Another limitation concerns the use of non-probability sampling techniques. The study adopted purposive and convenience sampling approaches due to practical limitations associated with access to firms and respondent availability. Although the participating firms possessed relevant managerial experience and operational knowledge, the selected sample cannot fully represent the total population of firms operating within the sector. Consequently, the findings should be interpreted with caution regarding broader statistical generalization.

The study additionally relied on self-reported questionnaire data. As a result, respondents' perceptions and managerial interpretations may have influenced the findings. Subjective evaluation of geopolitical risks, operational disruptions and organizational preparedness may differ according to managerial position, firm size, professional experience and previous exposure to supply chain disruptions. The possibility of response bias and social desirability bias should therefore be taken into

consideration. Moreover, all questionnaire responses were collected from a single respondent per firm using the same measurement instrument and Likert-scale structure. Consequently, the possibility of common method bias cannot be fully excluded despite the use of standardized questionnaire procedures and anonymity measures.

The cross-sectional nature of the study also constitutes an important methodological limitation. Data were collected during a specific time period characterized by ongoing geopolitical uncertainty and international market instability. Consequently, the findings capture organizational perceptions and operational conditions only within that particular context. Changes in geopolitical developments, trade relations or global logistics conditions may influence organizational strategies and operational priorities over time.

In addition, the relatively moderate sample size may limit the complexity of statistical procedures and the broader generalizability of the empirical findings. Although the sample was considered adequate for descriptive and inferential statistical analysis, larger samples could potentially provide stronger statistical power and allow more advanced analytical techniques.

Furthermore, the study did not employ exploratory or confirmatory factor analysis procedures in order to further examine construct validity. Although reliability analysis demonstrated generally acceptable levels of internal consistency, future studies using larger samples may apply more advanced validation techniques in order to strengthen construct measurement and scale validation.

The study also relied primarily on quantitative investigation through structured questionnaires. While this approach enabled systematic statistical analysis, it may not fully capture the deeper organizational experiences, strategic reasoning and managerial decision-making processes associated with geopolitical instability and supply chain disruption. Future studies incorporating qualitative methods may therefore provide a more comprehensive understanding of organizational adaptation and resilience within unstable international business environments.

7.5 Recommendations for future research

The present study provides several directions for future research concerning geopolitical instability, supply chain disruptions and organizational resilience within internationally exposed sectors. Given the increasing complexity of global supply networks and the growing influence of geopolitical uncertainty on business operations, additional empirical investigation is necessary in order to further develop the existing literature and improve understanding of organizational adaptation under unstable market conditions.

An important direction for future research concerns the expansion of the geographical and sectoral scope of analysis. Future studies could examine firms operating in different industries or compare organizations across multiple countries in order to identify similarities and differences in exposure to geopolitical risk, supply chain vulnerability and resilience-oriented practices. Comparative international studies may provide a broader understanding of how economic structure, market size and institutional context influence organizational responses to geopolitical instability.

Future research could also adopt longitudinal research designs in order to examine how organizational strategies and operational priorities evolve over time under changing geopolitical conditions. Since the present study employed a cross-sectional approach, it captured perceptions and operational conditions within a specific time period. Longitudinal studies may therefore provide deeper insight into how firms gradually adapt their sourcing structures, inventory policies and risk management practices in response to prolonged geopolitical uncertainty and supply chain disruption.

Another important direction concerns the use of mixed-methods or qualitative approaches. While quantitative analysis allows the identification of statistical relationships between variables, qualitative methods such as interviews or case studies may provide a more detailed understanding of managerial decision-making, organizational adaptation processes and strategic responses to external disruption. Future qualitative research could therefore explore how managers perceive geopolitical risk and how resilience-oriented strategies are implemented in practice within different organizational environments.

Further investigation may additionally focus on the role of digital technologies, artificial intelligence and data analytics within supply chain resilience and risk management. Emerging technologies associated with predictive analytics, real-time monitoring systems and digital supply chain visibility may increasingly influence organizational preparedness and operational adaptability under conditions of uncertainty. Examining the effectiveness of such technologies could provide important theoretical and managerial insights for future supply chain research.

Future studies could also explore the relationship between geopolitical instability and sustainability-oriented supply chain practices. Environmental sustainability, ESG considerations and resilience-oriented operational strategies are becoming increasingly interconnected within contemporary business environments. Additional research may therefore examine how firms balance sustainability objectives, operational efficiency and resilience requirements under conditions of geopolitical and economic instability.

Finally, future empirical studies using larger samples and more advanced statistical techniques may contribute to strengthening the generalizability and analytical depth of findings related to geopolitical risk and organizational resilience. Expanding the empirical investigation across different organizational contexts and operational environments may further enrich understanding of how firms adapt to the growing complexity and uncertainty of the contemporary international business landscape.

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